



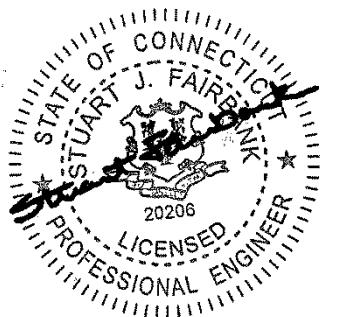
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SINCE 1966

Avery Brook Homes

Septic System Effluent Renovation Analysis

96-100 Stoddards Wharf Road
Ledyard, Connecticut



June 20, 2024

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Overview

The proposed Avery Brook Homes project is an 18 lot, single family residential subdivision submitted to the Ledyard Planning & Zoning Commission for consideration under the Affordable Housing Appeals Act (8-30g). The property is approximately 6.38 acres, located on the North side of Stoddards Wharf Road -CT Route 214. Each lot will be served by a drilled bedrock cased well and subsurface sewage disposal system (SSDS), to be reviewed and approved prior to construction by Ledge Light Health District (LLHD). Conceptual well and SSDS locations are depicted on the subdivision plan prepared by Dieter and Gardner, Inc. and last revised March 25, 2024, which have been approved for subdivision purposes by LLHD based on 3 bedroom homes.

The property is currently undeveloped, with surface cover consisting of partially overgrown agricultural fields with hardwood forest around the perimeter. The general slope of the land is from Northwest to Southeast, the lowest point being along the easterly boundary. We are unable to ascertain original slopes or drainage patterns northerly, easterly or westerly of the site because it appears that a significant volume of earth materials were removed 50 or more years ago, in some places to a depth of approximately 25'. It is likely that the excavation was a sand and gravel operation, since much of the subject site is underlain by sand and gravel.

Soils on the site mapped by the USDA Soil Conservation Service consist primarily of Agawam fine sandy loams and Hinckley gravelly sandy loams, with small areas of other soils mapped around the perimeter. Agawam fine sandy loam is a stratified drift sandy soil, typically exhibiting moderate-high soil permeabilities and deep depth to groundwater. Hinckley gravelly sandy loams are glacial outwash soils with high soil permeabilities and deep depth to groundwater.

The site lies within the public water supply watershed of the City of Groton. The city owns Billings Avery Pond, located to the Northwest of the subject site. Billings Avery Pond is connected to the City of Groton reservoir system by a canal (Stoddards Brook) constructed by the city. This canal diverts water on demand from the pond, which would otherwise discharge to the Thames River via Billings Avery Brook.

Scope of report

The Avery Brook Homes 18 lot Affordable Housing subdivision application is currently being reviewed by the Ledyard Planning & Zoning Commission. In late 2022-early 2023, the Ledyard Inland Wetland Commission requested an effluent renovation analysis of proposed Subsurface Sewage Disposal Systems (SSDS) for what was then proposed as a 26 lot subdivision proposal on 9.21 acres. At that time, three specific renovation parameters evaluated were Nitrogenous compound concentrations, effluent plume travel time and exposure from viruses. The analysis focused on these parameters, but of necessity touched on other aspects of effluent movement and renovation in soil and groundwater. The methodology presented was based on the Connecticut Department of Energy and

Environmental Protection (DEEP) publication "Guidance for Large-Scale on-site wastewater Renovation Systems" dated February 2006. This report did and will refer to this publication as the *Manual*. All single-family residential SSDS on the site are subject to permitting for construction and discharge by the local Health District (Ledge Light Health District) under Connecticut Public Health Code regulations. There are no discharge permits required by DEEP for single-family residential SSDS design and construction on any proposed lot on the site. Evaluating the development wastewater discharges by use of DEEP criteria is intended to provide additional assurance that the proposal is reasonable, beyond meeting all applicable Connecticut Public Health Code regulations.

During the 2022-2023 Public Hearing process, the City of Groton filed as an intervener. The Commission and City asked questions of the applicant regarding various aspects of this report, and requesting additional analysis for constituents not included in the original report.

The questions raised in 2022-2023 and considered here in addition to already evaluated parameters, are as follows:

1. Phosphorous- analysis of potential impacts from Phosphorous compounds in domestic sewage. We have included an analysis in this report, conducted as recommended in the *Manual*.
2. Groundwater contour mapping-additional groundwater monitoring wells were installed by the applicant's surveyor and groundwater depths measured during the spring of 2024. New groundwater contour mapping was generated and is included herein, which clarifies groundwater flow direction and gradient. Bacterial renovation travel time calculations have been revised and updated based on the new groundwater mapping.
3. Residential discharge as used for Nitrogen analysis- in 2023 this report had estimated water use from 3 bedroom homes at 135 gallons per day (GPD), or 45 GPD/bedroom. Water use data from Groton Public Utilities covering the time period July 2023-April 2024, submitted to the hearing record by the Applicant, indicates an average of 145 GPD/ home (or 48 GPD/bedroom assuming an average of 3 bedrooms per home). This data covers all residential properties in the Town of Ledyard served by public water during that time period, with over 15,000 meter readings covering approximately 1,500 residences. We have revised the Nitrogen calculations to correspond with the metered water use.

Soil Testing

Soil testing for subdivision approval was performed by Dieter & Gardner in cooperation with the Ledge Light Health District (LLHD). Subsequent soil testing (Test holes 100-115) was performed under the supervision of Angus McDonald/Gary Sharpe and Assoc. for the purpose of gathering soil samples for permeability determination, and installing groundwater level observation wells. Test hole locations for test hole number 100-115 and 200-209 are depicted on the ground water contour maps in Appendix C of this report. The soil logs for test holes 100-109 can be found in Appendix

D of this report, from which soil samples were gathered for permeability determination. Dieter & Gardner supervised installation of groundwater monitor wells #200-209 in March 2024, which were located and monitored by them. The groundwater elevations recorded are depicted on groundwater contour mapping in Appendix C.

Soil Permeability

The permeability of the soil on the site was determined using core tubes and washed sieve analysis from bag samples that were collected during each of the rounds of testing. The core tubes were analyzed using falling head permeability tests, and the bag samples were examined using grain size analysis. The results from all of the soil tests were compiled into the following tables that show the permeability average and geometric mean.

For reference, the majority of the site is mapped as either Agawam Fine sandy loam or Hinckley gravelly sandy loam by the United States Department of Agriculture, Soil Conservation Service. Udorthent soils mapped by SCS to the North, West and East of the site, on the adjacent property of City of Groton, appear to be the result of historical gravel mining, and are assumed to have been Agawam or Hinckley soils. The permeability range given for Agawam soils is 12-40 ft/day, for Hinckley >40 ft/day.

Test Hole	Description	Depth, in	Tube, in (T)	T-L	L in	H1 in	H2 in	H1-H2 in	T min	H1+H2/2	K ft/min	K ft/day
100	C-Horizon	47	12	9.75	2.25	11.875	8.25	3.625	90	10.1	0.0008	1.1
101	D-Horizon	38	11.75	8.75	3	11.625	11.25	0.375	90	11.4	0.0001	0.1
102	C-Horizon	46	11.875	9	2.875	11.75	5.625	6.125	11	8.7	0.0154	22.1
103	C-Horizon	48	11.75	9.5	2.25	11.625	6.5	5.125	0.33	9.1	0.3213	462.7
104	C-Horizon	48	12	8.75	3.25	11.875	4.875	7	1	8.4	0.2264	326.0
105	C-Horizon	48	12	7.875	4.125	11.875	6.625	5.25	2	9.3	0.0976	140.5
106	C-Horizon	57	11.375	9.25	2.125	11.75	4.5	7.25	1	8.1	0.2	227.5
108	C-Horizon	48	12	9.5	2.5	11.875	6.875	5	1.5	9.4	0.1	106.7
109	C-Horizon	52	12	9.5	2.5	11.875	7.75	4.125	3	9.8	0.0	42.0
Recompacted Samples (1/10/23)												
102*	recompacted	172	12	8.25	3.75	11.87	7.25	4.62	3	9.6	0.0503	72.5
103*	recompacted	168	12	7.12	4.88	11.75	7	4.75	1.5	9.4	0.1374	197.8
111*	recompacted	190	12	6.38	5.62	11.87	7.495	4.375	1.5	9.7	0.1411	203.2
*All three samples recompacted in tubes from bag samples												

NOTE: Samples 100 & 101 removed from analysis as outliers

Overall Arithmetic Mean = 180 ft/day
Overall Geometric Mean = 130 ft/day

In Situ Arithmetic Mean = 190 ft/day
In Situ Geometric Mean = 125 ft/day

Recompacted Arithmetic Mean = 158 ft/day
Recompacted Geometric Mean = 143 ft/day

Table 1 – Falling Head Permeability Calculations

The grain size sieve analysis results can be found in [Appendix B](#).

Test Hole	Split	Depth	Permeability Range				
100	1	42-48"	Dense	2	ft/day		
			Loose	7	ft/day		
100	2	42-48"	Dense	3	ft/day		
			Loose	10	ft/day		
101	1	30-36"	Dense	125	ft/day		
			Loose	374	ft/day		
101	2	30-36"	Dense	184	ft/day		
			Loose	552	ft/day		
102	1	42-48"	Dense	329	ft/day		
			Loose	986	ft/day		
102	2	42-48"	Dense	199	ft/day		
			Loose	596	ft/day		
102	1	180-186"	Dense	119	ft/day		
			Loose	356	ft/day		
102	2	180-186"	Dense	123	ft/day		
			Loose	368	ft/day		
103	1	42-48"	Dense	227	ft/day		
			Loose	831	ft/day		
103	2	42-48"	Dense	218	ft/day		
			Loose	655	ft/day		
103	1	165-171"	Dense	242	ft/day		
			Loose	726	ft/day		
103	2	165-171"	Dense	214	ft/day		
			Loose	642	ft/day		
104	1	42-48"	Dense	510	ft/day		
			Loose	1531	ft/day		
104	2	42-48"	Dense	371	ft/day		
			Loose	1114	ft/day		
105	1	42-48"	Dense	130	ft/day		
			Loose	389	ft/day		
105	2	42-48"	Dense	145	ft/day		
			Loose	436	ft/day		
106	1	55-60"	Dense	374	ft/day		
			Loose	1123	ft/day		
106	2	55-60"	Dense	258	ft/day		
			Loose	775	ft/day		
108	1	46-50"	Dense	162	ft/day		
			Loose	485	ft/day		
108	2	46-50"	Dense	155	ft/day		
			Loose	465	ft/day		
109	1	46-52"	Dense	260	ft/day		
			Loose	779	ft/day		
109	2	46-52"	Dense	196	ft/day		
			Loose	588	ft/day		
Overall Arithmetic Mean				417	ft/day		
Overall Geometric Mean				244	ft/day		
Dense Arithmetic Mean				207	ft/day		
Dense Geometric Mean				139	ft/day		
Loose Arithmetic Mean				627	ft/day		
Loose Geometric Mean				427	ft/day		

Table 2 – Washed Sieve Analysis Summary

For the purposes of effluent renovation calculations, core tube values will be utilized because they represent more closely in-situ soil conditions. In reviewing the various

average values of core tube permeabilities and grain size permeability estimates, there is a close correlation between the core tube values and the dense grain size analysis (dense soil values most closely represent in-situ soil conditions). This provides a cross-check to insure that the values utilized in the analysis are reasonable.

Ground Water Monitoring and Ground Water Contours

The groundwater observation wells #100-115 were installed on two dates in December, 2022 and January, 2023 and monitored on five dates. Wells # 100-109 and the existing dug well on the property were monitored on December 20th and 27th, 2022 and January 3, 2023. Because some of those wells did not penetrate the groundwater table, wells #110-115 were installed on January 3rd, then all wells were monitored on January 5th and 12th, 2023. Additional monitoring wells #200-209 were installed by Dieter and Gardner in March 2024 and monitored on several dates into May 2024.

Groundwater contours mapped as a result of the groundwater elevations measured in the monitoring wells on those dates indicate that the gradient across the entire site is toward the west-northwest. The updated 2024 groundwater contour maps confirm that groundwater flows primarily in a westerly direction, turning to the north as it approaches Billings Avery Brook.

Based on the 2023 groundwater mapping, it appeared that a groundwater boundary condition exists in the southeast portion of the site as evidenced by warped groundwater contours between wells 100-101 and down gradient wells to the west. Based on the observation of bedrock in test holes in the southerly and easterly portion of the site, we believed it likely that groundwater is perched on bedrock in those areas, resulting in the warping.

In response to questions raised during the 2022-2023 hearing, the applicant installed groundwater monitoring wells 200-209 around the perimeter of the site. Subsequent groundwater monitoring confirmed that groundwater gradients slope into the site from the perimeter, with the gradient reducing in deep sandy soils in the center and northern portion of the site. We note that the highest groundwater conditions observed in any 2023 -2024 monitoring occurred on April 19, 2024, so applicable calculations have been revised based on those observations.

Ground water contour maps and groundwater monitoring measurements can be found in [Appendix C](#) of this report, based on January 5th & 12th, 2023, April 8th, 19th, and May 2nd, 2024 monitoring.

Hydraulic Gradients

The hydraulic gradient of the water table across the site was determined using the ground water contour maps. The gradient on various monitoring dates varies from about 0.4% to 1.3% in down gradient (northwest) areas of the site. Because this report is concerned with potential impacts to Billings Avery Pond, the groundwater gradient

under lots closest to the pond was selected. It is the area of lots 13, 15, & 17 where the groundwater gradient varies from 0.4-1.3% depending on the date of the monitoring. Utilizing the highest gradients on site will yield the most conservative values for travel time. Travel time is determined because the *Manual* requires a minimum travel time of 21 days to a point of concern, the objective being to provide time for bacteria in SSDS effluent to die. The 21 day travel time is the standard DEEP model used to estimate bacterial die off, so we are presenting it here keeping in mind that the closest SSDS to Billings Avery Pond is more than 200' away (double the distance required by the Connecticut Public Health Code). In this report, we are considering Billings Avery Pond, and tributaries, as the point of concern. The *Manual* suggests that up to a 56 day travel time may be appropriate to a public water supply, however, the DEEP models were developed for DEEP permitting of large septic systems of over 5,000 GPD design flow (DEEP regulatory authority is now 7,500 GPD design flow and above). The Connecticut Public Health Code has regulatory authority over SSDS design in this development, and therefore the local Health District reviews and approves septic system design and installation. For small septic systems, such as are proposed by Avery Brook Homes, LLC, the Connecticut Public Health Code requires a 100' separating distance from a Public Water Supply Reservoir. For the following reasons we believe the 21 day travel time to be sufficient on this site:

- The Connecticut Public Health Code requires a 100' separating distance between a small SSDS and a Public Water Supply Reservoir. The 21 day travel time distance demonstrates a distance based on site specific conditions rather than a 100' cookbook distance. All proposed SSDS meet both the 100' separating distance and the 21 day travel time distance.
- The DEEP methodology presented in the *Manual* is intended for use on SSDS design for large discharges regulated by DEEP (currently defined as over 7,500 GPD). As such, a large SSDS would be in a central location where the discharge would be concentrated. This site has numerous small SSDS dispersed throughout the 18 proposed lots, so most SSDS far exceed any minimum standards for travel time to the reservoir.
- Note that three of the existing four building lots owned by Avery Brook Homes could potentially have an SSDS installed as close or closer to the Reservoir or its tributaries than are proposed in the current application.

Unsaturated Soil Thickness

The observed unsaturated soil thickness of the soil horizon was estimated by comparing the calculated ground water contours to the ground surface contours and test hole logs. With the exception of lots 1, 2, 7 & 9 the unsaturated soil thickness exceeds 10 feet somewhere on the lot. Most of the remaining lots on the site enjoy exceptionally deep, well drained soils with a water table as deep as 25' below grade in the central and westerly portion of the site. These deep unsaturated soils provide considerably more separation distance than recommended by the *Manual* between the bottom of leachfields and the mounded water table. (mounded water table calculated at 1.8', see mound calculation in Travel Time Analysis) The purpose of the separation, recommended at 3', is to insure the removal of viruses from the effluent prior to it

contacting groundwater. The deep soils provide adequate depth to groundwater from the bottom of the leachfields to meet or exceed the recommended separation.

The groundwater monitoring results can be found in [Appendix C](#) of this report. Test hole logs can be found in [Appendix D](#) of this Report.

Leaching Field Sizing and Type

The proposed septic tank/leaching systems (SSDS) for each lot were sized by Dieter and Gardner for three bedroom houses based on percolation rates as described in the *Connecticut Public Health Code, On-site Sewage Disposal Regulations and Technical Standards for Subsurface Sewage Disposal Systems*.

The leachfields proposed consist of Geomatrix GST 6236. The Geomatrix GST products consist of a crushed stone core with alternating fingers of crushed stone and ASTM C-33 sand extending horizontally for a total unit width of 5.17'.

This report is concerned with the renovation of wastewater within and after it leaves the leachfield. The leachfield type may affect the quality of effluent treatment in the biomat at the stone/soil interface, as well as in the select fill directly below the crushed stone leachfield. (See Massachusetts Alternative Septic System Test Center report on Geomatrix GST products in [Appendix E](#) and discussion page 21.)

Effluent Travel Time to Billings Avery Pond

The equation $V=Ki/n$ can be utilized to determine the velocity of the effluent plume down gradient of the leachfield. The objective of this calculation is to determine the elapsed time between the discharge of effluent from the leachfield and its arrival at any specified point of concern (POC). For purposes of this analysis, the POC is the nearest down gradient point of the Reservoir or its tributaries. The minimum travel time recommended by the *Manual*, and normally required by DEEP, is 21 days. The 21 day minimum is intended to provide time to remove pathogenic bacteria in the effluent to acceptable levels. It should again be noted that on a site with sandy soils such as this development, the 21 day travel time distance far exceeds the requirements of the Connecticut Public Health Code Technical Standards for a septic system serving a single family dwelling to the Reservoir: i.e. 100' between any component of the septic system and the Reservoir.

V = effluent plume movement in groundwater, ft/day

K = Soil permeability as determined by sample analysis, ft/day

i = hydraulic gradient, ft/ft

n = effective porosity, dimensionless

For the travel time analysis we have utilized the following values:

$K = 180$ ft/day. This value represents the arithmetic mean of permeability core tube values, minus very low outliers. Removing the outliers increases the permeability, providing a more conservative analysis.

$i = .013$ (1.3%) Maximum value in January, 2023 monitoring (Example **Figure 1a & 1b**)

$i = .010$ (1.0%) Average value in April, 2024 monitoring (**Figure 1b**)

$n = .25$ (value from *Manual*)

Based on the groundwater contours mapped for April 8, 2024, it appears that the gradient increases closer to the wetland areas. The average gradient from the leachfield on lot #16 to the nearest downgradient point at the edge of wetlands would be $2.7'/270' = 1\%$. For a comparison of travel times from SSDS on Lots 16, 17 and 18 to Billings Avery Reservoir and its tributaries, on groundwater monitoring dates January 12, 2013 and April 8, 2024 mapping, we demonstrate travel times 1.3% and 1.0% hydraulic gradients respectively because they are conservative values representing conditions during differing groundwater levels.

Calculated horizontal plume velocity in the groundwater at $i = 1.3\%$

$$V = (180 \cdot 0.013) / 0.25 = 9.4 \text{ ft/day}$$

21 day travel time distance = $197'$

Calculated horizontal plume velocity in the groundwater at $i = 1.0\%$

$$V = (180 \cdot 0.010) / 0.25 = 7.2 \text{ ft/day}$$

21 day travel time distance = $151'$



3 Bedroom House	450	gal/day	60	ft ³ /day
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Hydraulic Conductivity (K)	130	ft/day	(Overall Geometric Mean of core tubes)
Hydraulic Gradient (i)	1.3%		(TH 114-112, 1/12/22) 1.8'/140'
Leaching Bed Length	20	ft	
Leaching Bed Width	5.17	ft	

Cross-Sectional Area A=Q/ki	36	ft ²	Mound height = 36'/20' = 1.8'
Area of Proposed Leaching Bed	103.4	ft ²	

21 Day Bacteria Travel Time

$$V = \frac{Ki}{n}$$

Hydraulic Conductivity (K)	180	ft/day	(Overall Arithmetic Mean of core tubes)
Hydraulic Gradient (i)	1.3%		
Porosity (n)	0.25		(Effective Porosity of Sand per Manual)

Velocity (V)	9.36	ft/day
21 Travel Time (T ₂₁)	196.56	ft

Figure 1a – Example of Hydraulic Analysis and 21 Day Travel Time based on January 12, 2023

Travel times from proposed SSDS serving lots 16, 17 and 18 were calculated since they are the closest to Billings Avery Reservoir. Travel times vary based on fluctuating water table observations. The most complete groundwater contour coverage was obtained in spring 2024, at which time groundwater levels were higher, but gradients were lower than during the January 2023 observations. We have included estimates of travel times for both groundwater observation periods to provide a range of estimated travel times for comparison. (Max GW = April 8, 2024 mapping, Min GW = January 12, 2023 mapping) All estimated travel times from those SSDS proposed closest to Billings Avery Reservoir and tributaries exceed 21 days travel time. SSDS proposed at greater distance will have greater travel times to the same points.

Lot Number	Distance to Billings Avery Reservoir and/or tributaries	Travel time Max GW (Velocity = 7.2 ft/day)	Travel time Min GW (Velocity = 9.4 ft/day)
16	270 ft	38 days	29 days
17	343 ft	48 days	36 days
18	352 ft	49 days	37 days

Figure 1b – Travel Times to Nearest Point of Billings Avery Reservoir or Tributary

In contrast to **Figure 1b**, note that observed hydraulic gradients across much of the site are reduced to 0.4%-.6% (see April 2024 groundwater contour maps) at certain times. At a gradient of 0.4%, the 21 day travel time distance is reduced as follows: Calculated horizontal plume velocity in the groundwater = $V=(180(.004)/.25) = 2.9$ ft/day
21 day travel time distance = 61'

Therefore, the 21 day travel time distance is met at a distance of 61' from the leachfield in those locations, with groundwater conditions as observed on those dates. It is our opinion that actual travel times are greater than those calculated in Figure 1b, but we present Figure 1b as being a conservative estimate.

Mound Calculations and Leachfield Elevation above Groundwater for Virus Removal

In the **Figure 1a** calculations, an estimate of mounded water table under a leachfield is provided. The estimated mound is calculated based on Darcy's Law ($Q = KiA$).

$$Q = \text{discharge, cubic ft/day}$$

$$K = 130 \text{ ft/day}$$

$$i = .013 (1.3\%)$$

$$A = \text{hydraulic window, L} \times \text{H}$$

In the example, the value of K has been reduced to 130 ft/day, corresponding to the Geometric mean of the permeability core tubes. The reduced value provides a conservative estimate of the hydraulics under the leachfield. The Manual recommends a minimum separating distance of 3' above mounded water table, primarily for virus removal. The mounded water table is estimated to be 1.8', which means that the bottom of the leachfields on all lots should be at least 4.8' above the observed water table in their respective location. (3' separation + 1.8' mound height) The depth from the bottom of the leachfields to mounded groundwater exceeds this recommendation, (see separating distances in Phosphorous removal spreadsheets) thereby maximizing virus removal prior to effluent contacting the water table.

Nitrogen Analysis

The objective of this analysis is to determine the concentration of Nitrogenous compounds in the groundwater as a result of the proposed SSDS construction. The

target concentration is 10 mg/l, which is the EPA drinking water standard for Total Nitrogen (TN).

The methodology recommended by DEEP in the *Manual*, has remained essentially the same since the original DEEP (then DEP) design manual was introduced in 1982. Certain updates to input variables have been made, but the basic concept is that the TN concentration is governed by the volume of effluent + infiltrating rainwater.

On most sites where a large central leachfield is proposed, the rainfall contributing area is limited to the area of the site directly up gradient and down gradient from the proposed leachfield. Gradient in this context refers to groundwater gradient, not necessarily surface topography. On the Avery Brook site, residential lots and their corresponding SSDS are spread relatively uniformly around the property. It is our opinion that the entire area of the subject site and 94 Stoddard Wharf Road can be considered as contributing to infiltrated rainfall for dilution. The applicant has proposed development restrictions on the adjacent lot at 94 Stoddard's Wharf Road, providing an easement such that infiltrating groundwater on that site can be considered as part of the dilution calculations for the development. Use of such an easement has been acceptable to DEEP in this situation, since the applicant thus controls the site upon which the easement is proposed. In sum total, the Nitrogen calculations will consider 19, 3-bedroom homes including one 3-bedroom, single family home on 94 Stoddard's Wharf Road.

As part of our review of the site we have recommended that gutter outlets be collected and infiltrated on each lot. A detail of the proposed infiltration structure is depicted on Sheet 7 of the Site Development Plan Set in [Appendix A](#). The applicant has adopted this proposal and incorporated it into the design of the project.

The applicant's road design engineer has incorporated stormwater infiltration basins into the design of the subdivision. Refer to the project drainage report for details on that design. For the purpose of calculating infiltrating stormwater for Nitrogen dilution, we have chosen to use a 70% infiltration rate. This assumes that some stormwater is lost when a major event occurs, beyond the capacity of the infiltration basin.

Figures 2-5 below depict the steps in determining infiltrated rainfall and the resulting TN concentration.

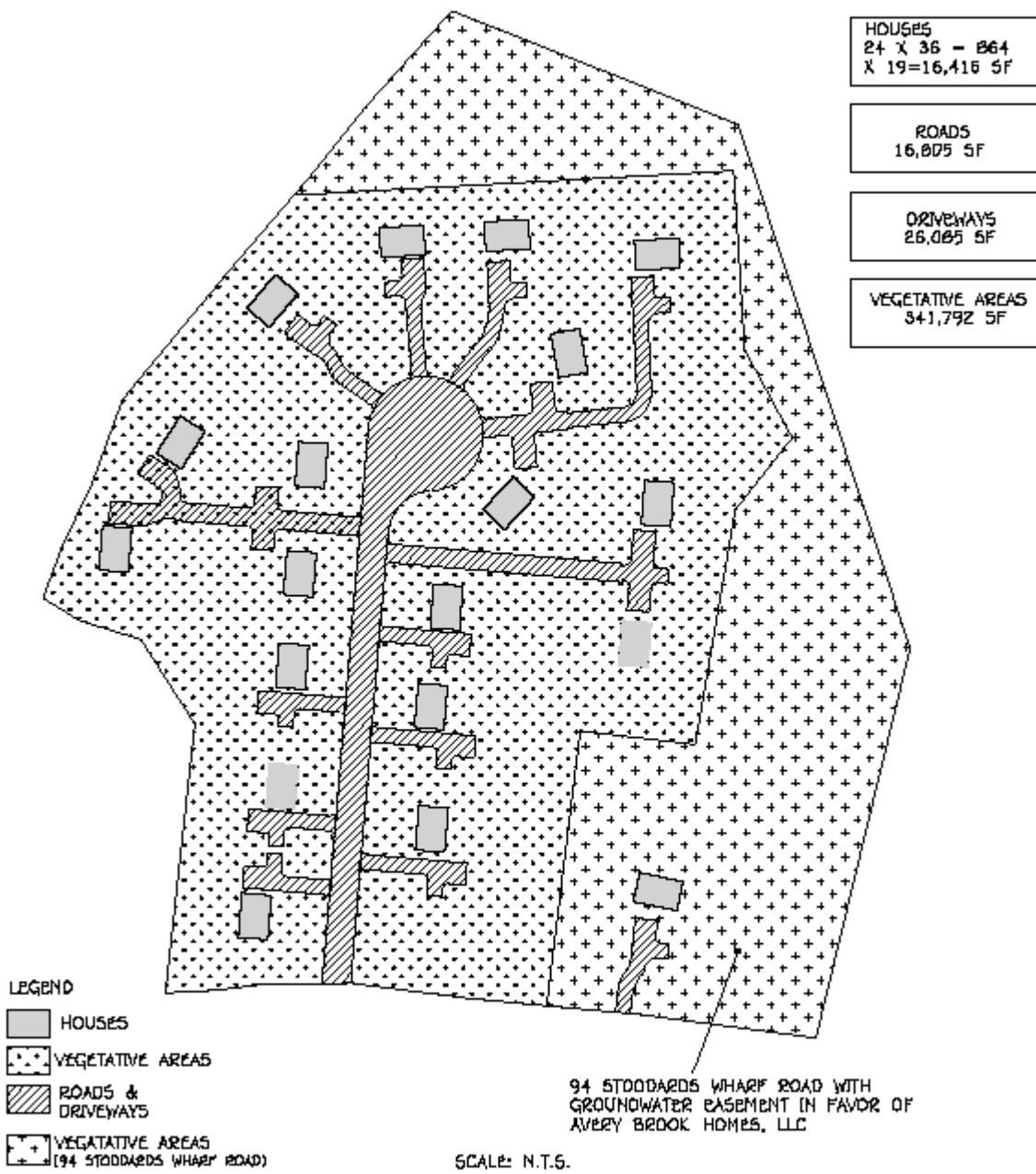


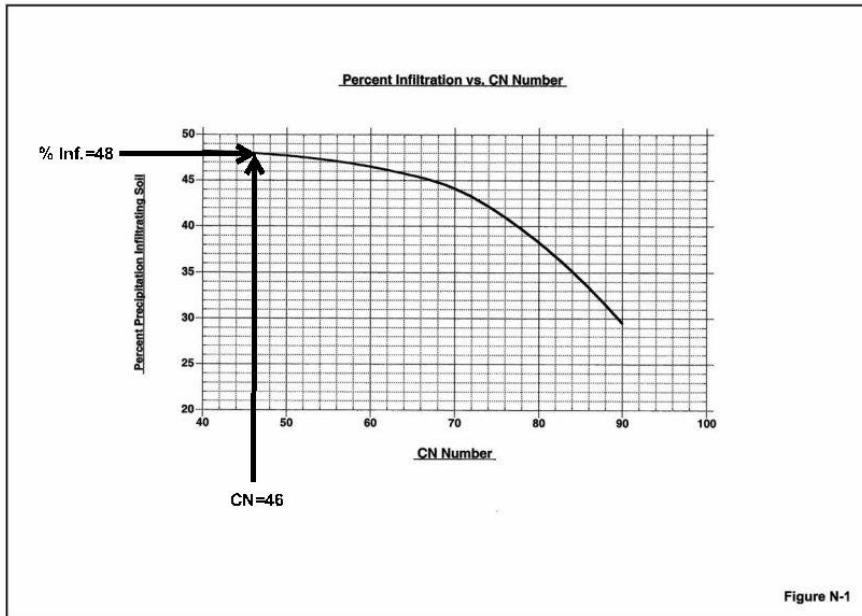
Figure 2 – Site Coverage Map

Figure 2 breaks out the various ground cover features. It is similar to a drainage area map commonly used for runoff calculations as a result of development, as it will be used to calculate a TR-55 composite curve number (CN). We have elected to calculate all vegetated areas at the same CN because doing so is conservative, assigning the wooded areas the same higher CN that lawns are assigned. Note that only rainwater infiltrating (+ effluent) on the subject site is considered for TN dilution.

Avery Brook Homes	Total (ft ²)	Total (Acres)	% of Total Area	Hydraulic Soil Group	Cover Type	Curve Number	Product CN x Area
Roads	16,805	0.39	4.19%	A	Impervious (Paved)	98	37.8
Roofs	16,416	0.38	4.09%	A	Roofs	95	35.8
Vegetated Areas	341,792	7.85	85.21%	A	Grass (Good)	39	306.0
Driveways	26,085	0.60	6.50%	A	Impervious (Gravel)	76	45.5
	401,098	9.21	1.00				425
						$CN \text{ (Weighted)} = \frac{425}{9}$	46

Figure 3 – Average Runoff Coefficient Calculation

Figure 3 calculates the composite CN, note that roof areas and roads have been assigned a CN of 95 even though they will ultimately be infiltrated at a rate of 90% and 70% respectively. This is conservative in that it elevates the CN somewhat, which would typically reduce the infiltrated rainwater volume. The composite CN is calculated as 46.



*Connecticut Department of Environmental Protection
Bureau of Materials Management and Compliance Assurance
Guidance for Design Of Large-Scale On-Site Wastewater
Renovation Systems*

Section X - Subsurface Wastewater Absorption System Design

Figure 4 – Infiltration Rate Determination

Figure 4 is copied from the *Manual*; the graph yields an infiltration rate of 48%. In the calculation of infiltrated rainwater for dilution in **Figure 5** below, the yards and drives are calculated at 48%, the roofs are calculated at 90% (See detail of gutter downspout collection and infiltration structure on plans) and the roads at 70% (see infiltration basin details on subdivision plans).

Lot Size:	401,098 ft ²	9.21 Acres
House Size: 3 beds, 24' x 36'	Number of Bedrooms:	57
<u>CALCULATE NITROGEN LOAD</u>		
Discharge per bedroom/day (DPB) =	48 gal/day	Approximates 145 GPD/home as shown in Ledyard use data 7/2023-4/2024
Design Flow = # Bedrooms x DPB x 3.8 l/g =	10397 L/day	
Raw Total Nitrogen from house	90 mg/L	90 mg/l is concentration submitted to DEEP in most recent 2023 & 2024 applications
Nitrogen Concentration discharge to ground	54 mg/L	
Daily Nitrogen Concentration = Design Flow x Nitrogen Concentration		
Nitrogen Load in Effluent = 561427.2 mg/Day		
<u>CALCULATE DILUTION WATER VOLUME</u>		
Daily Effluent Volume	10396.8 L/day	
Rain to the Site	0.01 ft/Day x Lot Area =	4010.98 ft ³ /day = 114008 L/day
% Precipitation Infiltrating	Area ft ²	
Impervious Area	0.70	16,805
Roofs	0.9	16,416
Grass Area	0.48	341,792
Driveways	0.48	26,085
		401,098
Infiltration Rate =	0.51	
Rain Infiltrating =	57,735 L/Day	
Notes :	CN _{AVE} of Impervious, Grass and Driveways = 46 % Precipitation Infiltrating = 48% taken from <i>Manual Fig. N-1</i> 70% infiltration of road runoff captured in infiltration system 90% infiltration due to use of roof runoff infiltration structure	
<u>TOTAL DILUTION WATER</u>		
Rain Infiltrating + Effluent =	68131 L/Day	
NITROGEN CONCENTRATION =	561427.2 mg/Day	÷ 68131 L/Day = 8.24 mg/L
ALLOWABLE DISCHARGE =	10 mg/L	
DISCHARGE IS ACCEPTABLE		

Figure 5 – Nitrogen Concentration Analysis (48 gpd)

For estimating the TN load to the groundwater in **Figure 5** above, the following discharge and TN concentrations are utilized:

In 2023 this report had estimated water use from 3 bedroom homes at 135 gallons per day (GPD), or 45 GPD/bedroom. Water use data from Groton Public Utilities covering

the time period July 2023-April 2024, submitted to the 2024 Ledyard Planning and Zoning Commission Public Hearing record by the Applicant, indicates an average of 145 GPD/ home (or 48 GPD/bedroom assuming an average of 3 bedrooms per home).

Table 3 - Portion of Groton Public Utilities Metered Water Usage of all Residential Properties on Public Water in Ledyard

This data covers all residential properties in the Town of Ledyard served by public water during that time period, with over 15,000 meter readings covering approximately 1,500 residences. We have revised the Nitrogen calculations to correspond with the metered water use.

Effluent TN concentration: 90 mg/l from house, 54 mg/l to leachfield. Recent applications to DEEP in 2023-2024 prepared by our office have utilized this concentration.

The 54 mg/l figure is a standard 60% of the raw sewage concentration, as used in the *Manual*. In the *Manual*, it is accepted that approximately 40% of the raw sewage TN is removed in the septic tank/leachfield system.

Based on the above, the calculated TN concentration exiting the site is below the EPA drinking water standard of 10 mg/l. There are no water bodies or inland wetlands mapped within the effluent plume on-site.

In **Figure 6** below, we present an analysis of TN based on the methodology used by DEEP prior to 2006. We have included it because at the 2023 Inland Wetland Commission hearing, commissioners questioned whether using 150 gpd/bedroom was the more conservative approach. The following spreadsheet uses a discharge of 150 gpd/bedroom, with a discharge concentration of 40 mg/l (as was standard practice for residential development prior to 2006). Note that the estimated site TN concentration is approximately the same using this method vs. the current method presented in **Figure 5**.

Lot Size:	401,098 ft ²	9.21 Acres																		
House Size: 3 beds, 24' x 36'	Number of Bedrooms:	57																		
<u>CALCULATE NITROGEN LOAD</u>																				
Discharge per bedroom/day (DPB) =	150 gal/day	Standard analysis prior to 2006 Manual																		
Design Flow = # Bedrooms x DPB x 3.8 l/g =	32490 L/day																			
Raw Total Nitrogen from house	40 mg/L																			
Nitrogen Concentration discharge to ground	24 mg/L																			
Daily Nitrogen Concentration = Design Flow x Nitrogen Concentration																				
Nitrogen Load in Effluent =	779760 mg/Day																			
<u>CALCULATE DILUTION WATER VOLUME</u>																				
Daily Effluent Volume	32490 L/day																			
Rain to the Site	0.01 ft/Day x Lot Area =	4010.98 ft ³ /day = 114008 L/day																		
<table border="1"> <thead> <tr> <th colspan="2">% Precipitation Infiltrating</th> <th>Area ft²</th> </tr> </thead> <tbody> <tr> <td>Impervious Area</td> <td>0.70</td> <td>16,805</td> </tr> <tr> <td>Roofs</td> <td>0.9</td> <td>16,416</td> </tr> <tr> <td>Grass Area</td> <td>0.48</td> <td>341,792</td> </tr> <tr> <td>Driveways</td> <td>0.48</td> <td>26,085</td> </tr> <tr> <td></td> <td></td> <td>401,098</td> </tr> </tbody> </table>			% Precipitation Infiltrating		Area ft ²	Impervious Area	0.70	16,805	Roofs	0.9	16,416	Grass Area	0.48	341,792	Driveways	0.48	26,085			401,098
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Infiltration Rate =	0.51																			
Rain Infiltrating =	57,735 L/Day																			
Notes :	CN _{AVE} of Impervious, Grass and Driveways = 46 % Precipitation Infiltrating = 48% taken from Manual Fig. N-1 70% infiltration of road runoff captured by infiltration system 90% infiltration due to use of roof runoff infiltration structure																			
<u>TOTAL DILUTION WATER</u>																				
Rain Infiltrating + Effluent =	90225 L/Day																			
NITROGEN CONCENTRATION =	779760 mg/Day	÷																		
ALLOWABLE DISCHARGE =	10 mg/L	= 8.64 mg/L																		
DISCHARGE IS ACCEPTABLE																				

Figure 6 – Nitrogen Concentration Analysis (Pre-2006 model @ 150 gpd/bedroom)

Massachusetts Alternative Septic System Test Center report on Geomatrix GST

The MASSTC report conducted on Geomatrix GST units is included herein because Geomatrix GST units are proposed as leachfields serving dwellings on the site. It is our opinion that this is a sound engineering choice, in part because GST units are constructed using a specific sand mix as part of the leachfield cross section (ASTM C-33 sand). Installation quality control is managed by the use of forms, rented from the manufacturer for each installation. The advantage to the GST cross section is that the crushed stone-soil interface, where the biological mat forms, is uniform as compared to other crushed stone leachfields where the crushed stone is in direct contact with potentially variable site soils. The biological mat, which is the primary area of the septic system where effluent treatment occurs, responds to differences in soil grain size at the crushed stone-soil interface. The mat will tend to be more or less vigorous as natural soil variations occur across the leachfield, possibly resulting in areas of saturated flow. In contrast, the C-33 sand provides a relatively uniform surface for the mat, resulting in a more evenly distributed discharge through the mat. This maximizes unsaturated percolation of the effluent through the sand, which in turn provides the time and environment for effective nitrification of the effluent, as well as virus removal.

The reason nitrification is important is that in the nitrogen cycle, the preferred nitrogen compound in ground or surface water is nitrate (NO_3). The very basic progression of nitrification in wastewater treatment is as follows:



In general, the primary constituent in the household waste stream is Organic N plus NH_3/NH_4 (ammonia/ammonium respectively), sometimes referred to as Total Kjeldahl Nitrogen (TKN). As treatment progresses through the septic tank/leachfield system, autotrophic bacteria convert (oxidize) the N compounds first to NO_2 and then NO_3 (nitrification). When a leachfield is first installed, it takes some time (3-6 months) for the biological mat to fully develop. During that time, treatment efficiency in the system increases, the results of which can be determined through effluent sampling under the leachfield.

In the MASSTC report (found in [Appendix E](#)), one can visualize the increase in treatment, and accompanying nitrification, by reviewing the raw sample data in the TKN, TN, NO_2 & NO_3 columns. Refer to the data appendices in the MASSTC report for definitions.

As mentioned above the objective in nitrification is to get the value of NO_3 to be as close to 100% of the TN value as possible. Reviewing the sampling data columns starting from day 1, 1-31-2019, through 8-14-2019, there is a progressive increase in nitrification efficiency. By the 8-14-2019 date, the nitrification rate is as high as 94%. This rate may be expected to vary over time as seen in the continuing test data, but demonstrates the potential performance of the GST in nitrification. Additional nitrification can still be expected below the leachfield, for N compounds not yet converted to NO_3 .

Phosphorous Analysis

The objective of this analysis is to calculate the capacity of soils under the proposed leachfield to remove Phosphorous (P) from the wastewater. The DEEP *Manual* outlines a procedure which estimates the capability of unsaturated soil under the leachfield to remove P.

Phosphorous (P), normally in the form of a phosphate (PO_4) is removed by chemically binding with other elements in the soil, primarily Iron, Aluminum and Calcium. The estimated ability of the soil to absorb the P varies by soil type, from typical published low values of 8 milligrams/100 grams soil to high values of 30 milligrams/100 grams soil. For this analysis we have chosen a sorption capacity of 6 milligrams/100 grams soil.

The model considers the unsaturated soil directly under a leachfield, defined as the "unfolded" plan area of the leachfield. Therefore, a 20 foot run of Geomatrix GST6236 would have a plan area of 224 square feet. Effluent percolating downward beneath the leachfield contacts unsaturated soil resulting in adsorption of the P to Fe, Al, and Ca in the soil. The model views the removal capacity on a 6 month regenerative basis, and only considers one half (50%) of the available unsaturated soil mass as being available.

We have prepared spreadsheets for each lot which estimate the P sorption capacity on that lot, which can be found in [Appendix F](#) of this report. The spreadsheets utilize a depth to seasonal high water table based on April 8, 2024 monitoring, a 36" deep leachfield, one foot of ground cover and a mounded water table of 1.8' to estimate unsaturated soil conditions beneath the respective leachfields.

The spreadsheets depict the Geomatrix GST 6236 leachfield length necessary to meet or exceed the estimated 6 month P sorption capacity on that lot. The subdivision plan depicts conceptual leachfields of 20 linear feet in length. We recommend that when final SSDS design is submitted to Ledge Light Health District, as required in their subdivision approval letter of May 22, 2024, that the designs provide the following minimum length GST6236 leachfield (or equivalent unfolded area based on leachfield type if an alternate leachfield is used):

	Lot #	Recommended length GST 6236 for Phosphorous removal (FT)
	1	30
	2	40
	3	20
	4	30
	5	20
	6	22
	7	20
	8	20
	9	20
	10	30
	11	20
	12	25
	13	20
	14	20
	15	20
	16	24
	17	20
	18	20

Table 4 – Recommended System Lengths

Conclusion

It is our opinion that the development of the proposed 18 single family, 3 bedroom homes, utilizing onsite septic systems, is reasonable and will not adversely impact groundwater or surface water on or adjacent to the site, based upon the pollutant renovation analysis conducted in this study. In particular, and for the reasons stated herein, it is our opinion that there is sufficient travel time between the SSDS proposed on the site and the nearest hydraulically down gradient point of Billing Avery Reservoir or its tributaries to remove bacteria based upon the guidance contained in the *Manual*, and there is sufficient dilution available based on the project design to reduce total nitrogen concentration from the site to a level which meets the standard for drinking water prior to encountering those same points. Vertical separation above the mounded groundwater exceeds the recommended separation in the *Manual*, and should therefore provide virus removal to the standards described therein. The Geomatrix GST leachfields proposed on the subdivision plan are effective at nitrifying TN in the effluent, converting a high percentage of the TN to NO₃ prior to effluent leaving the leachfield package. Sufficient unsaturated soil beneath the leachfields is provided to permit adsorption of Phosphorous in accordance with DEEP models.



ANGUS McDONALD
GARY SHARPE
& ASSOCIATES, INC.

SINCE 1966

Appendices

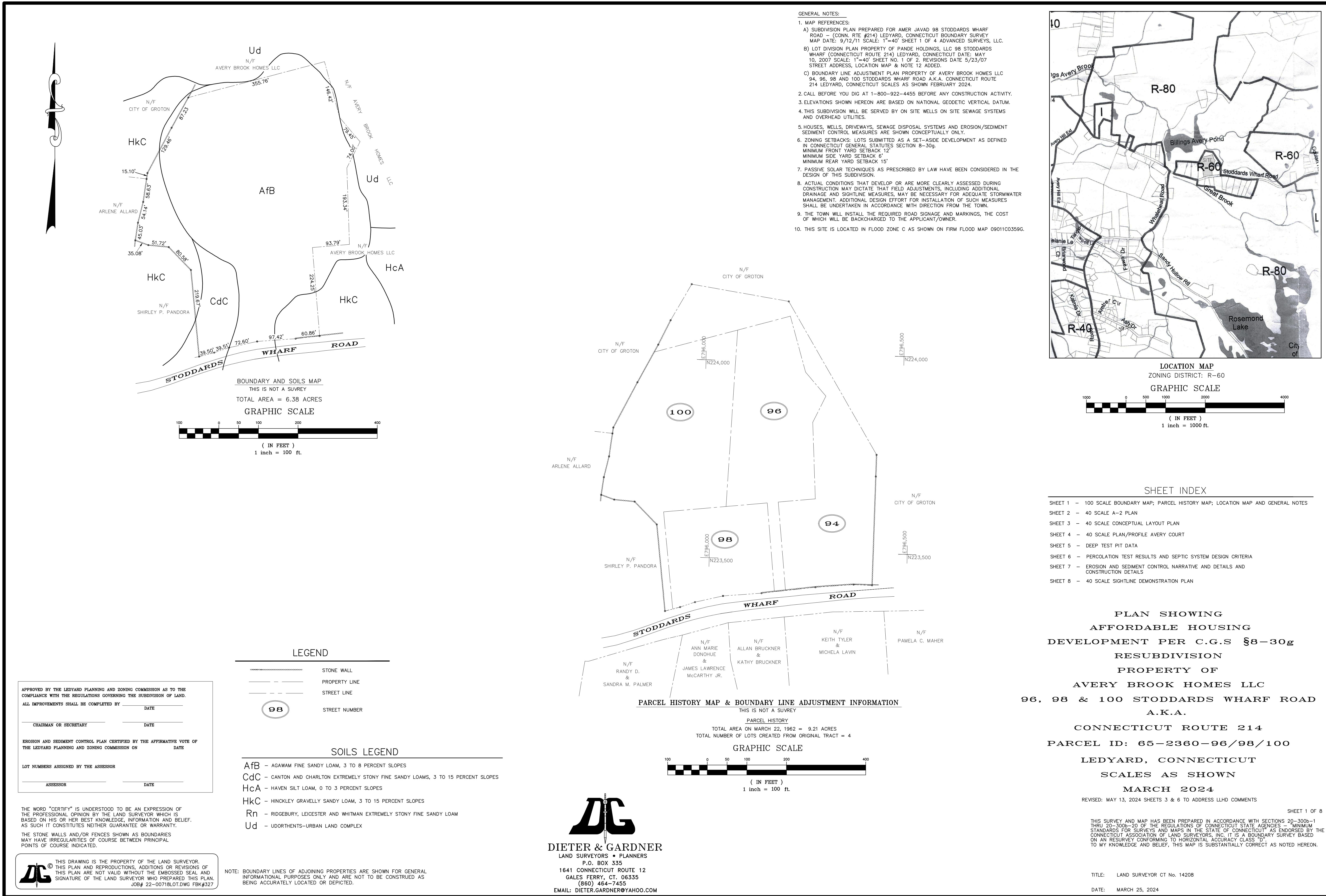


ANGUS McDONALD
GARY SHARPE
& ASSOCIATES, INC.

SINCE 1966

Appendix A

Site Development Plan Set



APPROVED BY THE LEDYARD PLANNING AND ZONING COMMISSION AS TO THE COMPLIANCE WITH THE REGULATIONS GOVERNING THE SUBDIVISION OF LAND.
ALL IMPROVEMENTS SHALL BE COMPLETED BY _____ DATE
CHAIRMAN OR SECRETARY _____ DATE
EROSION AND SEDIMENT CONTROL PLAN CERTIFIED BY THE AFFIRMATIVE VOTE OF THE LEDYARD PLANNING AND ZONING COMMISSION ON _____ DATE
LOT NUMBERS ASSIGNED BY THE ASSESSOR
ASSESSOR _____ DATE

STREET ADDRESS	TOTAL AREA
1	12,481 Sq. Ft. 0.29 ACRES
2	24,444 Sq. Ft. 0.58 ACRES
3	10,244 Sq. Ft. 0.24 ACRES
4	13,910 Sq. Ft. 0.32 ACRES
5	11,762 Sq. Ft. 0.28 ACRES
6	14,542 Sq. Ft. 0.33 ACRES
7	10,561 Sq. Ft. 0.24 ACRES
8	14,287 Sq. Ft. 0.33 ACRES
9	10,244 Sq. Ft. 0.23 ACRES
10	12,819 Sq. Ft. 0.29 ACRES
11	11,508 Sq. Ft. 0.28 ACRES
12	15,917 Sq. Ft. 0.37 ACRES
13	12,308 Sq. Ft. 0.28 ACRES
14	9,756 Sq. Ft. 0.24 ACRES
15	12,575 Sq. Ft. 0.29 ACRES
16	20,973 Sq. Ft. 0.48 ACRES
17	11,456 Sq. Ft. 0.26 ACRES
18	14,752 Sq. Ft. 0.34 ACRES

LEGEND

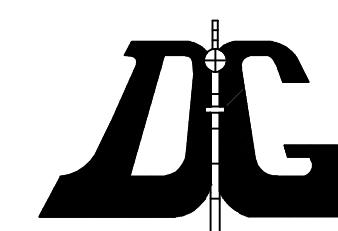
- oooooooooooo Stone Wall
- Property Line
- Street Line
- DH FND Drill Hole Found
- IP FND Iron Pipe Found
- Drill Hole or Rebar to be Set
- Monumnet or Drill Hole to be Set
- Curve Table Number
- Utility Pole
- Access/Utility Easement
- Street Address

THE STONE WALLS AND/OR FENCES SHOWN AS BOUNDARIES MAY HAVE IRRREGULARITIES OF COURSE BETWEEN PRINCIPAL POINTS OF COURSE INDICATED.

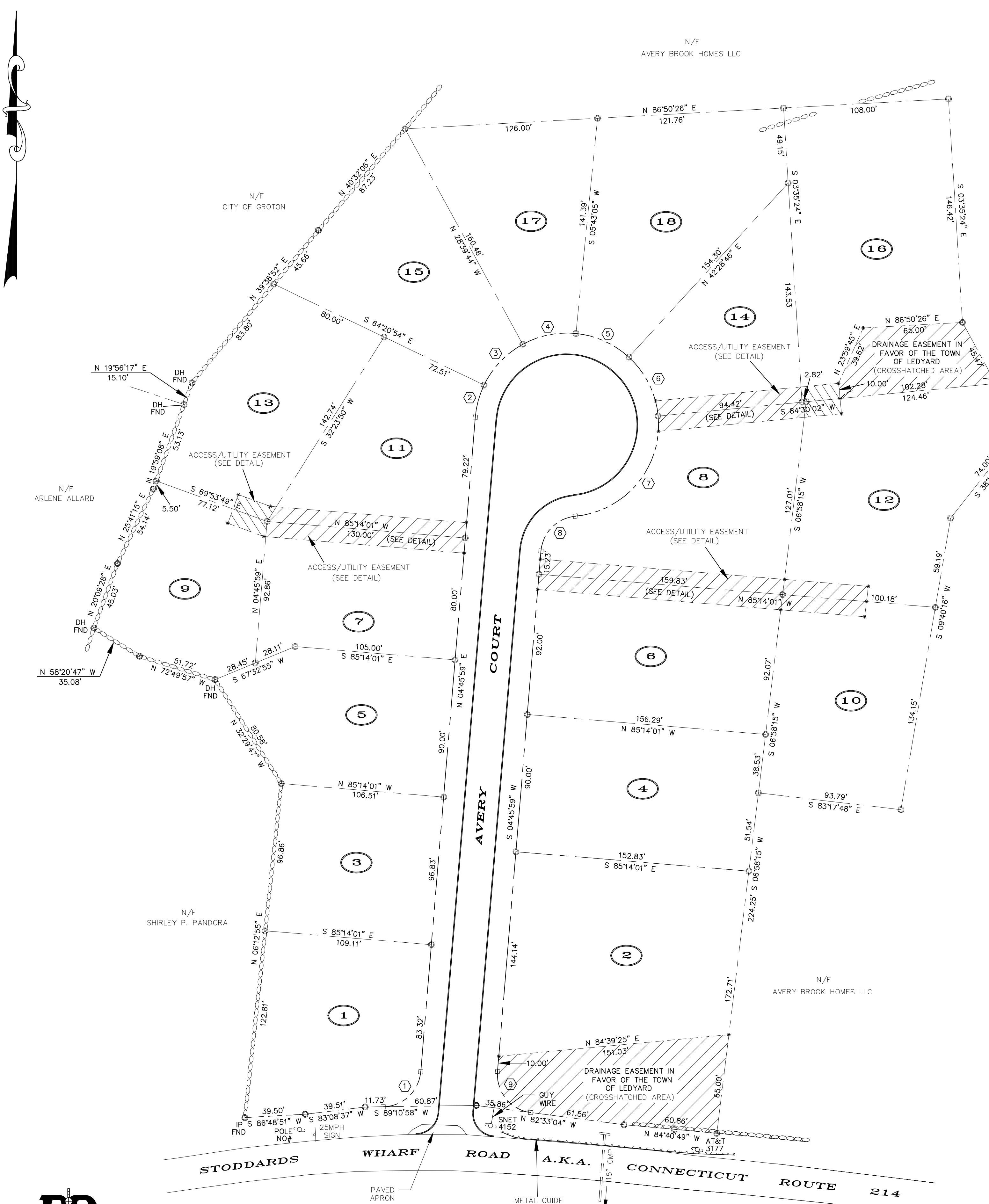
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NOTE: BOUNDARY LINES OF ADJOINING PROPERTIES ARE SHOWN FOR GENERAL INFORMATIONAL PURPOSES ONLY AND ARE NOT TO BE CONSTRUED AS BEING ACCURATELY LOCATED OR DEPICTED.

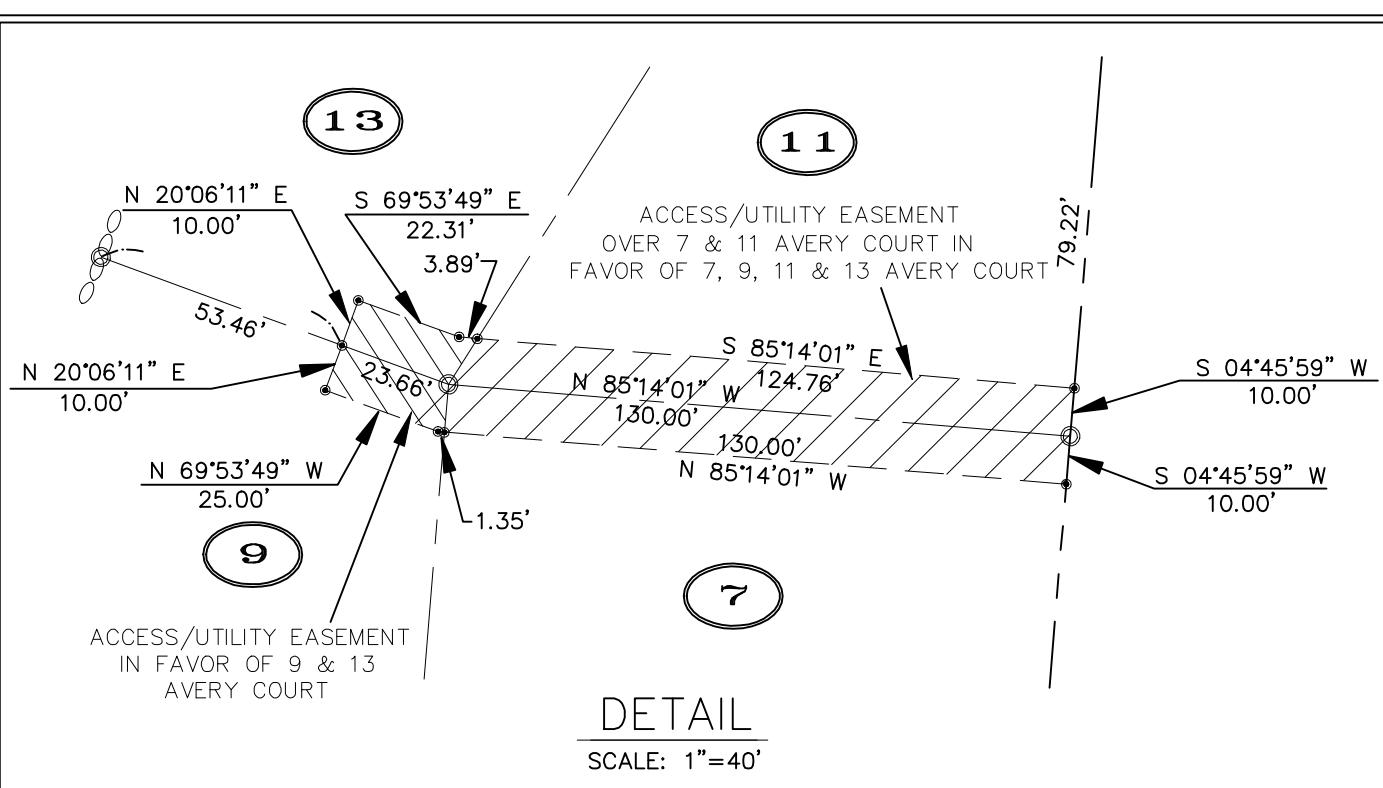
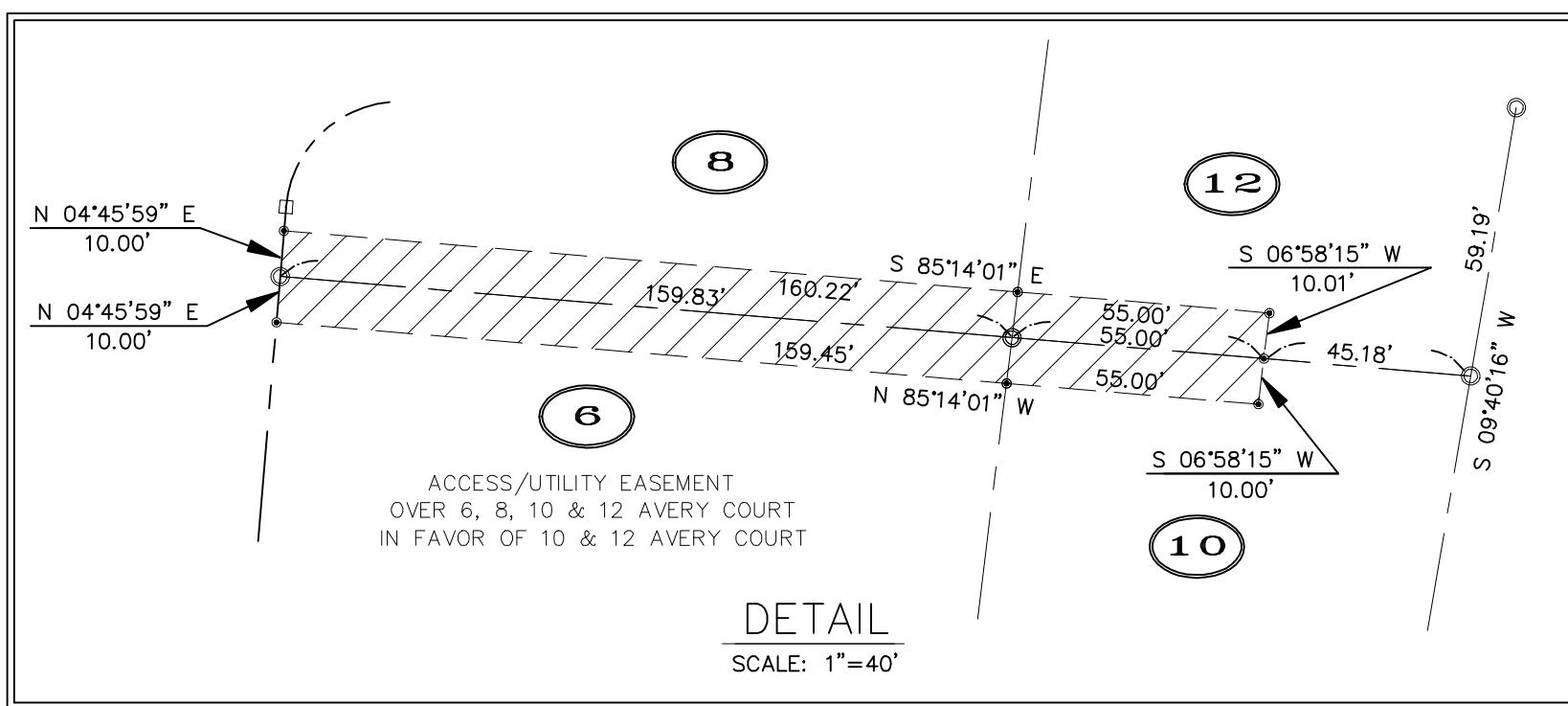
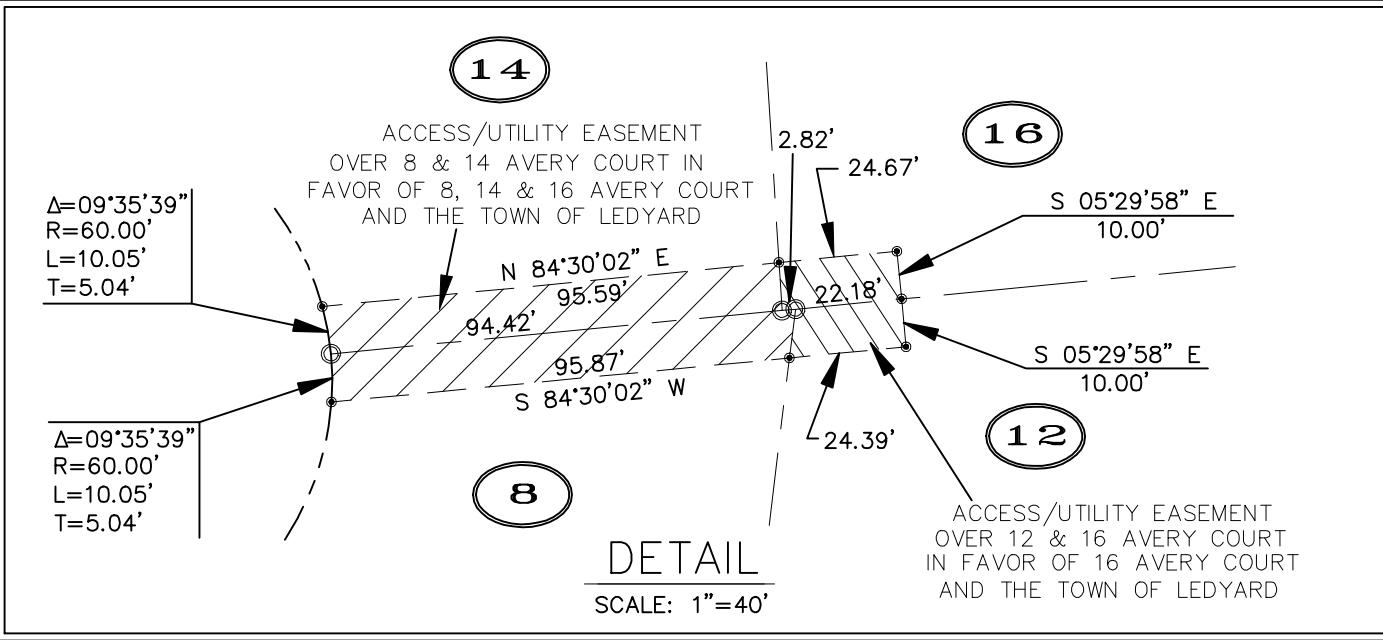
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GRAPHIC SCALE
(IN FEET)
1 inch = 40 ft



LOTS CURVE TABLE				
CURVE #	Δ	R	L	T
1	84°24'59"	25.00'	36.83'	22.68'
2	20°53'07"	60.00'	21.87'	11.06'
3	35°41'10"	60.00'	37.37'	19.31'
4	34°22'48"	60.00'	36.00'	18.56'
5	36°45'41"	60.00'	38.50'	19.94'
6	42°01'16"	60.00'	44.00'	23.04'
7	90°06'06"	60.00'	94.35'	60.11'
8	79°50'09"	25.00'	34.83'	20.92'
9	87°19'03"	25.00'	38.10'	23.86'

PLAN SHOWING
AFFORDABLE HOUSING
DEVELOPMENT PER C.G.S. §8-30g
RESUBDIVISION
PROPERTY OF
AVERY BROOK HOMES LLC
96, 98 & 100 STODDARDS WHARF ROAD
A.K.A.
CONNECTICUT ROUTE 214
PARCEL ID: 65-2360-96/98/100
LEDYARD, CONNECTICUT
SCALE: 1"=40'
MARCH 2024

THIS MAP AND SURVEY HAS BEEN PREPARED IN ACCORDANCE WITH SECTION 20-300B-1 THROUGH 20-300B-20 OF THE REGULATIONS OF THE STATE AGENCIES "MINIMUM STANDARDS OF ACCURACY, CONSTRUCTION, AND CERTIFICATION FOR SURVEYS AND MAPS IN THE STATE OF CONNECTICUT", ADOPTED EFFECTIVE JUNE 21, 1996, REVISED OCTOBER 26, 2018. IT IS A BOUNDARY SURVEY BASED ON A DEPENDENT RESURVEY CONFORMING TO HORIZONTAL ACCURACY CLASS A-2. TO MY KNOWLEDGE AND BELIEF, THIS MAP IS SUBSTANTIALLY CORRECT AS NOTED HEREON.

TITLE: LAND SURVEYOR CT No. 14208
DATE: MARCH 25, 2024

DEEP TEST PIT DATA	
WITNESSED AND RECORDED BY WENDY BROWN-ARNOLD RS./REHS AND ALEX WILBOUR LEDGE LIGHT HEALTH DISTRICT ON 5/2/22, 5/5/22 AND 5/23/2022 AND WENDY BROWN-ARNOLD RS./REHS ON JUNE 14, 2022.	
TP 13 0-13" TOPSOIL 13-25" BROWN FINE TO MED. SANDY LOAM 25-91" TAN TO BROWN MED. TO COARSE SAND AND GRAVEL, SOME COBBLES NO MOTTLING NO WATER NO LEDGE	TP 39 0-5" TOPSOIL 5-41" LIGHT BROWN FINE SANDY LOAM 41-83" TAN TO MED. SAND W/ GRAVEL AND COBBLES 83-104" OLIVE TO BROWN FINE SAND, SOME GRAVEL NO MOTTLING NO WATER NO LEDGE
TP 14 0-8" TOPSOIL 8-26" BROWN FINE TO MED. SANDY LOAM 26-91" TAN MED. TO FINE SAND/GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 53 0-13" TOPSOIL 13-32" BROWN FINE TO MED. SANDY LOAM 32-92" BROWN TO TAN COARSE TO MED. SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 17 0-11" TOPSOIL 11-37" BROWN FINE TO MED. SANDY LOAM 37-99" TAN TO GRAY MED. TO FINE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 40 0-8" TOPSOIL 8-32" BROWN FINE TO MED. SANDY LOAM 32-58" TAN TO GRAY MED. TO FINE SAND W/ GRAVEL AND COBBLES 58-99" TAN TO GRAY MED. TO FINE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 18 0-9" TOPSOIL 9-29" YELLOW TO BROWN FINE SANDY LOAM 29-103" TAN TO OLIVE MED. TO COARSE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 41 0-9" TOPSOIL 9-29" BROWN FINE TO MED. SANDY LOAM 29-52" TAN TO GRAY SILT FINE SAND, STAINED 52-101" STAINED TO GRAY, FINE TO MED. SAND NO MOTTLING W/ GRAVEL AND COBBLES NO WATER NO LEDGE
TP 29 0-12" TOPSOIL 12-32" BROWN FINE TO MED. SANDY LOAM 32-99" TAN TO GRAY MED. TO FINE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 42 0-5" TOPSOIL 5-14" LIGHT BROWN FINE TO VERY FINE SANDY LOAM 14-50" ORANGE TO GRAY SILT, STAINED 50-105" TAN TO BROWN FINE TO MED. SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 30 0-12" TOPSOIL 12-34" BROWN FINE SANDY LOAM (DEPTH VARIES) 34-98" TAN TO MED. TO FINE SAND W/ GRAVEL AND GRAVEL, STRATIFIED NO MOTTLING NO WATER NO LEDGE	TP 43 0-8" TOPSOIL 8-33" BROWN FINE SANDY LOAM 33-45" TAN TO GRAY SILT INCONSISTENT AROUND HOLE 45-83" TAN TO MED. TO FINE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 31 0-7" TOPSOIL 7-31" YELLOW TO BROWN FINE TO VERY FINE SANDY LOAM 31-100" TAN FINE TO MED. SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 44 0-6" TOPSOIL 6-14" BROWN FINE TO MED. SANDY LOAM 14-42" TAN TO GRAY SILT INCONSISTENT AROUND HOLE 42-102" TAN TO GRAY MED. TO FINE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 32 0-12" TOPSOIL 8-34" BROWN FINE SANDY LOAM 34-82" TAN TO GRAY MED. TO FINE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 45 0-13" TOPSOIL 13-37" BROWN FINE TO VERY FINE SANDY LOAM 37-93" BROWN TO GRAY COARSE SAND W/ GRAVEL AND COBBLES MOTTLING @ 37" NO WATER NO LEDGE
TP 33 0-10" TOPSOIL 10-34" BROWN FINE SANDY LOAM 34-75" TAN TO GRAY MED. TO FINE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 46 0-15" TOPSOIL 15-39" GRAY TO TAN VERY FINE SANDY W/ SILT 39-51" GRAY TO TAN VERY FINE SAND W/ SILT & HEAVILY WATER FILLED THROUGHOUT 51-108" BROWN TO COARSE SAND W/ GRAVEL AND COBBLES OLD FILTER FABRIC AND GRAVEL @ 20" MOTTLING @ 39" WATER @ 98" NO LEDGE
TP 34 0-12" TOPSOIL 12-44" YELLOW TO BROWN FINE TO VERY FINE SANDY LOAM 44-89" TAN TO BROWN MED. SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 47 0-17" TOPSOIL 10-22" BROWN FINE TO MED. SANDY LOAM W/ SILT 22-41" LIGHT BROWN TO ORANGE SILTY LOAM, TRACE FINE SAND 41-98" TAN TO GRAY COARSE SAND W/ GRAVEL AND COBBLES NO MOTTLING WATER @ 96" NO LEDGE
TP 35 0-8" TOPSOIL 8-21" BROWN FINE SANDY LOAM 21-47" TAN TO BROWN MED. SAND W/ GRAVEL, FEW COBBLES 47-110" TAN TO BROWN MED. SAND W/ GRAVEL, FEW COBBLES NO MOTTLING NO WATER NO LEDGE	TP 48 0-10" TOPSOIL 10-28" BROWN FINE TO VERY FINE SANDY LOAM TO SILT 28-106" BROWN TO GRAY MED. TO COARSE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER -WET AT BOTTOM NO LEDGE
TP 36 0-8" TOPSOIL 8-34" BROWN FINE SANDY LOAM 34-94" TAN TO GRAY MED. TO FINE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 49 0-14" TOPSOIL 10-24" BROWN FINE TO VERY FINE SANDY LOAM 24-52" LIGHT YELLOW TO BROWN VERY FINE FINE SAND W/ SILT 52-99" TAN TO GRAY COARSE SAND W/ GRAVEL AND COBBLES POSSIBLE MOTTLING @ 52" WATER @ 90" NO LEDGE
TP 37 0-9" TOPSOIL 9-39" LIGHT BROWN TO TAN, FINE TO VERY FINE, SANDY LOAM 39-100" LIGHT TAN FINE TO MED. SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 50 0-10" TOPSOIL 10-24" BROWN FINE TO VERY FINE SANDY LOAM 24-41" LIGHT YELLOW TO TAN VERY FINE SAND, W/ SILT 41-111" TAN TO BROWN COARSE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER -WET AT BOTTOM NO LEDGE
TP 38 0-8" TOPSOIL 8-34" BROWN FINE SANDY LOAM 34-90" TAN TO GRAY MED. TO FINE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 51 0-10" TOPSOIL 10-20" LIGHT BROWN FINE TO VERY FINE SANDY LOAM 20-42" LIGHT YELLOW TO BROWN VERY FINE SAND W/ TRACE SILT 42-101" BROWN TO BROWN COARSE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 39 0-8" TOPSOIL 8-34" BROWN FINE SANDY LOAM 34-90" TAN TO GRAY MED. TO FINE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 52 0-13" TOPSOIL 13-38" BROWN FINE TO VERY FINE SANDY LOAM 38-90" BROWN TO TAN COARSE TO MED. SAND WITH SOME GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 40 0-8" TOPSOIL 8-32" BROWN FINE TO MED. SANDY LOAM 32-90" TAN TO GRAY MED. TO COARSE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 53 0-11" TOPSOIL 11-38" BROWN FINE TO MED. SANDY LOAM 38-90" TAN TO GRAY MED. TO COARSE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 41 0-8" TOPSOIL 8-32" BROWN FINE TO MED. SANDY LOAM 32-90" TAN TO GRAY MED. TO COARSE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 54 0-11" TOPSOIL 11-32" BROWN FINE TO MED. SANDY LOAM 32-95" BROWN TO TAN COARSE TO MED. SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 42 0-8" TOPSOIL 8-32" BROWN FINE TO MED. SANDY LOAM 32-90" TAN TO GRAY MED. TO COARSE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 55 0-14" TOPSOIL 14-22" BROWN FINE TO VERY FINE SANDY LOAM 22-52" LIGHT BROWN FINE TO VERY FINE SAND W/ SILT 37-110" TAN MED. SAND W/ GRAVEL, FEW COBBLES NO MOTTLING NO WATER NO LEDGE
TP 43 0-8" TOPSOIL 8-32" BROWN FINE TO MED. SANDY LOAM 32-90" TAN TO GRAY MED. TO COARSE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 56 0-15" TOPSOIL 15-43" LIGHT BROWN SILT LOAM, SOME FINE SAND 43-110" TAN MED. SAND SOME GRAVEL FEW COBBLES NO MOTTLING NO WATER NO LEDGE
TP 44 0-6" TOPSOIL 6-14" BROWN FINE TO MED. SANDY LOAM 14-42" TAN TO GRAY SILT INCONSISTENT AROUND HOLE 42-102" TAN TO GRAY MED. TO FINE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 57 0-8" TOPSOIL 8-27" LIGHT BROWN FINE TO VERY FINE SANDY LOAM 27-104" TAN TO BROWN MED. TO COARSE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 45 0-13" TOPSOIL 13-32" BROWN FINE TO MED. SANDY LOAM 32-98" TAN TO BROWN MED. TO COARSE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 58 0-12" TOPSOIL 12-32" LIGHT BROWN FINE TO VERY FINE SANDY LOAM 32-98" TAN TO BROWN MED. TO COARSE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 46 0-15" TOPSOIL 15-39" GRAY TO TAN VERY FINE SANDY W/ SILT 39-51" GRAY TO TAN VERY FINE SAND W/ SILT & HEAVILY WATER FILLED THROUGHOUT 51-108" BROWN TO COARSE SAND W/ GRAVEL AND COBBLES OLD FILTER FABRIC AND GRAVEL @ 20" MOTTLING @ 39" WATER @ 98" NO LEDGE	TP 59 0-11" TOPSOIL 11-23" BROWN FINE TO VERY FINE SANDY LOAM 23-93" BROWN TO TAN COARSE TO MED. SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 47 0-17" TOPSOIL 10-22" BROWN FINE TO MED. SANDY LOAM W/ SILT 22-41" LIGHT BROWN TO ORANGE SILTY LOAM, TRACE FINE SAND 41-98" TAN TO GRAY COARSE SAND W/ GRAVEL AND COBBLES NO MOTTLING WATER @ 96" NO LEDGE	TP 60 0-10" TOPSOIL 10-23" BROWN FINE TO VERY FINE SANDY LOAM 23-97" BROWN TO TAN COARSE TO MED. SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 48 0-10" TOPSOIL 10-28" BROWN FINE TO MED. SANDY LOAM TO SILT 28-99" TAN TO BROWN COARSE SAND W/ GRAVEL AND COBBLES NO MOTTLING WATER @ 96" NO LEDGE	TP 61 0-8" TOPSOIL 8-28" BROWN FINE TO VERY FINE SANDY LOAM 28-99" TAN TO BROWN COARSE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 49 0-14" TOPSOIL 10-24" BROWN FINE TO VERY FINE SANDY LOAM 24-52" LIGHT YELLOW TO BROWN VERY FINE FINE SAND W/ SILT 52-99" TAN TO BROWN COARSE SAND W/ GRAVEL AND COBBLES POSSIBLE MOTTLING @ 52" WATER @ 90" NO LEDGE	TP 62 0-9" TOPSOIL 10-24" LIGHT BROWN FINE TO VERY FINE SANDY LOAM 24-96" BROWN TO TAN COARSE TO MED. SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 50 0-10" TOPSOIL 10-24" BROWN FINE TO VERY FINE SANDY LOAM 24-52" LIGHT YELLOW TO BROWN VERY FINE FINE SAND W/ SILT 52-99" TAN TO BROWN COARSE SAND W/ GRAVEL AND COBBLES POSSIBLE MOTTLING @ 52" WATER @ 90" NO LEDGE	TP 63 0-8" TOPSOIL 8-26" BROWN FINE TO MED. SANDY LOAM 26-91" BROWN TO TAN COARSE TO MED. SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 51 0-10" TOPSOIL 10-20" LIGHT BROWN FINE TO VERY FINE SANDY LOAM 20-42" LIGHT YELLOW TO BROWN VERY FINE SAND W/ TRACE SILT 42-101" BROWN TO BROWN COARSE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 64 0-10" TOPSOIL 10-31" BROWN FINE SANDY LOAM 31-91" BROWN TO TAN COARSE TO MED. SAND W/ SOME SILT GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 52 0-13" TOPSOIL 13-38" BROWN FINE TO MED. SANDY LOAM 38-90" BROWN TO TAN COARSE TO MED. SAND WITH SOME GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 65 0-10" TOPSOIL 10-30" LIGHT BROWN FINE TO VERY FINE SANDY LOAM 30-100" TAN TO BROWN COARSE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 53 0-11" TOPSOIL 11-32" BROWN FINE TO MED. SANDY LOAM 32-95" TAN TO GRAY MED. TO FINE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 66 0-10" TOPSOIL 10-28" BROWN FINE SANDY LOAM 28-90" TAN TO GRAY MED. TO COARSE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 54 0-12" TOPSOIL 12-32" BROWN FINE TO MED. SANDY LOAM 32-95" TAN TO GRAY MED. TO FINE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 67 0-11" TOPSOIL 11-32" BROWN FINE TO MED. SANDY LOAM 32-95" TAN TO GRAY MED. TO FINE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 55 0-12" TOPSOIL 12-32" BROWN FINE TO MED. SANDY LOAM 32-95" TAN TO GRAY MED. TO FINE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 68 0-11" TOPSOIL 11-29" BROWN FINE TO MED. SANDY LOAM 29-80" TAN TO GRAY MED. TO COARSE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 56 0-12" TOPSOIL 12-32" BROWN FINE TO MED. SANDY LOAM 32-95" TAN TO GRAY MED. TO FINE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 69 0-12" TOPSOIL 12-36" BROWN FINE TO MED. SANDY LOAM 36-91" TAN TO GRAY MED. TO FINE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 57 0-12" TOPSOIL 12-32" BROWN FINE TO MED. SANDY LOAM 32-95" TAN TO GRAY MED. TO FINE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 70 0-12" TOPSOIL 12-36" BROWN FINE TO MED. SANDY LOAM 36-91" TAN TO GRAY MED. TO FINE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 58 0-12" TOPSOIL 12-32" BROWN FINE TO MED. SANDY LOAM 32-95" TAN TO GRAY MED. TO FINE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 71 0-12" TOPSOIL 12-36" BROWN FINE TO MED. SANDY LOAM 36-91" TAN TO GRAY MED. TO FINE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 59 0-12" TOPSOIL 12-32" BROWN FINE TO MED. SANDY LOAM 32-95" TAN TO GRAY MED. TO FINE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 72 0-8" TOPSOIL 8-32" BROWN FINE TO MED. SANDY LOAM 32-91" TAN TO GRAY MED. TO FINE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 60 0-10" TOPSOIL 10-23" BROWN FINE TO VERY FINE SANDY LOAM 23-97" BROWN TO TAN COARSE TO MED. SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 73 0-13" TOPSOIL 13-28" BROWN FINE SANDY LOAM 28-97" YELLOW TO FINE TO VERY FINE SANDY LOAM 37-90" TAN TO BROWN FINE TO MED. SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 61 0-8" TOPSOIL 8-28" BROWN FINE SANDY LOAM 28-96" TAN TO BROWN COARSE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 74 0-6" TOPSOIL 6-39" BROWN FINE SANDY LOAM 39-99" TAN TO BROWN FINE TO MED. SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 62 0-9" TOPSOIL 10-24" LIGHT BROWN FINE TO MED. SANDY LOAM 24-96" BROWN TO TAN COARSE TO MED. SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 75 0-10" TOPSOIL 10-29" LIGHT BROWN FINE SANDY LOAM 29-96" TAN TO OLIVE/BROWN FINE TO MED. SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE
TP 63 0-8" TOPSOIL 8-26" BROWN FINE TO MED. SANDY LOAM 26-91" BROWN TO TAN COARSE TO MED. SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 76 0-10" TOPSOIL 10-34" LIGHT BROWN FINE SANDY LOAM 34-96" TAN TO OLIVE/BROWN FINE TO MED. SAND W/ GRAVEL AND COBBLES STRATIFIED NO MOTTLING NO WATER NO LEDGE
TP 64 0-10" TOPSOIL 10-31" BROWN FINE SANDY LOAM 31-91" BROWN TO TAN COARSE TO MED. SAND W/ SOME SILT GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 77 0-13" TOPSOIL 11-36" BROWN FINE TO MED. SANDY LOAM 36-101" BROWN TO TAN MED. TO FINE SAND W/ SOME GRAVEL NO MOTTLING NO WATER NO LEDGE
TP 65 0-10" TOPSOIL 10-31" BROWN FINE SANDY LOAM 31-91" BROWN TO TAN COARSE TO MED. SAND W/ SOME SILT GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 78 0-15" TOPSOIL 15-46" BROWN FINE TO MED. SANDY LOAM 46-106" BROWN TO TAN MED. FINE SAND W/ SOME GRAVEL NO MOTTLING NO WATER NO LEDGE
TP 66 0-10" TOPSOIL 10-28" BROWN FINE SANDY LOAM 28-90" TAN TO GRAY MED. TO COARSE SAND W/ GRAVEL AND COBBLES NO MOTTLING NO WATER NO LEDGE	TP 79 0-11" TOPSOIL 11-38" BROWN FINE TO MED. SANDY LOAM 38-90" TAN TO GRAY MED. TO FINE SAND W/ GRAVEL AND COBBLES

PERCOLATION TESTS PERFORMED ON MAY 26 & 27, JUNE 3 AND JUNE 10, 2022 BY DIETER & GARDNER, INC. (JODY TERRY AND MATT EMLYTA)

1 AVERY COURT AT PIT 41/42	1 AVERY COURT AT PIT 43/44	2 AVERY COURT AT PIT 47/48	2 AVERY COURT AT PIT 51/52	2 AVERY COURT AT PIT 55/56	3 AVERY COURT AT PIT 39/40	4 AVERY COURT AT PIT 59/60	4 AVERY COURT AT PIT 57/58
29" DEEP	26" DEEP	28" DEEP	29" DEEP	30" DEEP	29" DEEP	30" DEEP	30" DEEP
TIME	READING	TIME	READING	TIME	READING	TIME	READING
8:43	5"	8:40	5 1/2"	1:38	5"	4:14"	4"
8:46	10 3/4"	8:45	9 1/2"	1:43	11"	11 7/8"	8:46
8:53	15"	8:50	11 1/2"	1:48	13 1/2"	10:54	8 1/4"
8:58	17 1/2"	8:55	14"	1:53	15"	10:59	11"
9:03	19 1/2"	9:00	15 1/2"	1:58	18"	11:04	15 1/2"
9:08	21"	9:05	16 1/2"	2:03	21"	11:09	14 1/2"
9:13	22"	9:10	17 3/4"	2:08	20 1/8"	20 1/2"	14 1/2"
9:18	23"	9:15	18 1/2"	2:13	21 1/2"	11:14	15"
9:23	23 3/4"	9:20	19 1/2"	2:18	22 1/2"	11:19	19 1/2"
9:28	24 1/2"	9:25	20 1/2"	2:23	23 1/2"	11:24	23"
9:33	25 1/2"	9:30	21 1/2"	2:28	24 1/2"	11:29	24 1/2"
PERC RATE: 1"/5 MINS.	PERC RATE: 1"/5 MINS.	PERC RATE: 1"/5 MINS.	PERC RATE: 1"/2.7 MINS.	PERC RATE: 1"/5 MINS.	PERC RATE: 1"/5 MINS.	PERC RATE: 1"/3.3 MINS.	PERC RATE: 1"/3.3 MINS.

PERC RATE: 1"/5 MINS. PERC RATE: 1"/5 MINS. PERC RATE: 1"/5 MINS. PERC RATE: 1"/2.7 MINS. PERC RATE: 1"/5 MINS. PERC RATE: 1"/5 MINS. PERC RATE: 1"/3.3 MINS. PERC RATE: 1"/3.3 MINS.

5 AVERY COURT AT PIT 37/38	5 AVERY COURT AT PIT 81/82	6 AVERY COURT AT PIT 61/62	6 AVERY COURT AT PIT 63/64	8 AVERY COURT AT PIT 69/70	8 AVERY COURT AT PIT 67/68	8 AVERY COURT AT PIT 65/66	9 AVERY COURT AT PIT 35/36
28" DEEP	27" DEEP	30" DEEP	29" DEEP	28" DEEP	29" DEEP	28" DEEP	28" DEEP
TIME	READING	TIME	READING	TIME	READING	TIME	READING
10:37	3"	8:48	2"	10:18	3 1/2"	11:46	3"
10:42	6 3/4"	8:53	9"	10:23	12"	11:51	6 1/2"
10:47	9 1/4"	8:58	14"	10:28	15 1/2"	10:25	16 1/2"
10:52	12 1/2"	9:03	18"	10:33	19 1/2"	12:01	12"
10:57	15"	9:08	20"	10:38	21"	10:35	24"
11:02	17"	9:13	22"	10:43	22 1/2"	12:11	14 1/2"
11:07	19"	9:18	23"	10:48	24"	12:16	16"
11:12	20"	9:23	24"	10:53	25"	12:21	17 1/2"
11:17	21"	9:28	25"	10:58	25 3/4"	12:26	18 1/2"
11:22	22 1/8"	9:33	26"	11:03	26 3/4"	12:31	19 1/2"
11:27	23 1/8"	9:38	DRY			12:36	20 1/2"
PERC RATE: 1"/5 MINS.	PERC RATE: 1"/5 MINS.	PERC RATE: 1"/6 MINS.	PERC RATE: 1"/5 MINS.	PERC RATE: 1"/3.3 MINS.	PERC RATE: 1"/5 MINS.	PERC RATE: 1"/3.3 MINS.	PERC RATE: 1"/4 MINS.

PERC RATE: 1"/5 MINS. PERC RATE: 1"/5 MINS. PERC RATE: 1"/6 MINS. PERC RATE: 1"/5 MINS. PERC RATE: 1"/3.3 MINS. PERC RATE: 1"/5 MINS. PERC RATE: 1"/3.3 MINS. PERC RATE: 1"/4 MINS.

13 AVERY COURT AT PIT 31/32	13 AVERY COURT AT PIT 33/34	14 AVERY COURT AT PIT 79/80	15 AVERY COURT AT PIT 29/30	16 AVERY COURT AT PIT 17/18	18 AVERY COURT AT PIT 77/78
30" DEEP	30" DEEP	29" DEEP	32" DEEP	29" DEEP	29" DEEP
TIME	READING	TIME	READING	TIME	READING
10:41	9"	10:39	7"	11:45	3"
10:46	12 1/2"	10:44	11"	11:50	7 3/4"
10:51	15"	10:49	15"	11:55	11 1/2"
10:56	17"	10:54	19 1/2"	12:00	13 3/4"
11:01	19"	10:59	20 1/2"	12:05	16"
11:06	19 1/2"	11:04	22"	12:10	18"
11:11	20 1/2"	11:09	23"	12:15	20"
11:16	21 1/2"	11:14	24"	12:20	22"
11:21	22 1/2"	11:19	25"	12:25	22 1/4"
11:26	23 1/2"	11:24	25 3/4"	12:30	23 1/2"
PERC RATE: 1"/5 MINS.	PERC RATE: 1"/6 MINS.	PERC RATE: 1"/4 MINS.	PERC RATE: 1"/3.3 MINS.	PERC RATE: 1"/4 MINS.	PERC RATE: 1"/4 MINS.

PERC RATE: 1"/5 MINS. PERC RATE: 1"/5 MINS. PERC RATE: 1"/4 MINS. PERC RATE: 1"/5 MINS. PERC RATE: 1"/3.3 MINS. PERC RATE: 1"/5 MINS. PERC RATE: 1"/4 MINS. PERC RATE: 1"/4 MINS.

PERCOLATION TESTS PERFORMED ON APRIL 22, 2024 BY DIETER & GARDNER, INC.

7 AVERY COURT AT PIT 316/317	8 AVERY COURT AT PIT 302/303	10 AVERY COURT AT PIT 300/301	11 AVERY COURT AT PIT 312/313	12 AVERY COURT AT PIT 304/305
30" DEEP	30" DEEP	32" DEEP	29" DEEP	32" DEEP
TIME	READING	TIME	READING	TIME
11:47	4"	8:00	3"	7:58
11:52	11"	8:05	11"	8:03
11:57	15"	8:10	13 1/2"	8:08
12:02	18 3/4"	8:15	15 1/2"	8:13
12:07	21 1/4"	8:20	17 1/2"	8:18
12:12	23"	8:25	19"	8:23
12:17	24 1/2"	8:30	20 3/4"	8:28
12:22	26"	8:35	22"	8:33
12:27	27 1/4"	8:40	23 1/4"	8:38
PERC RATE: 1"/4 MINS.	PERC RATE: 1"/4 MINS.	PERC RATE: 1"/5 MINS.	PERC RATE: 1"/5 MINS.	PERC RATE: 1"/5 MINS.

PERC RATE: 1"/5 MINS. PERC RATE: 1"/5 MINS. PERC RATE: 1"/4 MINS. PERC RATE: 1"/5 MINS. PERC RATE: 1"/5 MINS. PERC RATE: 1"/5 MINS.

PERCOLATION TESTS PERFORMED ON APRIL 22, 2024 BY DIETER & GARDNER, INC.

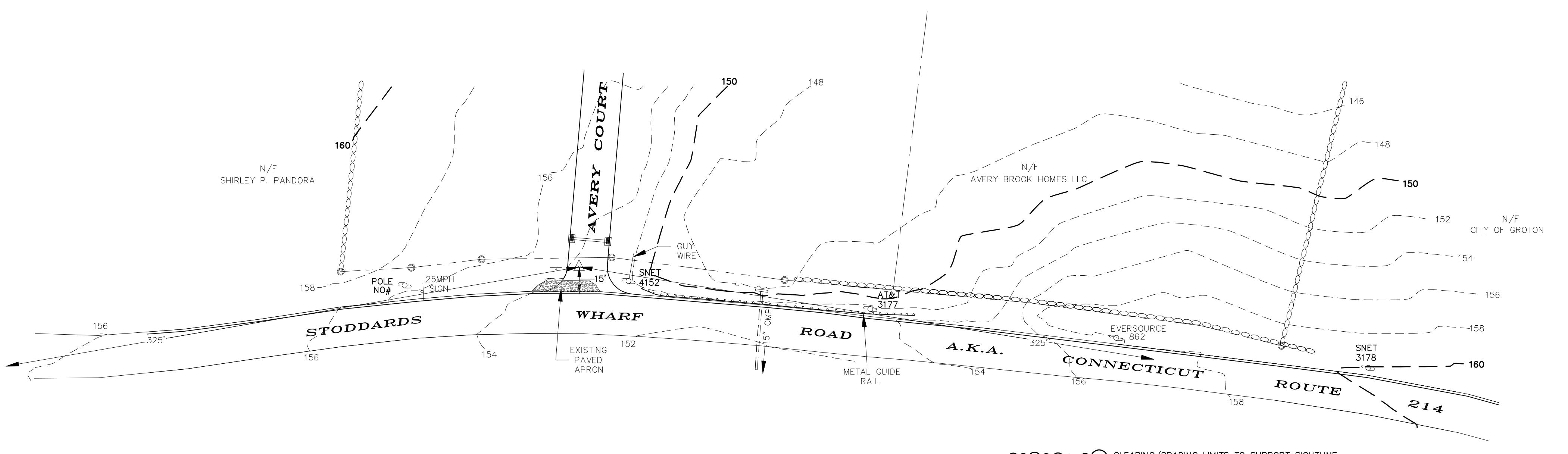
13 AVERY COURT AT PIT 314/315	15 AVERY COURT AT PIT 310/311	16 AVERY COURT AT PIT 306/307	17 AVERY COURT AT PIT 308/309
28" DEEP	30" DEEP	31" DEEP	29" DEEP
TIME	READING	TIME	READING
11:45	5"	9:34	5"
11:50	9"	9:39	1"
11:55	11 1/2"	9:44	13 1/2"
12:00	13 1/2"	9:49	15 1/2"
12:05	15 1/4"	9:54	17 1/4"
12:10	16 3/4"	9:59	19"
12:15	18"	10:04	20 1/2"
12:20	19"	10:09	21 3/4"
12:25	20"	10:14	22 3/4"
PERC RATE: 1"/5 MINS.			

PERC RATE: 1"/5 MINS. PERC RATE: 1"/5 MINS. PERC RATE: 1"/5 MINS. PERC RATE: 1"/5 MINS.

PERCOLATION TESTS PERFORMED ON APRIL 22, 2024 BY DIETER & GARDNER, INC.

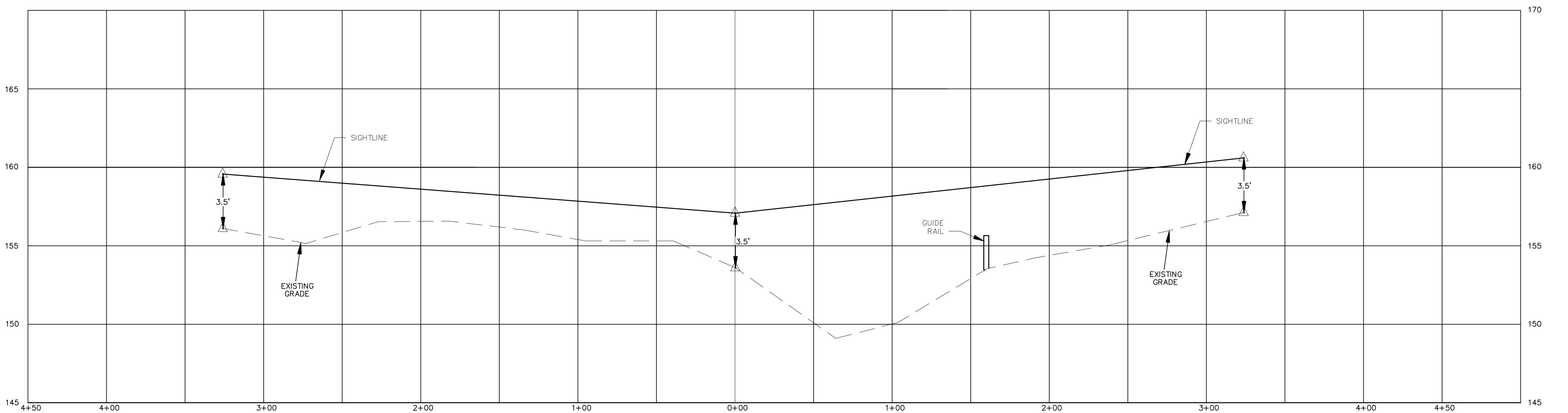
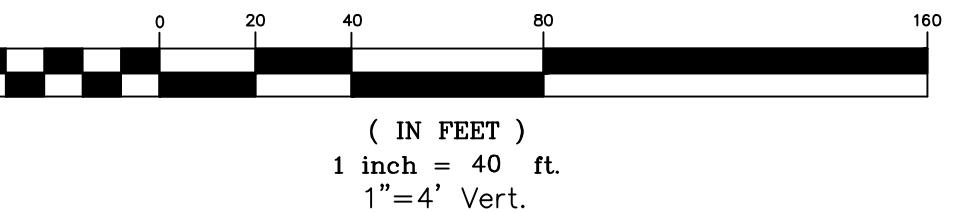
13 AVERY COURT AT PIT 314/315	15 AVERY COURT AT PIT 310/311	16 AVERY COURT AT PIT 306/307	17 AVERY COURT AT PIT 308/309
28" DEEP	30" DEEP	31" DEEP	29" DEEP
TIME	READING	TIME	READING
9:47	8:47	9:32	4"

APPROVED BY THE LEDYARD PLANNING AND ZONING COMMISSION AS TO THE COMPLIANCE WITH THE REGULATIONS GOVERNING THE SUBDIVISION OF LAND.
 ALL IMPROVEMENTS SHALL BE COMPLETED BY _____ DATE
 CHAIRMAN OR SECRETARY _____ DATE
 EROSION AND SEDIMENT CONTROL PLAN CERTIFIED BY THE AFFIRMATIVE VOTE OF THE LEDYARD PLANNING AND ZONING COMMISSION ON _____ DATE
 LOT NUMBERS ASSIGNED BY THE ASSESSOR
 ASSESSOR _____ DATE



~~~~~ CLEARING/GRADING LIMITS TO SUPPORT SIGHTLINE

GRAPHIC SCALE



SIGHTLINE  
 DEMONSTRATION PLAN  
 AFFORDABLE HOUSING  
 DEVELOPMENT PER C.G.S. §8-30g  
 PROPERTY OF  
 AVERY BROOK HOMES LLC  
 STODDARDS WHARF ROAD  
 A.K.A.  
 CONNECTICUT ROUTE 214  
 PARCEL ID: 65-2360-96/98/100  
 LEDYARD, CONNECTICUT  
 SCALE: 1"=40' HORIZ.  
 1"=4' VERT.  
 MARCH 2024

LEGEND

- oooooooooooo STONE WALL
- — PROPERTY LINE
- — STREET LINE
- - - EXISTING CONTOUR
- — PROPOSED CONTOUR
- Utility Pole

**DG**  
 DIETER & GARDNER  
 LAND SURVEYORS • PLANNERS  
 P.O. BOX 335  
 1641 CONNECTICUT ROUTE 12  
 GALES FERRY, CT. 06335  
 (860) 464-7455  
 EMAIL: DIETER.GARDNER@YAHOO.COM

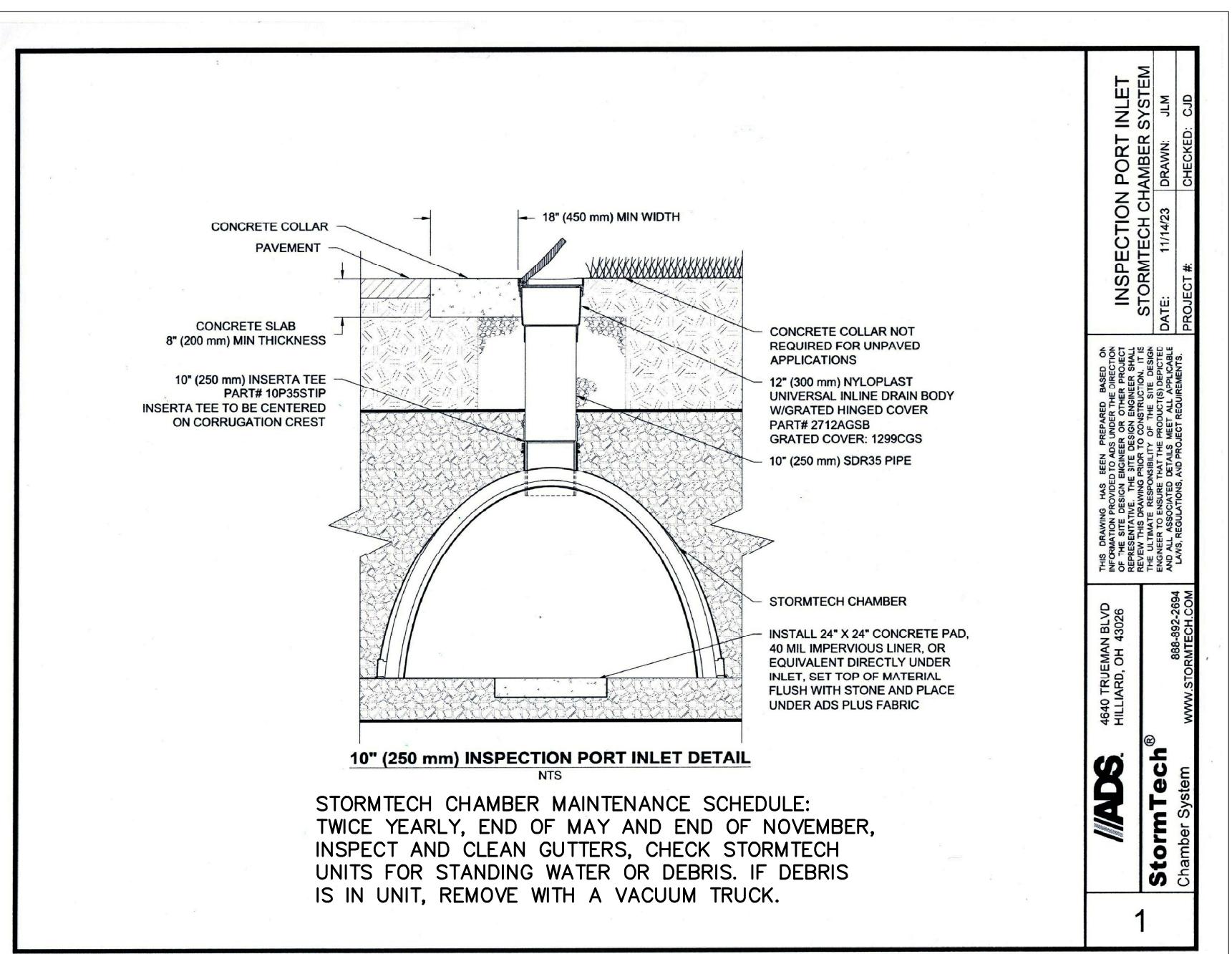
APPROVED BY THE LEDYARD PLANNING AND ZONING COMMISSION AS TO THE COMPLIANCE WITH THE REGULATIONS GOVERNING THE SUBDIVISION OF LAND. ALL IMPROVEMENTS SHALL BE COMPLETED BY \_\_\_\_\_ DATE

CHAIRMAN OR SECRETARY \_\_\_\_\_ DATE

EROSION AND SEDIMENT CONTROL PLAN CERTIFIED BY THE AFFIRMATIVE VOTE OF THE LEDYARD PLANNING AND ZONING COMMISSION ON \_\_\_\_\_ DATE

LOT NUMBERS ASSIGNED BY THE ASSESSOR

ASSESSOR \_\_\_\_\_ DATE



PLAN SHOWING  
AFFORDABLE HOUSING  
DEVELOPMENT PER C.G.S. §8-30g  
RESUBDIVISION  
PROPERTY OF  
AVERY BROOK HOMES LLC  
96, 98 & 100 STODDARDS WHARF ROAD  
A.K.A.  
CONNECTICUT ROUTE 214

PARCEL ID: 65-2360-96/98/100  
LEDYARD, CONNECTICUT

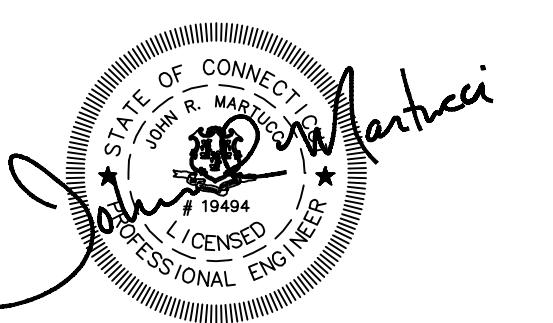
SCALE: 1"=40'

MARCH 2024

REVISED: APRIL 24, 2024  
REVISED: MAY 13, 2024 TO ADDRESS LLHD COMMENTS

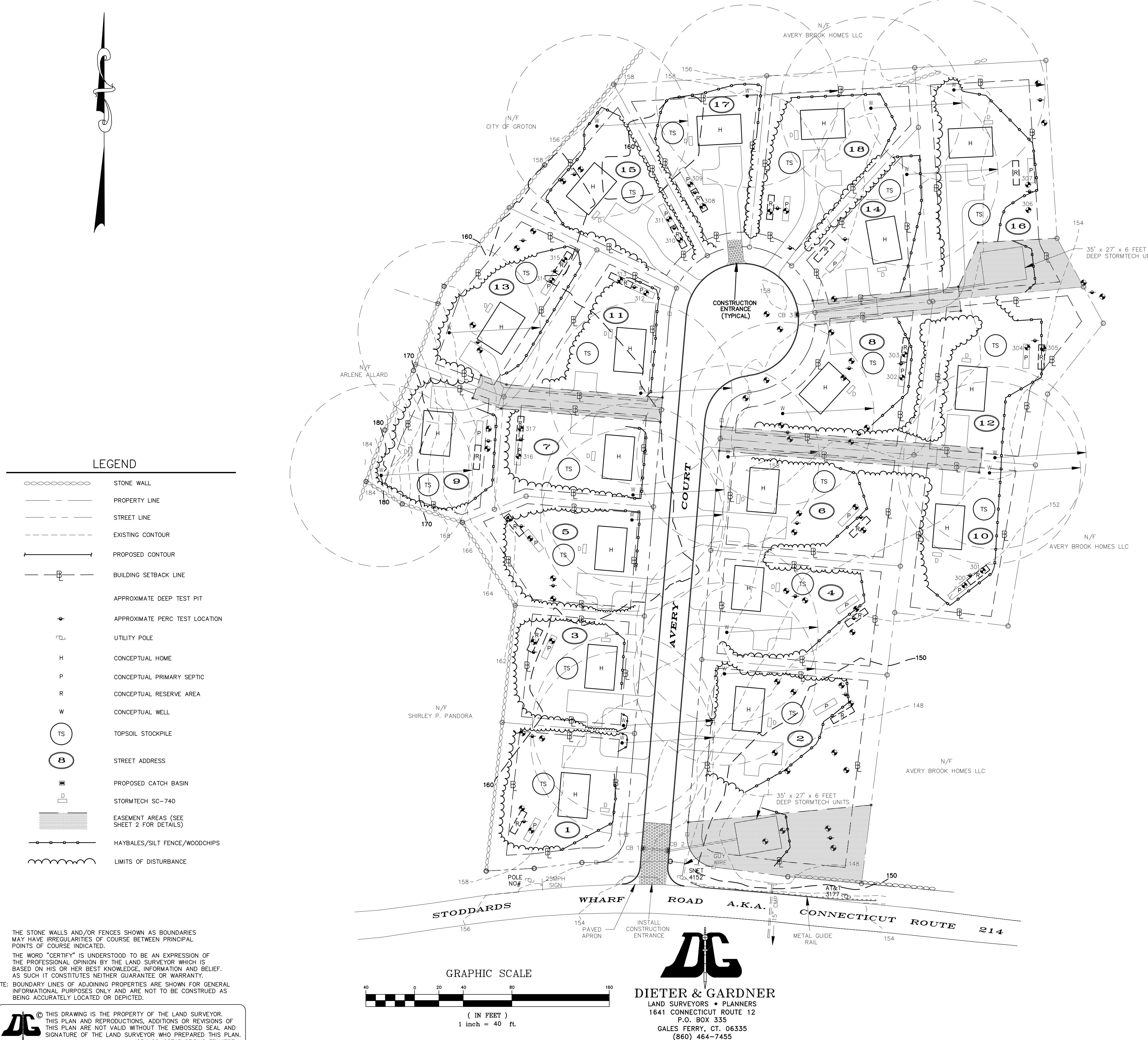
Sheet 3 of 8

THIS MAP AND SURVEY HAS BEEN PREPARED IN ACCORDANCE WITH SECTIONS 20-300B-1 THROUGH 20-300B-20 OF THE REGULATIONS OF CONNECTICUT STATE AGENCIES "MINIMUM STANDARDS FOR LAND SURVEYORS" AND CONFORMS TO THE STANDARDS IN THE STATE OF CONNECTICUT, ADOPTED EFFECTIVE JUNE 21, 1996, REVISED OCTOBER 26, 2018. IT IS A BOUNDARY SURVEY BASED ON A DEPENDENT SURVEY CONFORMING TO HORIZONTAL ACCURACY CLASS "D" AND TOPOGRAPHIC ACCURACY T-2. TO MY KNOWLEDGE AND BELIEF, THIS MAP IS SUBSTANTIALLY CORRECT AS NOTED HEREON.



TITLE: LAND SURVEYOR CT No. 14208

DATE: MARCH 25, 2024





ANGUS McDONALD  
GARY SHARPE  
& ASSOCIATES, INC.

SINCE 1966

## Appendix B

# Washed Sieve Analysis Results

## WASHED SIEVE ANALYSIS

CLIENT: Avery Brook LLC

DATE: 12/14/2022

SAMPLE: TH 100 42-48", Split 1 of 2

MOIST WEIGHT = 0.764 Kg  
 TOTAL DRY WEIGHT = 0.728 Kg  
 DRY WEIGHT AFTER WASH = 0.610 Kg

Water Content 4.95%

Unified Soil Classification System

Grain Size Comparison

Cobbles 0.0%

Coarse Gravel 18.7%

Fine Gravel 12.1%

Coarse Sand 6.6%

Medium Sand 15.4%

Fine Sand 31.0%

Silt & Clay 16.2%

Uniformity Coeff. 34.39

Permeability Range \*\*

Dense 2 ft/day

Loose 7 ft/day

2000 CT. Health Code Septic Fill Specs

%Retained on #4 30.8%

% Passing #4-%#200 (Fill less Gravel) Permitted

100.0% 100.0%

90.5% 100.0%

80.5% 70%-100%

70.5% \*10%-50%

60.5% 0%-20%

50.5% 0%-5%

| Sieve Size (mm) | Weight Retained | % Retained | % Passing |
|-----------------|-----------------|------------|-----------|
| 3"              | 75.0            | 0.000      | 0.0%      |
| 1 1/2"          | 37.5            | 0.000      | 0.0%      |
| 1"              | 25.0            | 0.096      | 13.2%     |
| 3/4"            | 19.0            | 0.040      | 5.5%      |
| 1/2"            | 12.5            | 0.028      | 3.8%      |
| #4              | 4.75            | 0.060      | 8.2%      |
| #10             | 2.00            | 0.048      | 6.6%      |
| #20             | 0.850           | 0.054      | 7.4%      |
| #40             | 0.425           | 0.058      | 8.0%      |
| #60             | 0.250           | 0.078      | 10.7%     |
| #80             | 0.180           | 0.056      | 7.7%      |
| #100            | 0.150           | 0.020      | 2.7%      |
| #140            | 0.106           | 0.042      | 5.8%      |
| #200            | 0.075           | 0.030      | 4.1%      |
| Passing #200    | 0.118           | 16.2%      |           |

Weight of Material Passing #200 Sieve = Total Dry Weight - Dry Weight After Wash

%Passing #40

37.7%

30.8%

26.1% %Passing #100

90.5%

100.0% %Passing #10

100.0%

100.0% %Passing #4

20.3%

16.2% %Passing #60

36.5%

12.1% %Passing #80

28.8%

10.7% %Passing #100

55.2%

7.4% %Passing #140

20.3%

5.8% %Passing #200

16.2%

4.1% %Passing #200

1.0% %Passing #200

0.0% %Passing #200

## WASHED SIEVE ANALYSIS

CLIENT: Avery Brook LLC

DATE: 12/14/2022

SAMPLE: TH 100 42-48", Split 2 of 2

MOIST WEIGHT = 0.858 Kg  
 TOTAL DRY WEIGHT = 0.82 Kg  
 DRY WEIGHT AFTER WASH = 0.706 Kg

Water Content 4.63%

Unified Soil Classification System

Grain Size Comparison

Cobbles 0.0%

Coarse Gravel 28.0%

Fine Gravel 11.7%

Coarse Sand 5.1%

Medium Sand 12.9%

Fine Sand 28.3%

Silt & Clay 13.9%

Uniformity Coeff. 85.62

Permeability Range \*\*

Dense 3 ft/day

Loose 10 ft/day

2000 CT. Health Code Septic Fill Specs

%Retained on #4 39.8%

%Passing #4-#200 (Fill less Gravel) Permitted

100.0% 100%

100%

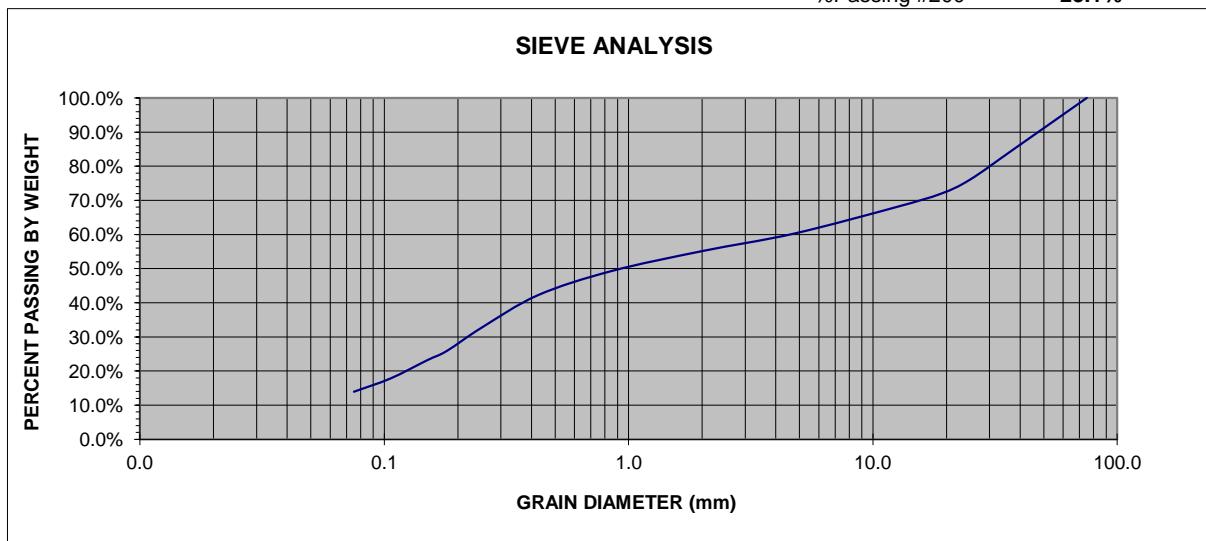
91.5% 70%-100%

70%-100%

70.0% \*10%-50%

\*10%-50%

| Sieve Size (mm)                                                                  | Weight Retained | % Retained | % Passing |               |       |          |
|----------------------------------------------------------------------------------|-----------------|------------|-----------|---------------|-------|----------|
| 3"                                                                               | 75.0            | 0.000      | 0.0%      | 100.0%        |       |          |
| 1 1/2"                                                                           | 37.5            | 0.124      | 15.1%     | 84.9%         |       |          |
| 1"                                                                               | 25.0            | 0.072      | 8.8%      | 76.1%         |       |          |
| 3/4"                                                                             | 19.0            | 0.034      | 4.1%      | 72.0%         |       |          |
| 1/2"                                                                             | 12.5            | 0.032      | 3.9%      | 68.0%         |       |          |
| #4                                                                               | 4.75            | 0.064      | 7.8%      | 60.2%         |       |          |
| #10                                                                              | 2.00            | 0.042      | 5.1%      | 55.1%         |       |          |
| #20                                                                              | 0.850           | 0.048      | 5.9%      | 49.3%         |       |          |
| #40                                                                              | 0.425           | 0.058      | 7.1%      | 42.2%         |       |          |
| #60                                                                              | 0.250           | 0.078      | 9.5%      | 32.7%         |       |          |
| #80                                                                              | 0.180           | 0.056      | 6.8%      | 25.9%         |       |          |
| #100                                                                             | 0.150           | 0.022      | 2.7%      | 23.2%         |       |          |
| #140                                                                             | 0.106           | 0.044      | 5.4%      | 17.8%         |       |          |
| #200                                                                             | 0.075           | 0.032      | 3.9%      | 13.9%         |       |          |
| Passing #200                                                                     | 0.114           | 13.9%      |           | %Passing #40  | 70.0% | *10%-50% |
| Weight of Material Passing #200 Sieve = Total Dry Weight - Dry Weight After Wash |                 |            |           | %Passing #100 | 38.5% | 0%-20%   |
|                                                                                  |                 |            |           | %Passing #200 | 23.1% | 0%-5%    |



\* Percent Passing the #40 sieve can be increased to no greater than 75% if the percent passing the #100 sieve does not exceed 10% and the #200 does not exceed 5%.

\*\* Based on empirical relationship by Hazen (1911) relating permeability to the D<sub>10</sub> grain size.

Accuracy diminishes with >5% passing the #200 Sieve or permeability values <.3 ft/day.

Relationship invalid when D<sub>10</sub> < .1mm or D<sub>10</sub> > 3mm

## WASHED SIEVE ANALYSIS

CLIENT: Avery Brook LLC

DATE: 12/14/2022

SAMPLE: TH 101 30-36", Split 1 of 2

MOIST WEIGHT = 0.594 Kg  
 TOTAL DRY WEIGHT = 0.536 Kg  
 DRY WEIGHT AFTER WASH = 0.522 Kg

Water Content 10.82%

Unified Soil Classification System

Grain Size Comparison

Cobbles 0.0%

Coarse Gravel 20.1%

Fine Gravel 36.9%

Coarse Sand 10.1%

Medium Sand 18.7%

Fine Sand 11.6%

Silt & Clay 2.6%

Uniformity Coeff. 34.51

Permeability Range \*\*

Dense 125 ft/day

Loose 374 ft/day

2000 CT. Health Code Septic Fill Specs

4.1% %Retained on #4 57.1%

3.7% % Passing #4-#200 (Fill less Gravel) Permitted

100.0% 100%

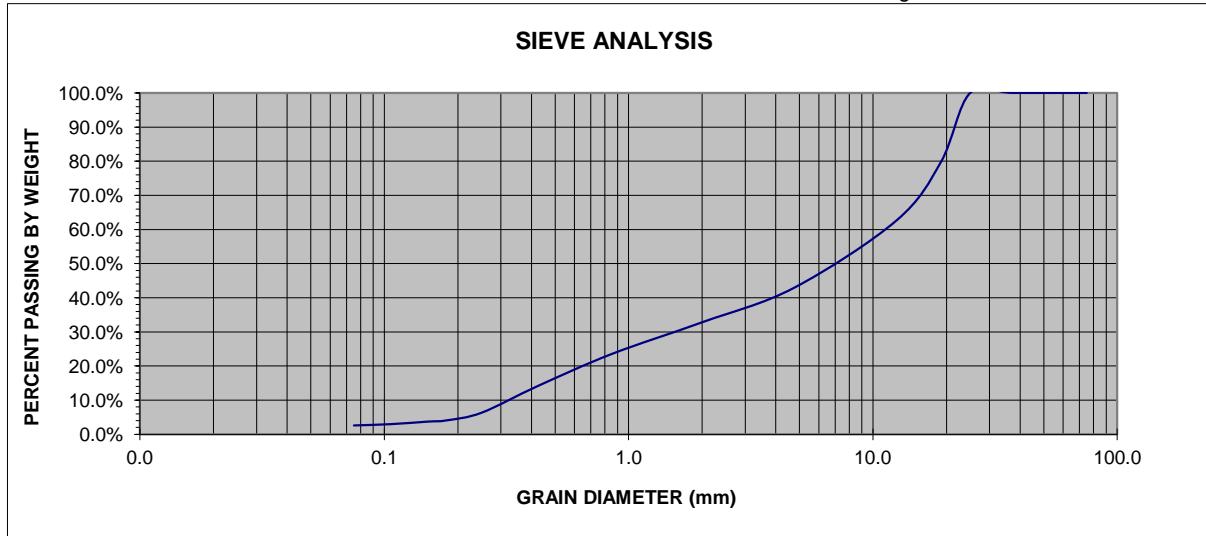
76.5% 70%-100%

33.0% \*10%-50%

8.7% 0%-20%

6.1% 0%-5%

| Sieve Size (mm)                                                                  | Weight Retained | % Retained | % Passing |               |      |  |  |
|----------------------------------------------------------------------------------|-----------------|------------|-----------|---------------|------|--|--|
| 3"                                                                               | 75.0            | 0.000      | 0.0%      | 100.0%        |      |  |  |
| 1 1/2"                                                                           | 37.5            | 0.000      | 0.0%      | 100.0%        |      |  |  |
| 1"                                                                               | 25.0            | 0.000      | 0.0%      | 100.0%        |      |  |  |
| 3/4"                                                                             | 19.0            | 0.108      | 20.1%     | 79.9%         |      |  |  |
| 1/2"                                                                             | 12.5            | 0.092      | 17.2%     | 62.7%         |      |  |  |
| #4                                                                               | 4.75            | 0.106      | 19.8%     | 42.9%         |      |  |  |
| #10                                                                              | 2.00            | 0.054      | 10.1%     | 32.8%         |      |  |  |
| #20                                                                              | 0.850           | 0.050      | 9.3%      | 23.5%         |      |  |  |
| #40                                                                              | 0.425           | 0.050      | 9.3%      | 14.2%         |      |  |  |
| #60                                                                              | 0.250           | 0.042      | 7.8%      | 6.3%          |      |  |  |
| #80                                                                              | 0.180           | 0.012      | 2.2%      | 4.1%          |      |  |  |
| #100                                                                             | 0.150           | 0.002      | 0.4%      | 3.7%          |      |  |  |
| #140                                                                             | 0.106           | 0.004      | 0.7%      | 3.0%          |      |  |  |
| #200                                                                             | 0.075           | 0.002      | 0.4%      | 2.6%          |      |  |  |
| Passing #200                                                                     | 0.014           | 2.6%       |           | %Passing #40  |      |  |  |
| Weight of Material Passing #200 Sieve = Total Dry Weight - Dry Weight After Wash |                 |            |           | %Passing #100 |      |  |  |
|                                                                                  |                 |            |           | %Passing #100 | 8.7% |  |  |
|                                                                                  |                 |            |           | %Passing #200 | 6.1% |  |  |



\* Percent Passing the #40 sieve can be increased to no greater than 75% if the percent passing the #100 sieve does not exceed 10% and the #200 does not exceed 5%.

\*\* Based on empirical relationship by Hazen (1911) relating permeability to the D<sub>10</sub> grain size.

Accuracy diminishes with >5% passing the #200 Sieve or permeability values <.3 ft/day.

Relationship invalid when D<sub>10</sub> < .1mm or D<sub>10</sub> > 3mm

## WASHED SIEVE ANALYSIS

CLIENT: Avery Brook LLC

DATE: 12/14/2022

SAMPLE: TH 101 30-36", Split 2 of 2

MOIST WEIGHT = 0.648 Kg  
 TOTAL DRY WEIGHT = 0.594 Kg  
 DRY WEIGHT AFTER WASH = 0.584 Kg

Water Content 9.09%

Unified Soil Classification System

Grain Size Comparison

Cobbles 0.0%

Coarse Gravel 29.3%

Fine Gravel 34.7%

Coarse Sand 10.4%

Medium Sand 14.8%

Fine Sand 9.1%

Silt & Clay 1.7%

Uniformity Coeff. 37.50

Permeability Range \*\*

Dense 184 ft/day

Loose 552 ft/day

2000 CT. Health Code Septic Fill Specs

%Retained on #4 64.0%

% Passing #4-%#200 (Fill less Gravel) Permitted

100.0% 100.0%

100%

71.0% 70%-100%

70%-100%

29.9% \*10%-50%

\*10%-50%

Passing #200

Weight of Material Passing #200 Sieve = Total Dry Weight - Dry Weight After Wash

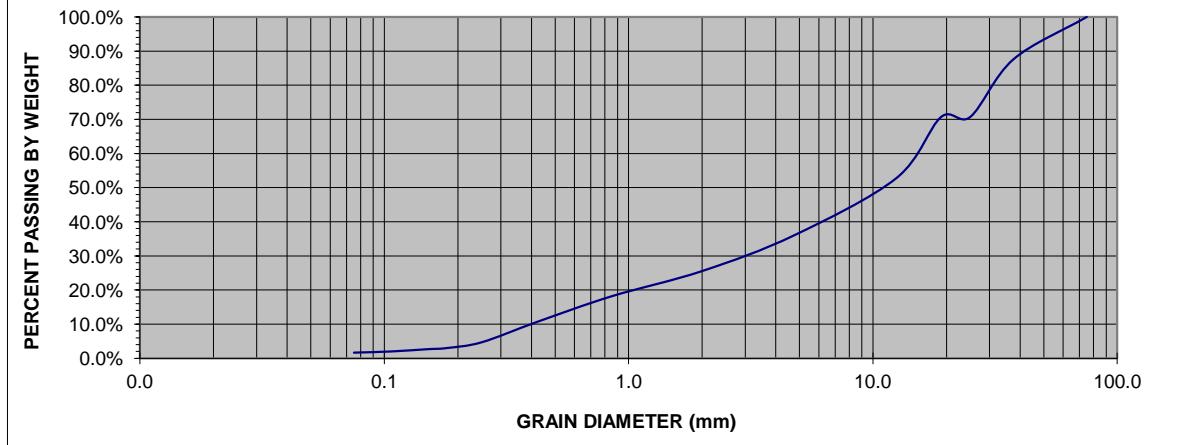
%Passing #100 7.5%

0%-20%

%Passing #200 4.7%

0%-5%

### SIEVE ANALYSIS



\* Percent Passing the #40 sieve can be increased to no greater than 75% if the percent passing the #100 sieve does not exceed 10% and the #200 does not exceed 5%.

\*\* Based on empirical relationship by Hazen (1911) relating permeability to the D10 grain size.

Accuracy diminishes with >5% passing the #200 Sieve or permeability values <.3 ft/day.

Relationship invalid when D10 < .1mm or D10 > 3mm

## WASHED SIEVE ANALYSIS

CLIENT: Avery Brook LLC

DATE: 12/14/2022

SAMPLE: TH 102 42-48", Split 1 of 2

MOIST WEIGHT = 0.7 Kg  
 TOTAL DRY WEIGHT = 0.68 Kg  
 DRY WEIGHT AFTER WASH = 0.664 Kg

Water Content 2.94%

Unified Soil Classification System

Grain Size Comparison

Cobbles 0.0%

Coarse Gravel 34.7%

Fine Gravel 33.2%

Coarse Sand 11.5%

Medium Sand 11.8%

Fine Sand 6.5%

Silt & Clay 2.4%

Uniformity Coeff. 30.12

Permeability Range \*\*

Dense 329 ft/day

Loose 986 ft/day

2000 CT. Health Code Septic Fill Specs

%Retained on #4 67.9%

% Passing #4-%#200 (Fill less Gravel) Permitted

100.0% 100.0%

100%

64.2%

70%-100%

27.5%

\*10%-50%

10.1%

0%-20%

7.3%

0%-5%

| Sieve Size (mm) | Weight Retained | % Retained | % Passing |
|-----------------|-----------------|------------|-----------|
| 3"              | 75.0            | 0.000      | 0.0%      |
| 1 1/2"          | 37.5            | 0.000      | 0.0%      |
| 1"              | 25.0            | 0.118      | 17.4%     |
| 3/4"            | 19.0            | 0.118      | 17.4%     |
| 1/2"            | 12.5            | 0.084      | 12.4%     |
| #4              | 4.75            | 0.142      | 20.9%     |
| #10             | 2.00            | 0.078      | 11.5%     |
| #20             | 0.850           | 0.050      | 7.4%      |
| #40             | 0.425           | 0.030      | 4.4%      |
| #60             | 0.250           | 0.026      | 3.8%      |
| #80             | 0.180           | 0.010      | 1.5%      |
| #100            | 0.150           | 0.002      | 0.3%      |
| #140            | 0.106           | 0.004      | 0.6%      |
| #200            | 0.075           | 0.002      | 0.3%      |
| Passing #200    | 0.016           | 2.4%       |           |

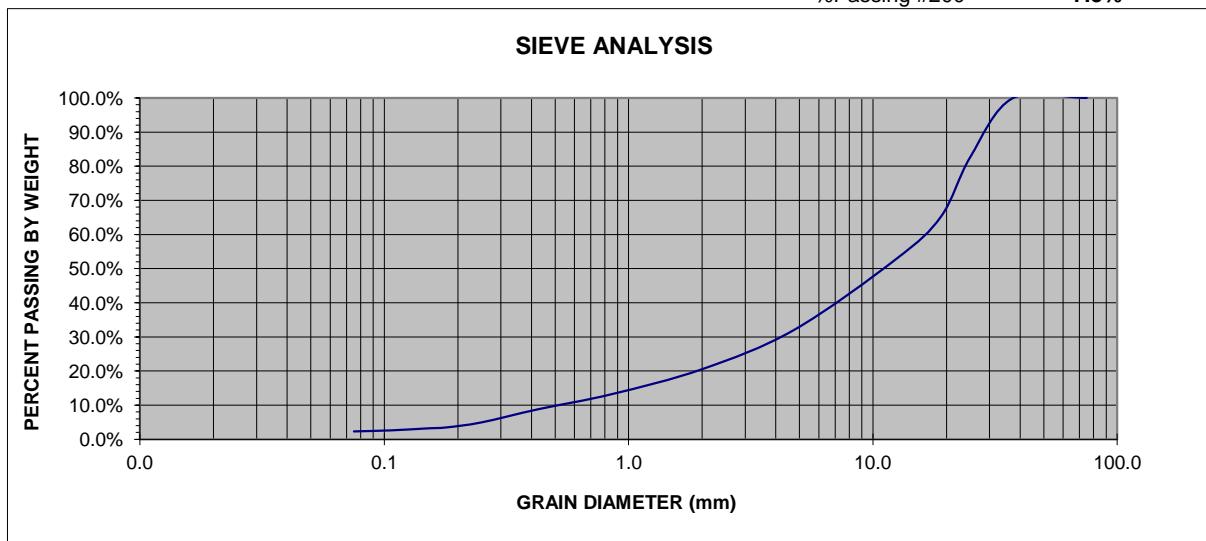
Weight of Material Passing #200 Sieve = Total Dry Weight - Dry Weight After Wash

%Passing #100

10.1%

%Passing #200

7.3%



\* Percent Passing the #40 sieve can be increased to no greater than 75% if the percent passing the #100 sieve does not exceed 10% and the #200 does not exceed 5%.

\*\* Based on empirical relationship by Hazen (1911) relating permeability to the D<sub>10</sub> grain size.

Accuracy diminishes with >5% passing the #200 Sieve or permeability values <.3 ft/day.

Relationship invalid when D<sub>10</sub> < .1mm or D<sub>10</sub> > 3mm

## WASHED SIEVE ANALYSIS

CLIENT: Avery Brook LLC

DATE: 12/14/2022

SAMPLE: TH 102 42-48", Split 2 of 2

MOIST WEIGHT = 0.75 Kg  
 TOTAL DRY WEIGHT = 0.728 Kg  
 DRY WEIGHT AFTER WASH = 0.706 Kg

Water Content 3.02%

Unified Soil Classification System

Grain Size Comparison

Cobbles 0.0%

Coarse Gravel 28.6%

Fine Gravel 33.0%

Coarse Sand 14.0%

Medium Sand 14.3%

Fine Sand 7.1%

Silt & Clay 3.0%

Uniformity Coeff. 28.85

Permeability Range \*\*

Dense 199 ft/day

Loose 596 ft/day

5.8% 2000 CT. Health Code Septic Fill Specs

4.4% %Retained on #4 61.5%

4.1% % Passing #4-#200 (Fill less Gravel) Permitted

100.0% 100%

63.6% 70%-100%

26.4% \*10%-50%

10.7% 0%-20%

7.9% 0%-5%

| Sieve Size (mm) | Weight Retained | % Retained | % Passing    |
|-----------------|-----------------|------------|--------------|
| 3"              | 75.0            | 0.000      | 0.0%         |
| 1 1/2"          | 37.5            | 0.000      | 0.0%         |
| 1"              | 25.0            | 0.062      | 8.5%         |
| 3/4"            | 19.0            | 0.146      | 20.1%        |
| 1/2"            | 12.5            | 0.074      | 10.2%        |
| #4              | 4.75            | 0.166      | 22.8%        |
| #10             | 2.00            | 0.102      | 14.0%        |
| #20             | 0.850           | 0.066      | 9.1%         |
| #40             | 0.425           | 0.038      | 5.2%         |
| #60             | 0.250           | 0.032      | 4.4%         |
| #80             | 0.180           | 0.010      | 1.4%         |
| #100            | 0.150           | 0.002      | 0.3%         |
| #140            | 0.106           | 0.004      | 0.5%         |
| #200            | 0.075           | 0.004      | 0.5%         |
| Passing #200    | 0.022           | 3.0%       | %Passing #40 |

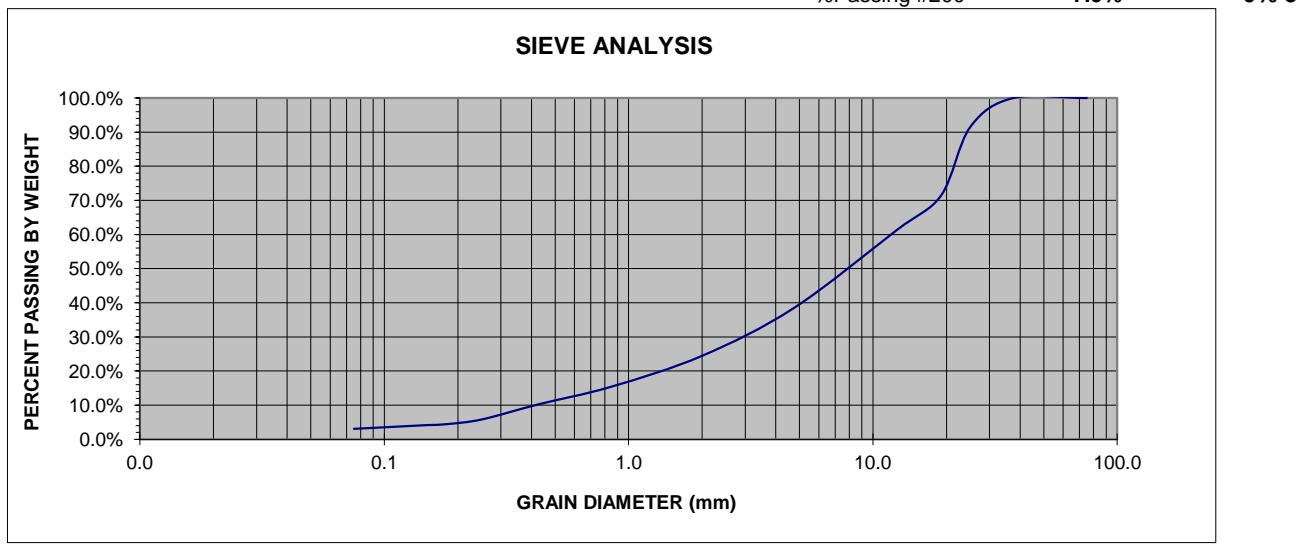
Weight of Material Passing #200 Sieve = Total Dry Weight - Dry Weight After Wash

%Passing #100

10.7%

%Passing #200

7.9%



\* Percent Passing the #40 sieve can be increased to no greater than 75% if the percent passing the #100 sieve does not exceed 10% and the #200 does not exceed 5%.

\*\* Based on empirical relationship by Hazen (1911) relating permeability to the D<sub>10</sub> grain size.

Accuracy diminishes with >5% passing the #200 Sieve or permeability values <.3 ft/day.

Relationship invalid when D<sub>10</sub> < .1mm or D<sub>10</sub> > 3mm

## WASHED SIEVE ANALYSIS

CLIENT: Avery Brook LLC

DATE: 12/14/2022

SAMPLE: TH 102 180-186", Split 1 of 2

MOIST WEIGHT = 0.802 Kg  
 TOTAL DRY WEIGHT = 0.786 Kg  
 DRY WEIGHT AFTER WASH = 0.770 Kg

Water Content 2.04%

Unified Soil Classification System

Grain Size Comparison

Cobbles 0.0%

Coarse Gravel 23.4%

Fine Gravel 20.4%

Coarse Sand 12.7%

Medium Sand 28.5%

Fine Sand 13.0%

Silt & Clay 2.0%

Uniformity Coeff. 20.40

Permeability Range \*\*

Dense 119 ft/day

Loose 356 ft/day

2000 CT. Health Code Septic Fill Specs

4.1% %Retained on #4 43.8%

3.6% % Passing #4-#200 (Fill less Gravel) Permitted

100.0% 100%

70%-100%

\*10%-50%

26.7% 6.3%

0%-20%

3.6% 0%-5%

| Sieve Size (mm) | Weight Retained | % Retained | % Passing |
|-----------------|-----------------|------------|-----------|
| 3"              | 75.0            | 0.000      | 0.0%      |
| 1 1/2"          | 37.5            | 0.094      | 12.0%     |
| 1"              | 25.0            | 0.000      | 0.0%      |
| 3/4"            | 19.0            | 0.090      | 11.5%     |
| 1/2"            | 12.5            | 0.036      | 4.6%      |
| #4              | 4.75            | 0.124      | 15.8%     |
| #10             | 2.00            | 0.100      | 12.7%     |
| #20             | 0.850           | 0.110      | 14.0%     |
| #40             | 0.425           | 0.114      | 14.5%     |
| #60             | 0.250           | 0.068      | 8.7%      |
| #80             | 0.180           | 0.018      | 2.3%      |
| #100            | 0.150           | 0.004      | 0.5%      |
| #140            | 0.106           | 0.008      | 1.0%      |
| #200            | 0.075           | 0.004      | 0.5%      |
| Passing #200    | 0.016           | 2.0%       |           |

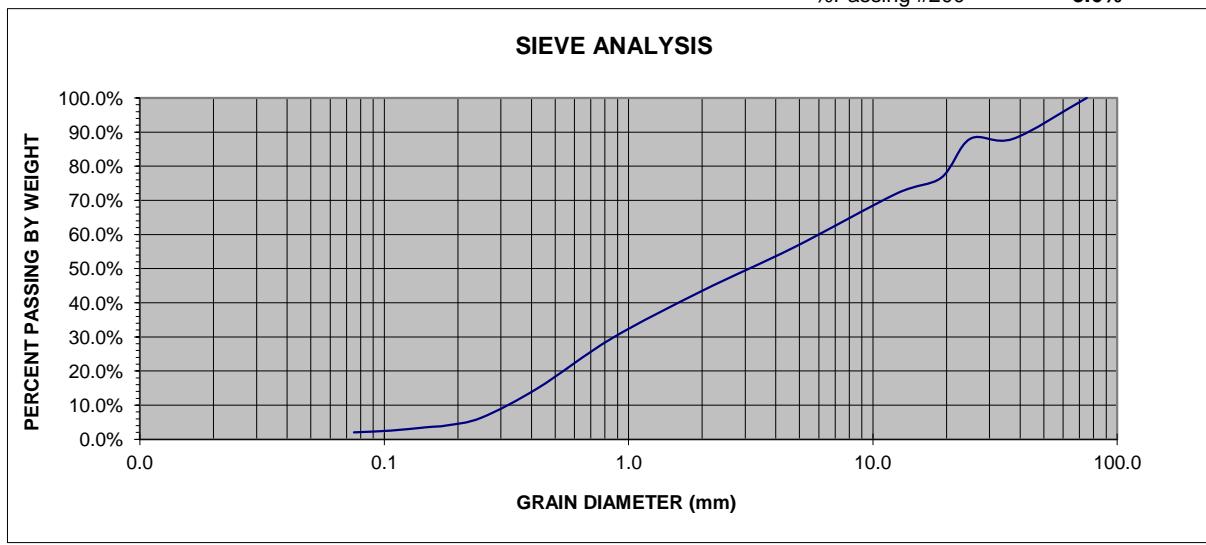
Weight of Material Passing #200 Sieve = Total Dry Weight - Dry Weight After Wash

%Passing #100

6.3%

%Passing #200

3.6%



\* Percent Passing the #40 sieve can be increased to no greater than 75% if the percent passing the #100 sieve does not exceed 10% and the #200 does not exceed 5%.

\*\* Based on empirical relationship by Hazen (1911) relating permeability to the D<sub>10</sub> grain size.

Accuracy diminishes with >5% passing the #200 Sieve or permeability values <.3 ft/day.

Relationship invalid when D<sub>10</sub> < .1mm or D<sub>10</sub> > 3mm

## WASHED SIEVE ANALYSIS

CLIENT: Avery Brook LLC

DATE: 12/14/2022

SAMPLE: TH 102 180-186", Split 2 of 2

MOIST WEIGHT = 0.832 Kg  
 TOTAL DRY WEIGHT = 0.818 Kg  
 DRY WEIGHT AFTER WASH = 0.804 Kg

Water Content 1.71%

Unified Soil Classification System

Grain Size Comparison

Cobbles 0.0%

Coarse Gravel 25.7%

Fine Gravel 22.2%

Coarse Sand 11.5%

Medium Sand 26.2%

Fine Sand 12.7%

Silt & Clay 1.7%

Uniformity Coeff. 28.84

Permeability Range \*\*

Dense 123 ft/day

Loose 368 ft/day

2000 CT. Health Code Septic Fill Specs

%Retained on #4 47.9%

% Passing #4-%#200 (Fill less Gravel) Permitted

100.0% 100%

70%-100%

\*10%-50%

6.6% 0%-20%

3.3% 0%-5%

| Sieve Size (mm) | Weight Retained | % Retained | % Passing |
|-----------------|-----------------|------------|-----------|
| 3"              | 75.0            | 0.000      | 0.0%      |
| 1 1/2"          | 37.5            | 0.122      | 14.9%     |
| 1"              | 25.0            | 0.000      | 0.0%      |
| 3/4"            | 19.0            | 0.088      | 10.8%     |
| 1/2"            | 12.5            | 0.076      | 9.3%      |
| #4              | 4.75            | 0.106      | 13.0%     |
| #10             | 2.00            | 0.094      | 11.5%     |
| #20             | 0.850           | 0.104      | 12.7%     |
| #40             | 0.425           | 0.110      | 13.4%     |
| #60             | 0.250           | 0.066      | 8.1%      |
| #80             | 0.180           | 0.018      | 2.2%      |
| #100            | 0.150           | 0.006      | 0.7%      |
| #140            | 0.106           | 0.008      | 1.0%      |
| #200            | 0.075           | 0.006      | 0.7%      |
| Passing #200    | 0.014           | 1.7%       |           |

Weight of Material Passing #200 Sieve = Total Dry Weight - Dry Weight After Wash

%Passing #40

%Passing #100

%Passing #200

123 ft/day

368 ft/day

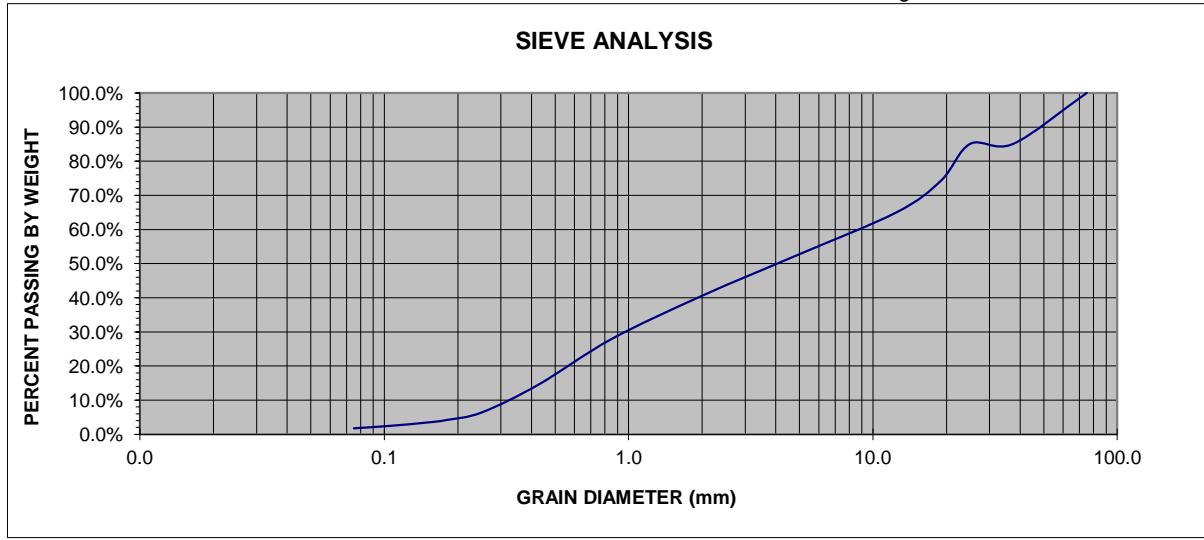
100.0% 100%

77.9% 70%-100%

27.7% \*10%-50%

6.6% 0%-20%

3.3% 0%-5%



\* Percent Passing the #40 sieve can be increased to no greater than 75% if the percent passing the #100 sieve does not exceed 10% and the #200 does not exceed 5%.

\*\* Based on empirical relationship by Hazen (1911) relating permeability to the D<sub>10</sub> grain size.

Accuracy diminishes with >5% passing the #200 Sieve or permeability values <.3 ft/day.

Relationship invalid when D<sub>10</sub> < .1mm or D<sub>10</sub> > 3mm

## WASHED SIEVE ANALYSIS

CLIENT: Avery Brook LLC

DATE: 12/14/2022

SAMPLE: TH 103 42-48", Split 1 of 2

MOIST WEIGHT = 0.958 Kg  
 TOTAL DRY WEIGHT = 0.932 Kg  
 DRY WEIGHT AFTER WASH = 0.926 Kg

Water Content 2.79%

Unified Soil Classification System

Grain Size Comparison

Cobbles 0.0%

Coarse Gravel 20.8%

Fine Gravel 18.9%

Coarse Sand 10.5%

Medium Sand 43.6%

Fine Sand 5.6%

Silt & Clay 0.6%

Uniformity Coeff. 9.45

Permeability Range \*\*

Dense 277 ft/day

Loose 831 ft/day

2000 CT. Health Code Septic Fill Specs

1.5% %Retained on #4 39.7%

1.1% %Passing #4-#200 (Fill less Gravel) Permitted

100.0% 100%

70%-100%

100.0% 100%

70%-100%

10.3% \*10%-50%

1.8% 0%-20%

1.1% 0%-5%

| Sieve Size (mm) | Weight Retained | % Retained | % Passing    |
|-----------------|-----------------|------------|--------------|
| 3"              | 75.0            | 0.000      | 0.0%         |
| 1 1/2"          | 37.5            | 0.000      | 0.0%         |
| 1"              | 25.0            | 0.136      | 14.6%        |
| 3/4"            | 19.0            | 0.058      | 6.2%         |
| 1/2"            | 12.5            | 0.060      | 6.4%         |
| #4              | 4.75            | 0.116      | 12.4%        |
| #10             | 2.00            | 0.098      | 10.5%        |
| #20             | 0.850           | 0.190      | 20.4%        |
| #40             | 0.425           | 0.216      | 23.2%        |
| #60             | 0.250           | 0.044      | 4.7%         |
| #80             | 0.180           | 0.004      | 0.4%         |
| #100            | 0.150           | 0.000      | 0.0%         |
| #140            | 0.106           | 0.002      | 0.2%         |
| #200            | 0.075           | 0.002      | 0.2%         |
| Passing #200    | 0.006           | 0.6%       | %Passing #40 |

Weight of Material Passing #200 Sieve = Total Dry Weight - Dry Weight After Wash

%Passing #100

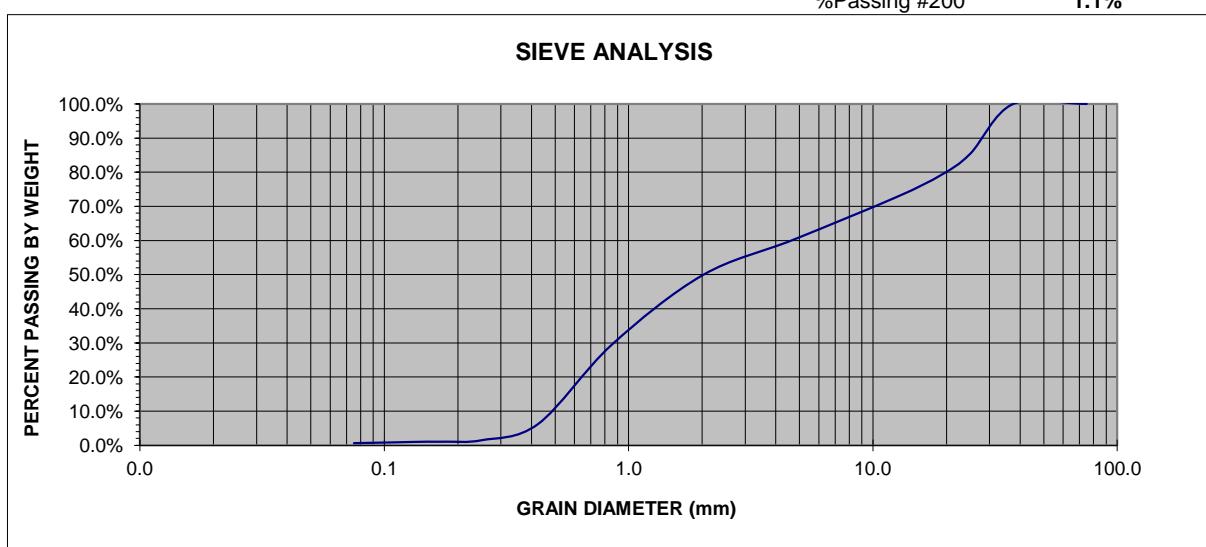
1.8%

0%-20%

%Passing #200

1.1%

0%-5%



\* Percent Passing the #40 sieve can be increased to no greater than 75% if the percent passing the #100 sieve does not exceed 10% and the #200 does not exceed 5%.

\*\* Based on empirical relationship by Hazen (1911) relating permeability to the D<sub>10</sub> grain size.

Accuracy diminishes with >5% passing the #200 Sieve or permeability values <.3 ft/day.

Relationship invalid when D<sub>10</sub> < .1mm or D<sub>10</sub> > 3mm

## WASHED SIEVE ANALYSIS

CLIENT: Avery Brook LLC

DATE: 12/14/2022

SAMPLE: TH 103 42-48", Split 2 of 2

MOIST WEIGHT = 0.79 Kg  
 TOTAL DRY WEIGHT = 0.764 Kg  
 DRY WEIGHT AFTER WASH = 0.742 Kg

Water Content 3.40%

Unified Soil Classification System

Grain Size Comparison

Cobbles 0.0%

Coarse Gravel 6.8%

Fine Gravel 25.1%

Coarse Sand 9.9%

Medium Sand 49.0%

Fine Sand 6.3%

Silt & Clay 2.9%

Uniformity Coeff. 5.75

Permeability Range \*\*

Dense 218 ft/day

Loose 655 ft/day

2000 CT. Health Code Septic Fill Specs

%Retained on #4 31.9%

% Passing #4-#200 (Fill less Gravel) Permitted

100.0% 100.0%

100%

85.4% 70%-100%

70%-100%

13.5% \*10%-50%

\*10%-50%

| Sieve Size (mm) | Weight Retained | % Retained | % Passing |
|-----------------|-----------------|------------|-----------|
| 3"              | 75.0            | 0.000      | 0.0%      |
| 1 1/2"          | 37.5            | 0.000      | 0.0%      |
| 1"              | 25.0            | 0.000      | 0.0%      |
| 3/4"            | 19.0            | 0.052      | 6.8%      |
| 1/2"            | 12.5            | 0.074      | 9.7%      |
| #4              | 4.75            | 0.118      | 15.4%     |
| #10             | 2.00            | 0.076      | 9.9%      |
| #20             | 0.850           | 0.176      | 23.0%     |
| #40             | 0.425           | 0.198      | 25.9%     |
| #60             | 0.250           | 0.040      | 5.2%      |
| #80             | 0.180           | 0.004      | 0.5%      |
| #100            | 0.150           | 0.000      | 0.0%      |
| #140            | 0.106           | 0.002      | 0.3%      |
| #200            | 0.075           | 0.002      | 0.3%      |
| Passing #200    | 0.022           | 2.9%       |           |

Weight of Material Passing #200 Sieve = Total Dry Weight - Dry Weight After Wash

%Passing #40

13.5%

0%-20%

%Passing #100

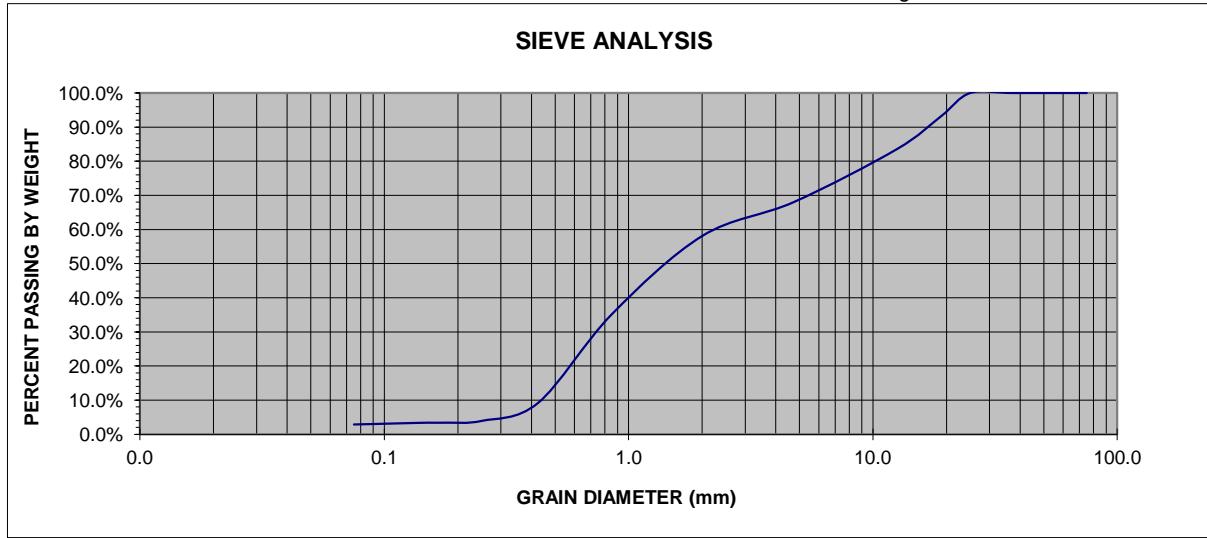
5.0%

0%-5%

%Passing #200

4.2%

0%-5%



\* Percent Passing the #40 sieve can be increased to no greater than 75% if the percent passing the #100 sieve does not exceed 10% and the #200 does not exceed 5%.

\*\* Based on empirical relationship by Hazen (1911) relating permeability to the D<sub>10</sub> grain size.

Accuracy diminishes with >5% passing the #200 Sieve or permeability values <.3 ft/day.

Relationship invalid when D<sub>10</sub> < .1mm or D<sub>10</sub> > 3mm

## WASHED SIEVE ANALYSIS

CLIENT: Avery Brook LLC

DATE: 12/14/2022

SAMPLE: TH 103 165-171", Split 1 of 2

MOIST WEIGHT = 0.85 Kg  
 TOTAL DRY WEIGHT = 0.822 Kg  
 DRY WEIGHT AFTER WASH = 0.812 Kg

Water Content 3.41%

Unified Soil Classification System

Grain Size Comparison

Cobbles 0.0%

Coarse Gravel 24.8%

Fine Gravel 11.2%

Coarse Sand 6.6%

Medium Sand 49.9%

Fine Sand 6.3%

Silt & Clay 1.2%

Uniformity Coeff. 6.67

Permeability Range \*\*

Dense 242 ft/day

Loose 726 ft/day

2000 CT. Health Code Septic Fill Specs

%Retained on #4 36.0%

% Passing #4-%#200 (Fill less Gravel) Permitted

100.0% 100.0%

100.0% 100.0%

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## WASHED SIEVE ANALYSIS

CLIENT: Avery Brook LLC

DATE: 12/14/2022

SAMPLE: TH 103 165-171", Split 2 of 2

MOIST WEIGHT = 0.948 Kg  
 TOTAL DRY WEIGHT = 0.916 Kg  
 DRY WEIGHT AFTER WASH = 0.898 Kg

Water Content 3.49%

Unified Soil Classification System

Grain Size Comparison

Cobbles 0.0%

Coarse Gravel 17.5%

Fine Gravel 16.2%

Coarse Sand 8.7%

Medium Sand 48.3%

Fine Sand 7.4%

Silt & Clay 2.0%

Uniformity Coeff. 6.31

Permeability Range \*\*

Dense 214 ft/day

Loose 642 ft/day

2000 CT. Health Code Septic Fill Specs

3.1% %Retained on #4 33.6%

2.8% % Passing #4-#200 (Fill less Gravel) Permitted

100.0% 100%

86.8% 70%-100%

\*10%-50%

4.3% 0%-20%

3.0% 0%-5%

| Sieve Size (mm) | Weight Retained | % Retained | % Passing |
|-----------------|-----------------|------------|-----------|
| 3"              | 75.0            | 0.000      | 0.0%      |
| 1 1/2"          | 37.5            | 0.102      | 11.1%     |
| 1"              | 25.0            | 0.058      | 6.3%      |
| 3/4"            | 19.0            | 0.000      | 0.0%      |
| 1/2"            | 12.5            | 0.066      | 7.2%      |
| #4              | 4.75            | 0.082      | 9.0%      |
| #10             | 2.00            | 0.080      | 8.7%      |
| #20             | 0.850           | 0.190      | 20.7%     |
| #40             | 0.425           | 0.252      | 27.5%     |
| #60             | 0.250           | 0.050      | 5.5%      |
| #80             | 0.180           | 0.008      | 0.9%      |
| #100            | 0.150           | 0.002      | 0.2%      |
| #140            | 0.106           | 0.004      | 0.4%      |
| #200            | 0.075           | 0.004      | 0.4%      |
| Passing #200    | 0.018           | 2.0%       |           |

Weight of Material Passing #200 Sieve = Total Dry Weight - Dry Weight After Wash

%Passing #40

%Passing #100

%Passing #200

14.1%

4.3%

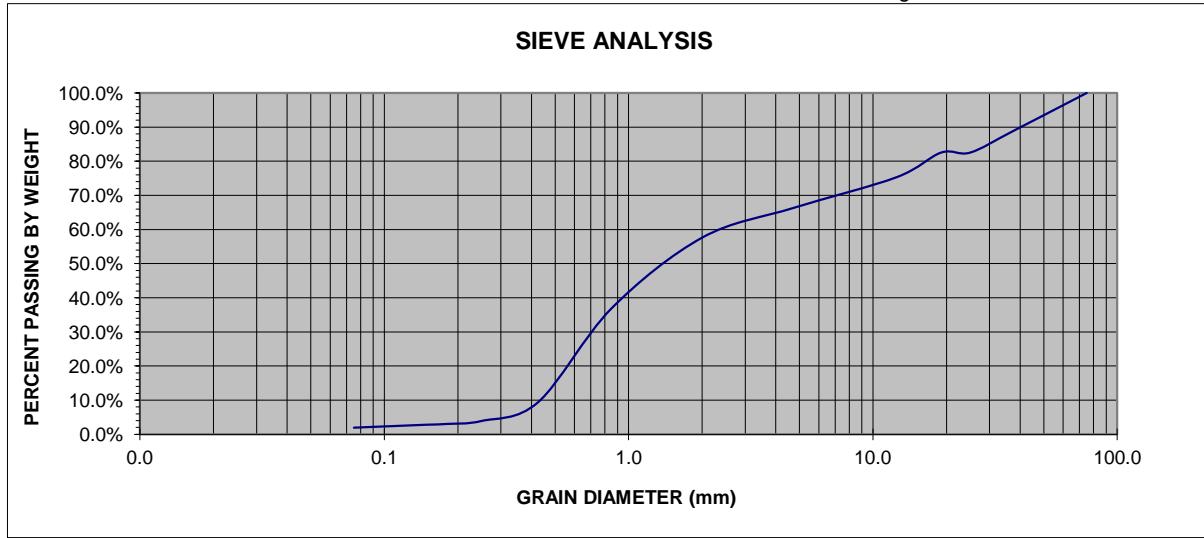
3.0%

100.0% 100%

86.8% 70%-100%

4.3% 0%-20%

3.0% 0%-5%



\* Percent Passing the #40 sieve can be increased to no greater than 75% if the percent passing the #100 sieve does not exceed 10% and the #200 does not exceed 5%.

\*\* Based on empirical relationship by Hazen (1911) relating permeability to the D<sub>10</sub> grain size.

Accuracy diminishes with >5% passing the #200 Sieve or permeability values <.3 ft/day.

Relationship invalid when D<sub>10</sub> < .1mm or D<sub>10</sub> > 3mm

## WASHED SIEVE ANALYSIS

CLIENT: Avery Brook LLC

DATE: 12/14/2022

SAMPLE: TH 104 42-48", Split 1 of 2

MOIST WEIGHT = 0.918 Kg  
 TOTAL DRY WEIGHT = 0.904 Kg  
 DRY WEIGHT AFTER WASH = 0.888 Kg

Water Content 1.55%

Unified Soil Classification System

Grain Size Comparison

Cobbles 0.0%

Coarse Gravel 35.0%

Fine Gravel 35.2%

Coarse Sand 12.4%

Medium Sand 11.1%

Fine Sand 4.6%

Silt & Clay 1.8%

Uniformity Coeff. 22.93

Permeability Range \*\*

Dense 510 ft/day

Loose 1531 ft/day

2000 CT. Health Code Septic Fill Specs

3.1% %Retained on #4 70.1%

2.4% %Passing #4-#200 (Fill less Gravel) Permitted

2.2% %Passing #4 100.0% 100%

2.0% %Passing #10 58.5% 70%-100%

1.8% %Passing #40 21.5% \*10%-50%

1.8% %Passing #100 7.4% 0%-20%

1.8% %Passing #200 5.9% 0%-5%

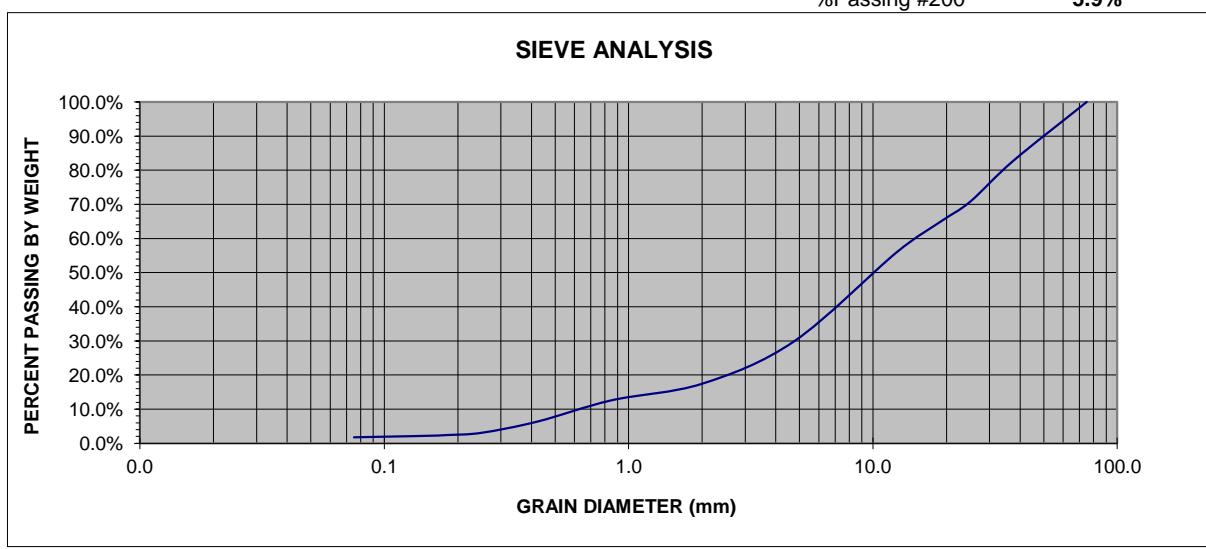
| Sieve Size (mm) | Weight Retained | % Retained | % Passing |
|-----------------|-----------------|------------|-----------|
| 3"              | 75.0            | 0.000      | 0.0%      |
| 1 1/2"          | 37.5            | 0.156      | 17.3%     |
| 1"              | 25.0            | 0.108      | 11.9%     |
| 3/4"            | 19.0            | 0.052      | 5.8%      |
| 1/2"            | 12.5            | 0.082      | 9.1%      |
| #4              | 4.75            | 0.236      | 26.1%     |
| #10             | 2.00            | 0.112      | 12.4%     |
| #20             | 0.850           | 0.044      | 4.9%      |
| #40             | 0.425           | 0.056      | 6.2%      |
| #60             | 0.250           | 0.030      | 3.3%      |
| #80             | 0.180           | 0.006      | 0.7%      |
| #100            | 0.150           | 0.002      | 0.2%      |
| #140            | 0.106           | 0.002      | 0.2%      |
| #200            | 0.075           | 0.002      | 0.2%      |
| Passing #200    | 0.016           | 1.8%       |           |

Weight of Material Passing #200 Sieve = Total Dry Weight - Dry Weight After Wash

%Passing #40 21.5%

%Passing #100 7.4%

%Passing #200 5.9%



\* Percent Passing the #40 sieve can be increased to no greater than 75% if the percent passing the #100 sieve does not exceed 10% and the #200 does not exceed 5%.

\*\* Based on empirical relationship by Hazen (1911) relating permeability to the D<sub>10</sub> grain size.

Accuracy diminishes with >5% passing the #200 Sieve or permeability values <.3 ft/day.

Relationship invalid when D<sub>10</sub> < .1mm or D<sub>10</sub> > 3mm

## WASHED SIEVE ANALYSIS

CLIENT: Avery Brook LLC

DATE: 12/14/2022

SAMPLE: TH 104 42-48", Split 2 of 2

MOIST WEIGHT = 0.786 Kg  
 TOTAL DRY WEIGHT = 0.774 Kg  
 DRY WEIGHT AFTER WASH = 0.760 Kg

Water Content 1.55%

Unified Soil Classification System

Grain Size Comparison

Cobbles 0.0%

Coarse Gravel 13.7%

Fine Gravel 53.0%

Coarse Sand 13.2%

Medium Sand 12.7%

Fine Sand 5.7%

Silt & Clay 1.8%

Uniformity Coeff. 19.95

Permeability Range \*\*

Dense 371 ft/day

Loose 1114 ft/day

2000 CT. Health Code Septic Fill Specs

%Retained on #4 66.7%

% Passing #4-%#200 (Fill less Gravel) Permitted

100.0% 100%

60.5% 70%-100%

\*10%-50%

22.5% 0%-20%

7.8% 0%-5%

5.4% 0%-5%

| Sieve Size (mm) | Weight Retained | % Retained | % Passing |
|-----------------|-----------------|------------|-----------|
| 3"              | 75.0            | 0.000      | 0.0%      |
| 1 1/2"          | 37.5            | 0.000      | 0.0%      |
| 1"              | 25.0            | 0.054      | 7.0%      |
| 3/4"            | 19.0            | 0.052      | 6.7%      |
| 1/2"            | 12.5            | 0.170      | 22.0%     |
| #4              | 4.75            | 0.240      | 31.0%     |
| #10             | 2.00            | 0.102      | 13.2%     |
| #20             | 0.850           | 0.042      | 5.4%      |
| #40             | 0.425           | 0.056      | 7.2%      |
| #60             | 0.250           | 0.030      | 3.9%      |
| #80             | 0.180           | 0.006      | 0.8%      |
| #100            | 0.150           | 0.002      | 0.3%      |
| #140            | 0.106           | 0.004      | 0.5%      |
| #200            | 0.075           | 0.002      | 0.3%      |
| Passing #200    | 0.014           | 1.8%       |           |

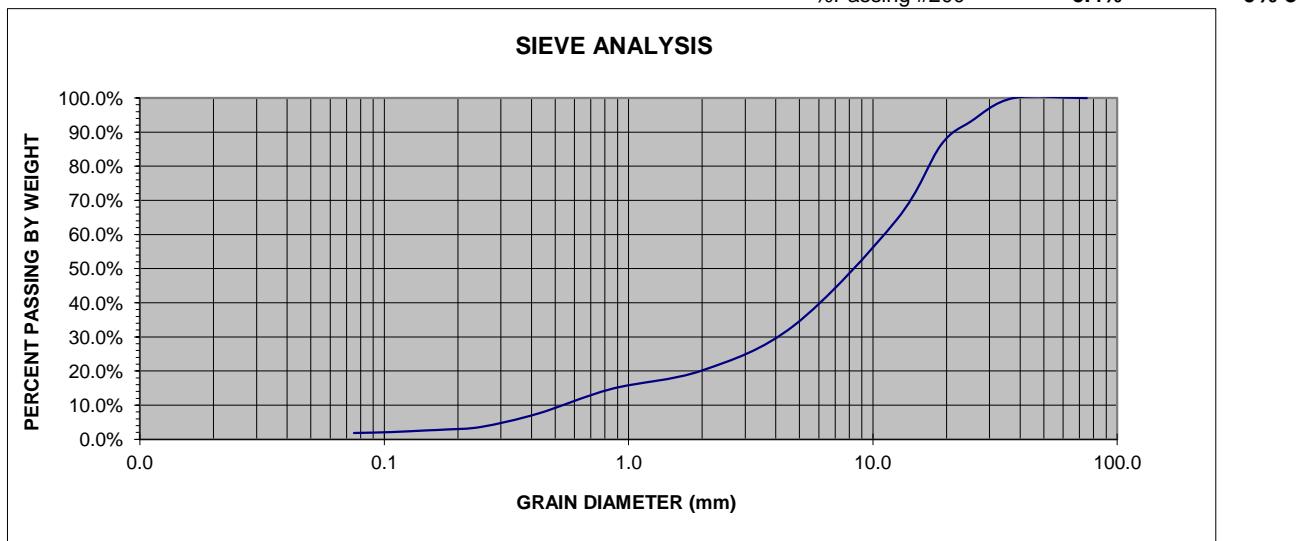
Weight of Material Passing #200 Sieve = Total Dry Weight - Dry Weight After Wash

%Passing #40

%Passing #100

%Passing #100

%Passing #200



\* Percent Passing the #40 sieve can be increased to no greater than 75% if the percent passing the #100 sieve does not exceed 10% and the #200 does not exceed 5%.

\*\* Based on empirical relationship by Hazen (1911) relating permeability to the D<sub>10</sub> grain size.

Accuracy diminishes with >5% passing the #200 Sieve or permeability values <.3 ft/day.

Relationship invalid when D<sub>10</sub> < .1mm or D<sub>10</sub> > 3mm

## WASHED SIEVE ANALYSIS

CLIENT: Avery Brook LLC

DATE: 12/14/2022

SAMPLE: TH 105 42-48", Split 1 of 2

MOIST WEIGHT = 0.728 Kg  
 TOTAL DRY WEIGHT = 0.712 Kg  
 DRY WEIGHT AFTER WASH = 0.700 Kg

Water Content 2.25%

Unified Soil Classification System

Grain Size Comparison

Cobbles 0.0%

Coarse Gravel 19.7%

Fine Gravel 29.2%

Coarse Sand 11.8%

Medium Sand 25.0%

Fine Sand 12.6%

Silt & Clay 1.7%

Uniformity Coeff. 24.11

Permeability Range \*\*

Dense 130 ft/day

Loose 389 ft/day

2000 CT. Health Code Septic Fill Specs

3.4% %Retained on #4 48.9%

2.8% % Passing #4-#200 (Fill less Gravel) Permitted

100.0% 100%

70%-100%

\*10%-50%

28.0% 5.5%

0%-20%

3.3% 0%-5%

| Sieve Size (mm) | Weight Retained | % Retained | % Passing |
|-----------------|-----------------|------------|-----------|
| 3"              | 75.0            | 0.000      | 0.0%      |
| 1 1/2"          | 37.5            | 0.000      | 0.0%      |
| 1"              | 25.0            | 0.058      | 8.1%      |
| 3/4"            | 19.0            | 0.082      | 11.5%     |
| 1/2"            | 12.5            | 0.064      | 9.0%      |
| #4              | 4.75            | 0.144      | 20.2%     |
| #10             | 2.00            | 0.084      | 11.8%     |
| #20             | 0.850           | 0.066      | 9.3%      |
| #40             | 0.425           | 0.112      | 15.7%     |
| #60             | 0.250           | 0.062      | 8.7%      |
| #80             | 0.180           | 0.016      | 2.2%      |
| #100            | 0.150           | 0.004      | 0.6%      |
| #140            | 0.106           | 0.006      | 0.8%      |
| #200            | 0.075           | 0.002      | 0.3%      |
| Passing #200    | 0.012           | 1.7%       |           |

Weight of Material Passing #200 Sieve = Total Dry Weight - Dry Weight After Wash

%Passing #100

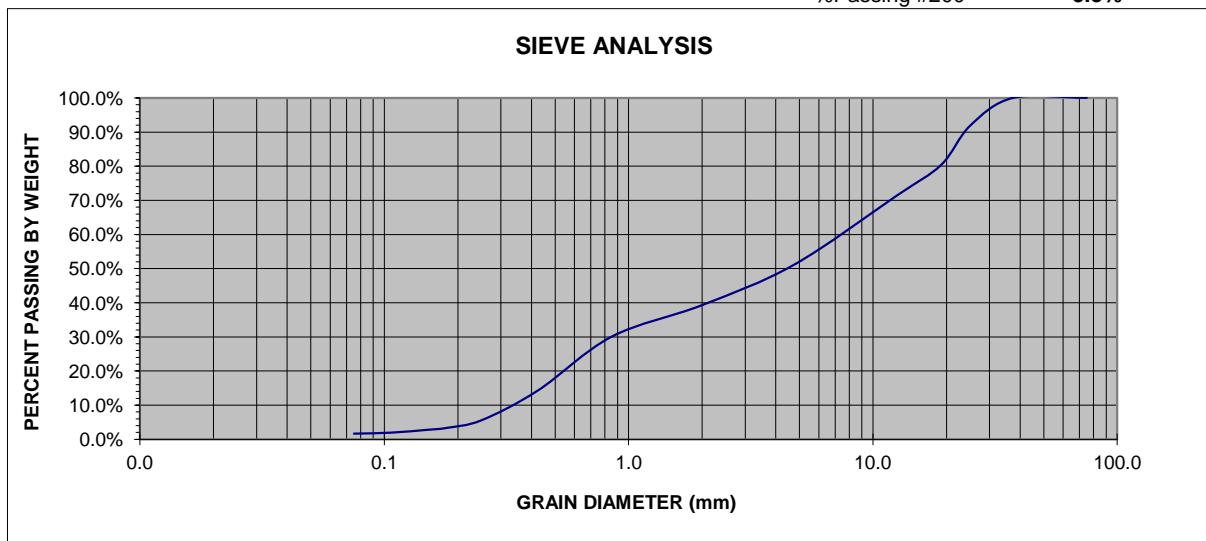
5.5%

0%-20%

%Passing #200

3.3%

0%-5%



\* Percent Passing the #40 sieve can be increased to no greater than 75% if the percent passing the #100 sieve does not exceed 10% and the #200 does not exceed 5%.

\*\* Based on empirical relationship by Hazen (1911) relating permeability to the D<sub>10</sub> grain size.

Accuracy diminishes with >5% passing the #200 Sieve or permeability values <.3 ft/day.

Relationship invalid when D<sub>10</sub> < .1mm or D<sub>10</sub> > 3mm

## WASHED SIEVE ANALYSIS

CLIENT: Avery Brook LLC

DATE: 12/14/2022

SAMPLE: TH 105 42-48", Split 2 of 2

MOIST WEIGHT = 0.872 Kg  
 TOTAL DRY WEIGHT = 0.852 Kg  
 DRY WEIGHT AFTER WASH = 0.840 Kg

Water Content 2.35%

Unified Soil Classification System

Grain Size Comparison

Cobbles 0.0%

Coarse Gravel 18.3%

Fine Gravel 30.0%

Coarse Sand 13.1%

Medium Sand 25.4%

Fine Sand 11.7%

Silt & Clay 1.4%

Uniformity Coeff. 21.13

Permeability Range \*\*

Dense 145 ft/day

Loose 436 ft/day

2000 CT. Health Code Septic Fill Specs

3.1% %Retained on #4 48.4%

2.6% % Passing #4-#200 (Fill less Gravel) Permitted

100.0% 100%

74.5% 70%-100%

\*10%-50%

5.0% 0%-20%

2.7% 0%-5%

| Sieve Size (mm) | Weight Retained | % Retained | % Passing |
|-----------------|-----------------|------------|-----------|
| 3"              | 75.0            | 0.000      | 0.0%      |
| 1 1/2"          | 37.5            | 0.000      | 0.0%      |
| 1"              | 25.0            | 0.076      | 8.9%      |
| 3/4"            | 19.0            | 0.080      | 9.4%      |
| 1/2"            | 12.5            | 0.060      | 7.0%      |
| #4              | 4.75            | 0.196      | 23.0%     |
| #10             | 2.00            | 0.112      | 13.1%     |
| #20             | 0.850           | 0.082      | 9.6%      |
| #40             | 0.425           | 0.134      | 15.7%     |
| #60             | 0.250           | 0.070      | 8.2%      |
| #80             | 0.180           | 0.016      | 1.9%      |
| #100            | 0.150           | 0.004      | 0.5%      |
| #140            | 0.106           | 0.006      | 0.7%      |
| #200            | 0.075           | 0.004      | 0.5%      |
| Passing #200    | 0.012           | 1.4%       |           |

Weight of Material Passing #200 Sieve = Total Dry Weight - Dry Weight After Wash

%Passing #100

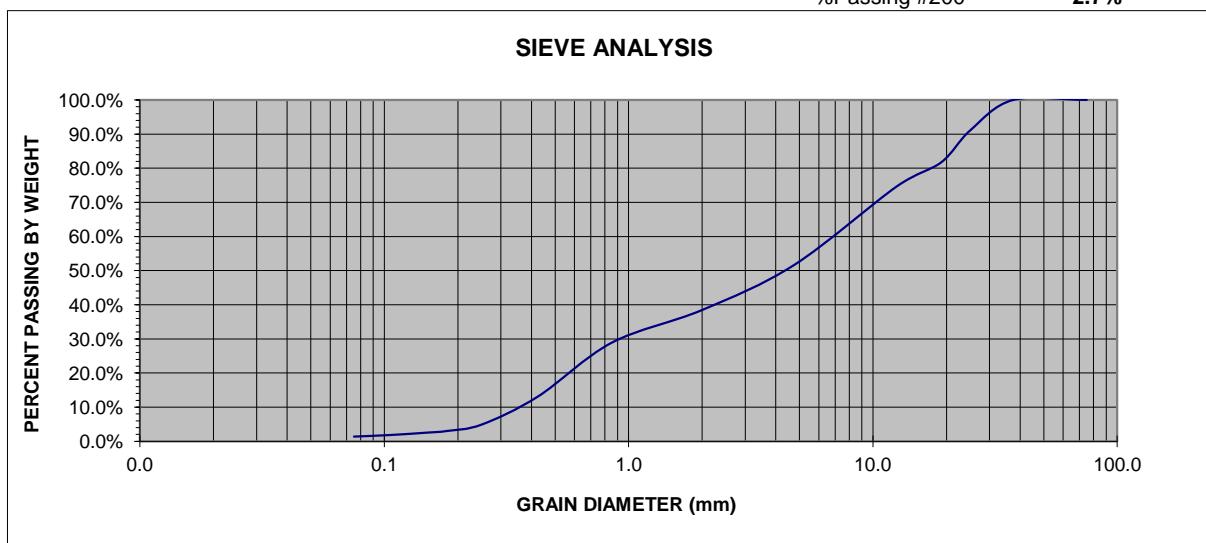
5.0%

0%-20%

%Passing #200

2.7%

0%-5%



\* Percent Passing the #40 sieve can be increased to no greater than 75% if the percent passing the #100 sieve does not exceed 10% and the #200 does not exceed 5%.

\*\* Based on empirical relationship by Hazen (1911) relating permeability to the D<sub>10</sub> grain size.

Accuracy diminishes with >5% passing the #200 Sieve or permeability values <.3 ft/day.

Relationship invalid when D<sub>10</sub> < .1mm or D<sub>10</sub> > 3mm

## WASHED SIEVE ANALYSIS

CLIENT: Avery Brook LLC

DATE: 12/14/2022

SAMPLE: TH 106 55-60", Split 1 of 2

MOIST WEIGHT = 1.042 Kg  
 TOTAL DRY WEIGHT = 1.028 Kg  
 DRY WEIGHT AFTER WASH = 1.016 Kg

Water Content 1.36%

Unified Soil Classification System

Grain Size Comparison

Cobbles 0.0%

Coarse Gravel 44.0%

Fine Gravel 19.6%

Coarse Sand 7.0%

Medium Sand 23.3%

Fine Sand 4.9%

Silt & Clay 1.2%

Uniformity Coeff. 43.86

Permeability Range \*\*

Dense 374 ft/day

Loose 1123 ft/day

2000 CT. Health Code Septic Fill Specs

%Retained on #4 63.6%

% Passing #4-%#200 (Fill less Gravel) Permitted

100.0% 100.0%

100%

80.7% 70%-100%

70%-100%

60.6% \*10%-50%

\*10%-50%

| Sieve Size (mm) | Weight Retained | % Retained | % Passing |
|-----------------|-----------------|------------|-----------|
| 3"              | 75.0            | 0.000      | 0.0%      |
| 1 1/2"          | 37.5            | 0.236      | 23.0%     |
| 1"              | 25.0            | 0.178      | 17.3%     |
| 3/4"            | 19.0            | 0.038      | 3.7%      |
| 1/2"            | 12.5            | 0.078      | 7.6%      |
| #4              | 4.75            | 0.124      | 12.1%     |
| #10             | 2.00            | 0.072      | 7.0%      |
| #20             | 0.850           | 0.124      | 12.1%     |
| #40             | 0.425           | 0.116      | 11.3%     |
| #60             | 0.250           | 0.036      | 3.5%      |
| #80             | 0.180           | 0.006      | 0.6%      |
| #100            | 0.150           | 0.004      | 0.4%      |
| #140            | 0.106           | 0.002      | 0.2%      |
| #200            | 0.075           | 0.002      | 0.2%      |
| Passing #200    | 0.012           | 1.2%       |           |

Weight of Material Passing #200 Sieve = Total Dry Weight - Dry Weight After Wash

%Passing #40

16.6%

\*10%-50%

%Passing #100

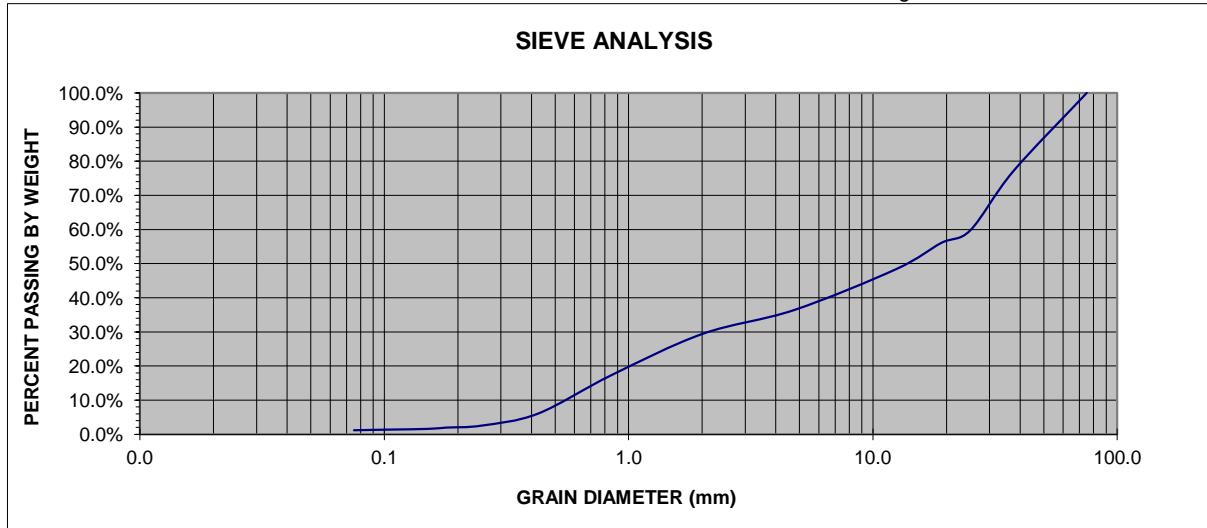
4.3%

0%-20%

%Passing #200

3.2%

0%-5%



\* Percent Passing the #40 sieve can be increased to no greater than 75% if the percent passing the #100 sieve does not exceed 10% and the #200 does not exceed 5%.

\*\* Based on empirical relationship by Hazen (1911) relating permeability to the D<sub>10</sub> grain size.

Accuracy diminishes with >5% passing the #200 Sieve or permeability values <.3 ft/day.

Relationship invalid when D<sub>10</sub> < .1mm or D<sub>10</sub> > 3mm

## WASHED SIEVE ANALYSIS

CLIENT: Avery Brook LLC

DATE: 12/14/2022

SAMPLE: TH 106 55-60", Split 2 of 2

MOIST WEIGHT = 1.136 Kg  
 TOTAL DRY WEIGHT = 1.114 Kg  
 DRY WEIGHT AFTER WASH = 1.098 Kg

Water Content 1.97%

Unified Soil Classification System

Grain Size Comparison

Cobbles 0.0%

Coarse Gravel 27.5%

Fine Gravel 23.9%

Coarse Sand 9.2%

Medium Sand 31.4%

Fine Sand 6.6%

Silt & Clay 1.4%

Uniformity Coeff. 22.62

Permeability Range \*\*

Dense 258 ft/day

Loose 775 ft/day

2000 CT. Health Code Septic Fill Specs

%Retained on #4 51.3%

% Passing #4-%#200 (Fill less Gravel) Permitted

100.0% 100.0%

100%

81.2% 70%-100%

70%-100%

16.6% \*10%-50%

\*10%-50%

| Sieve Size (mm) | Weight Retained | % Retained | % Passing |
|-----------------|-----------------|------------|-----------|
| 3"              | 75.0            | 0.000      | 0.0%      |
| 1 1/2"          | 37.5            | 0.268      | 24.1%     |
| 1"              | 25.0            | 0.000      | 0.0%      |
| 3/4"            | 19.0            | 0.038      | 3.4%      |
| 1/2"            | 12.5            | 0.104      | 9.3%      |
| #4              | 4.75            | 0.162      | 14.5%     |
| #10             | 2.00            | 0.102      | 9.2%      |
| #20             | 0.850           | 0.176      | 15.8%     |
| #40             | 0.425           | 0.174      | 15.6%     |
| #60             | 0.250           | 0.052      | 4.7%      |
| #80             | 0.180           | 0.012      | 1.1%      |
| #100            | 0.150           | 0.002      | 0.2%      |
| #140            | 0.106           | 0.004      | 0.4%      |
| #200            | 0.075           | 0.004      | 0.4%      |
| Passing #200    | 0.016           | 1.4%       |           |

Weight of Material Passing #200 Sieve = Total Dry Weight - Dry Weight After Wash

%Passing #100

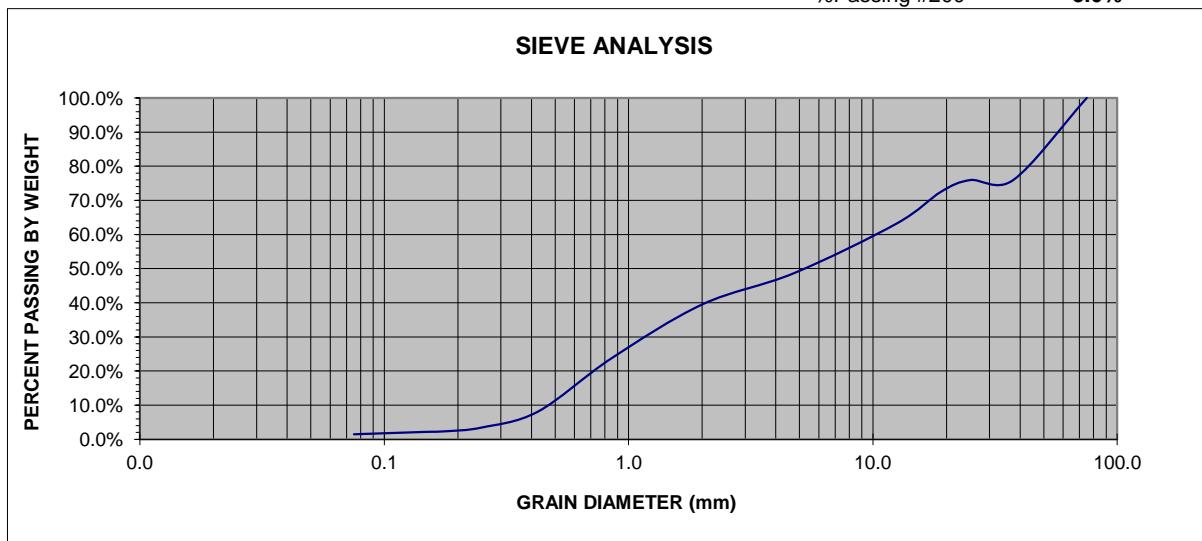
4.4%

0%-20%

%Passing #200

3.0%

0%-5%



\* Percent Passing the #40 sieve can be increased to no greater than 75% if the percent passing the #100 sieve does not exceed 10% and the #200 does not exceed 5%.

\*\* Based on empirical relationship by Hazen (1911) relating permeability to the D<sub>10</sub> grain size.

Accuracy diminishes with >5% passing the #200 Sieve or permeability values <.3 ft/day.

Relationship invalid when D<sub>10</sub> < .1mm or D<sub>10</sub> > 3mm

## WASHED SIEVE ANALYSIS

CLIENT: Avery Brook LLC

DATE: 12/14/2022

SAMPLE: TH 108 46-50", Split 1 of 2

MOIST WEIGHT = 0.85 Kg  
 TOTAL DRY WEIGHT = 0.836 Kg  
 DRY WEIGHT AFTER WASH = 0.828 Kg

Water Content 1.67%

Unified Soil Classification System

Grain Size Comparison

Cobbles 0.0%

Coarse Gravel 28.9%

Fine Gravel 30.1%

Coarse Sand 7.2%

Medium Sand 21.5%

Fine Sand 11.2%

Silt & Clay 1.0%

Uniformity Coeff. 39.11

Permeability Range \*\*

Dense 162 ft/day

Loose 485 ft/day

2000 CT. Health Code Septic Fill Specs

%Retained on #4 59.1%

% Passing #4-%#200 (Fill less Gravel) Permitted

100.0% 100%

82.5% 70%-100%

29.8% \*10%-50%

4.7% 0%-20%

2.3% 0%-5%

| Sieve Size (mm) | Weight Retained | % Retained | % Passing |
|-----------------|-----------------|------------|-----------|
| 3"              | 75.0            | 0.000      | 0.0%      |
| 1 1/2"          | 37.5            | 0.000      | 0.0%      |
| 1"              | 25.0            | 0.182      | 21.8%     |
| 3/4"            | 19.0            | 0.060      | 7.2%      |
| 1/2"            | 12.5            | 0.142      | 17.0%     |
| #4              | 4.75            | 0.110      | 13.2%     |
| #10             | 2.00            | 0.060      | 7.2%      |
| #20             | 0.850           | 0.070      | 8.4%      |
| #40             | 0.425           | 0.110      | 13.2%     |
| #60             | 0.250           | 0.068      | 8.1%      |
| #80             | 0.180           | 0.014      | 1.7%      |
| #100            | 0.150           | 0.004      | 0.5%      |
| #140            | 0.106           | 0.004      | 0.5%      |
| #200            | 0.075           | 0.004      | 0.5%      |
| Passing #200    | 0.008           | 1.0%       |           |

Weight of Material Passing #200 Sieve = Total Dry Weight - Dry Weight After Wash

%Passing #100

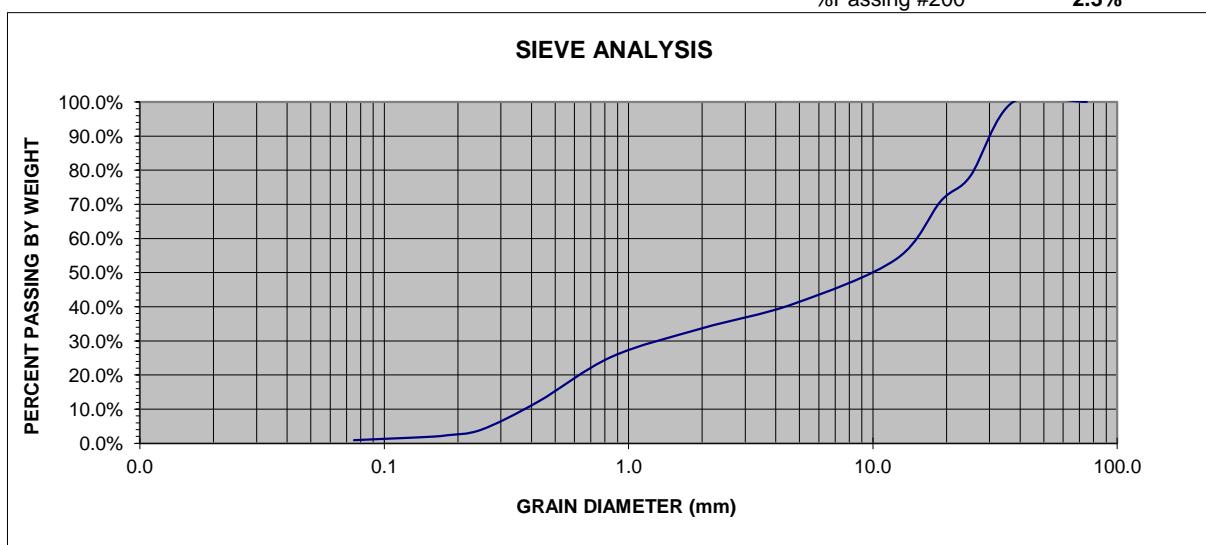
4.7%

0%-20%

%Passing #200

2.3%

0%-5%



\* Percent Passing the #40 sieve can be increased to no greater than 75% if the percent passing the #100 sieve does not exceed 10% and the #200 does not exceed 5%.

\*\* Based on empirical relationship by Hazen (1911) relating permeability to the D<sub>10</sub> grain size.

Accuracy diminishes with >5% passing the #200 Sieve or permeability values <.3 ft/day.

Relationship invalid when D<sub>10</sub> < .1mm or D<sub>10</sub> > 3mm

## WASHED SIEVE ANALYSIS

CLIENT: Avery Brook LLC

DATE: 12/14/2022

SAMPLE: TH 108 46-50", Split 2 of 2

MOIST WEIGHT = 0.95 Kg  
 TOTAL DRY WEIGHT = 0.932 Kg  
 DRY WEIGHT AFTER WASH = 0.916 Kg

Water Content 1.93%

Unified Soil Classification System

Grain Size Comparison

Cobbles 0.0%

Coarse Gravel 33.7%

Fine Gravel 28.1%

Coarse Sand 6.7%

Medium Sand 19.1%

Fine Sand 10.7%

Silt & Clay 1.7%

Uniformity Coeff. 39.66

Permeability Range \*\*

Dense 155 ft/day

Loose 465 ft/day

2000 CT. Health Code Septic Fill Specs

%Retained on #4 61.8%

% Passing #4-%#200 (Fill less Gravel) Permitted

100.0% 100%

82.6% 70%-100%

\*10%-50%

6.7% 0%-20%

4.5% 0%-5%

| Sieve Size (mm) | Weight Retained | % Retained | % Passing |
|-----------------|-----------------|------------|-----------|
| 3"              | 75.0            | 0.000      | 0.0%      |
| 1 1/2"          | 37.5            | 0.000      | 0.0%      |
| 1"              | 25.0            | 0.266      | 28.5%     |
| 3/4"            | 19.0            | 0.048      | 5.2%      |
| 1/2"            | 12.5            | 0.088      | 9.4%      |
| #4              | 4.75            | 0.174      | 18.7%     |
| #10             | 2.00            | 0.062      | 6.7%      |
| #20             | 0.850           | 0.070      | 7.5%      |
| #40             | 0.425           | 0.108      | 11.6%     |
| #60             | 0.250           | 0.072      | 7.7%      |
| #80             | 0.180           | 0.016      | 1.7%      |
| #100            | 0.150           | 0.004      | 0.4%      |
| #140            | 0.106           | 0.004      | 0.4%      |
| #200            | 0.075           | 0.004      | 0.4%      |
| Passing #200    | 0.016           | 1.7%       |           |

Weight of Material Passing #200 Sieve = Total Dry Weight - Dry Weight After Wash

%Passing #40

32.6%

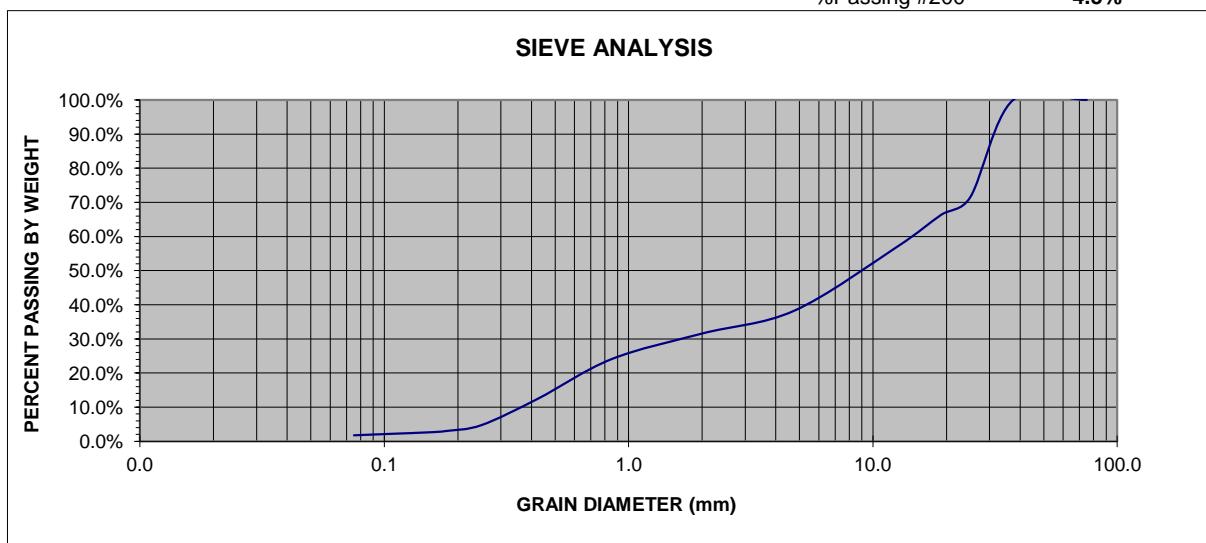
\*10%-50%

6.7%

0%-20%

4.5%

0%-5%



\* Percent Passing the #40 sieve can be increased to no greater than 75% if the percent passing the #100 sieve does not exceed 10% and the #200 does not exceed 5%.

\*\* Based on empirical relationship by Hazen (1911) relating permeability to the D<sub>10</sub> grain size.

Accuracy diminishes with >5% passing the #200 Sieve or permeability values <.3 ft/day.

Relationship invalid when D<sub>10</sub> < .1mm or D<sub>10</sub> > 3mm

## WASHED SIEVE ANALYSIS

CLIENT: Avery Brook LLC

DATE: 12/14/2022

SAMPLE: TH 109 46-52", Split 1 of 2

MOIST WEIGHT = 0.9 Kg  
 TOTAL DRY WEIGHT = 0.878 Kg  
 DRY WEIGHT AFTER WASH = 0.860 Kg

Water Content 2.51%

Unified Soil Classification System

Grain Size Comparison

Cobbles 0.0%

Coarse Gravel 38.3%

Fine Gravel 24.8%

Coarse Sand 11.2%

Medium Sand 16.6%

Fine Sand 7.1%

Silt & Clay 2.1%

Uniformity Coeff. 36.92

Permeability Range \*\*

Dense 260 ft/day

Loose 779 ft/day

2000 CT. Health Code Septic Fill Specs

%Retained on #4 63.1%

% Passing #4-%#200 (Fill less Gravel) Permitted

100.0% 100.0%

100%

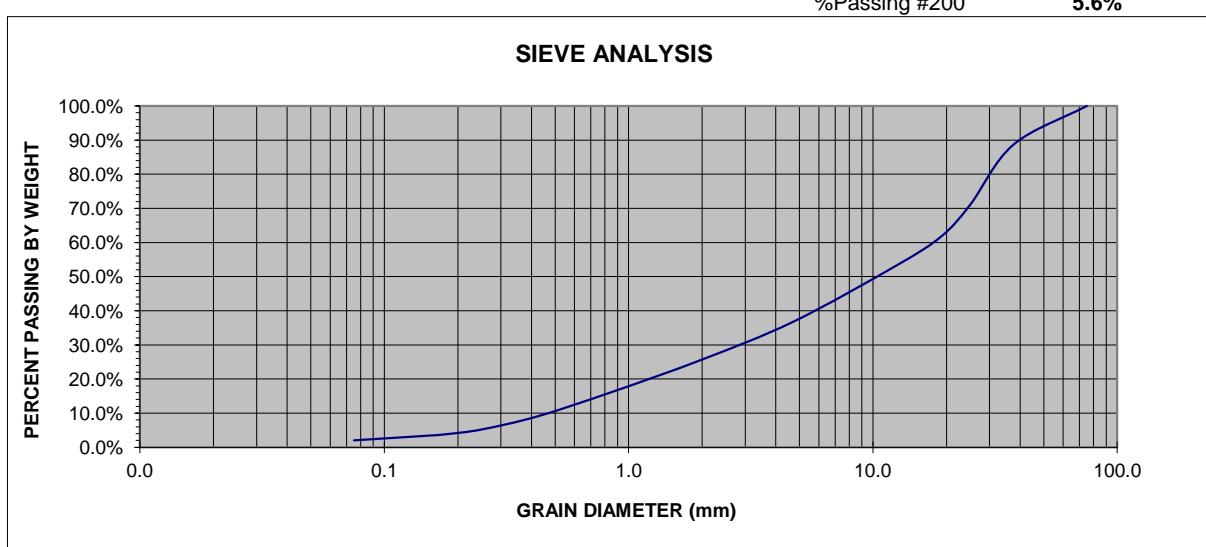
69.8% 70%-100%

70%-100%

24.7% \*10%-50%

\*10%-50%

| Sieve Size (mm)                                                                  | Weight Retained | % Retained | % Passing |               |       |        |
|----------------------------------------------------------------------------------|-----------------|------------|-----------|---------------|-------|--------|
| 3"                                                                               | 75.0            | 0.000      | 0.0%      | 100.0%        |       |        |
| 1 1/2"                                                                           | 37.5            | 0.100      | 11.4%     | 88.6%         |       |        |
| 1"                                                                               | 25.0            | 0.154      | 17.5%     | 71.1%         |       |        |
| 3/4"                                                                             | 19.0            | 0.082      | 9.3%      | 61.7%         |       |        |
| 1/2"                                                                             | 12.5            | 0.074      | 8.4%      | 53.3%         |       |        |
| #4                                                                               | 4.75            | 0.144      | 16.4%     | 36.9%         |       |        |
| #10                                                                              | 2.00            | 0.098      | 11.2%     | 25.7%         |       |        |
| #20                                                                              | 0.850           | 0.084      | 9.6%      | 16.2%         |       |        |
| #40                                                                              | 0.425           | 0.062      | 7.1%      | 9.1%          |       |        |
| #60                                                                              | 0.250           | 0.034      | 3.9%      | 5.2%          |       |        |
| #80                                                                              | 0.180           | 0.012      | 1.4%      | 3.9%          |       |        |
| #100                                                                             | 0.150           | 0.004      | 0.5%      | 3.4%          |       |        |
| #140                                                                             | 0.106           | 0.006      | 0.7%      | 2.7%          |       |        |
| #200                                                                             | 0.075           | 0.006      | 0.7%      | 2.1%          |       |        |
| Passing #200                                                                     | 0.018           | 2.1%       |           | %Passing #40  | 24.7% |        |
| Weight of Material Passing #200 Sieve = Total Dry Weight - Dry Weight After Wash |                 |            |           | %Passing #100 | 9.3%  | 0%-20% |
|                                                                                  |                 |            |           | %Passing #200 | 5.6%  | 0%-5%  |



\* Percent Passing the #40 sieve can be increased to no greater than 75% if the percent passing the #100 sieve does not exceed 10% and the #200 does not exceed 5%.

\*\* Based on empirical relationship by Hazen (1911) relating permeability to the D<sub>10</sub> grain size.

Accuracy diminishes with >5% passing the #200 Sieve or permeability values <.3 ft/day.

Relationship invalid when D<sub>10</sub> < .1mm or D<sub>10</sub> > 3mm

## WASHED SIEVE ANALYSIS

CLIENT: Avery Brook LLC

DATE: 12/14/2022

SAMPLE: TH 109 46-52", Split 2 of 2

MOIST WEIGHT = 0.8 Kg  
 TOTAL DRY WEIGHT = 0.78 Kg  
 DRY WEIGHT AFTER WASH = 0.764 Kg

Water Content 2.56%

Unified Soil Classification System

Grain Size Comparison

Cobbles 0.0%

Coarse Gravel 26.4%

Fine Gravel 27.9%

Coarse Sand 13.6%

Medium Sand 21.8%

Fine Sand 8.2%

Silt & Clay 2.1%

Uniformity Coeff. 26.77

Permeability Range \*\*

Dense 196 ft/day

Loose 588 ft/day

2000 CT. Health Code Septic Fill Specs

%Retained on #4 54.4%

% Passing #4-%#200 (Fill less Gravel) Permitted

100.0% 100.0%

70.2% 70.2%

22.5% \*10%-50%

7.3% 0%-20%

4.5% 0%-5%

| Sieve Size (mm) | Weight Retained | % Retained | % Passing    |
|-----------------|-----------------|------------|--------------|
| 3"              | 75.0            | 0.000      | 0.0%         |
| 1 1/2"          | 37.5            | 0.000      | 0.0%         |
| 1"              | 25.0            | 0.162      | 20.8%        |
| 3/4"            | 19.0            | 0.044      | 5.6%         |
| 1/2"            | 12.5            | 0.082      | 10.5%        |
| #4              | 4.75            | 0.136      | 17.4%        |
| #10             | 2.00            | 0.106      | 13.6%        |
| #20             | 0.850           | 0.100      | 12.8%        |
| #40             | 0.425           | 0.070      | 9.0%         |
| #60             | 0.250           | 0.038      | 4.9%         |
| #80             | 0.180           | 0.012      | 1.5%         |
| #100            | 0.150           | 0.004      | 0.5%         |
| #140            | 0.106           | 0.006      | 0.8%         |
| #200            | 0.075           | 0.004      | 0.5%         |
| Passing #200    | 0.016           | 2.1%       | %Passing #40 |

Weight of Material Passing #200 Sieve = Total Dry Weight - Dry Weight After Wash

%Passing #100

7.3%

%Passing #200

4.5%

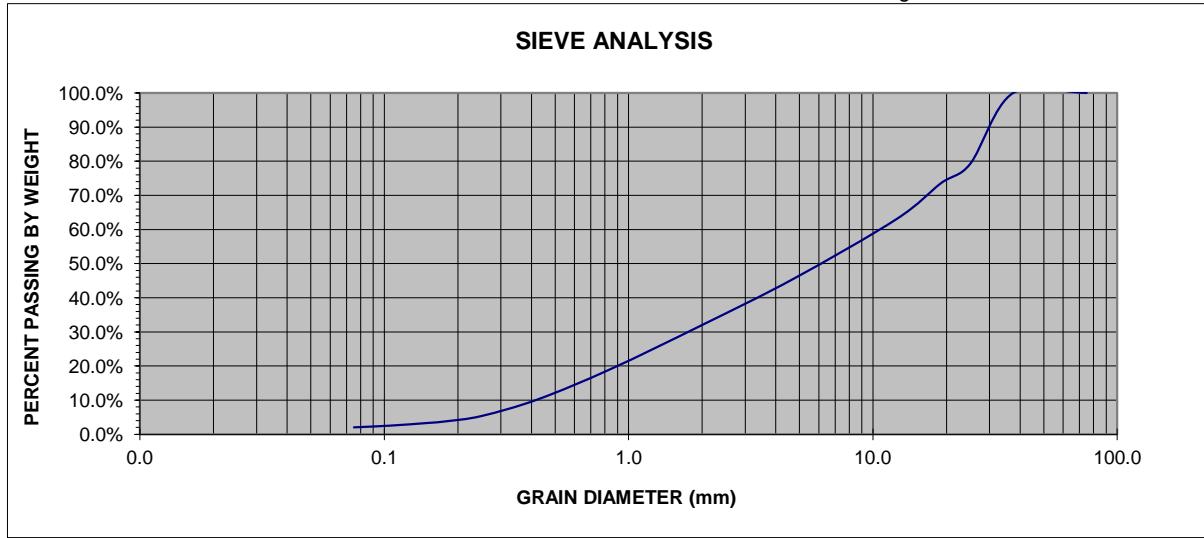
100.0% 100.0%

70.2% 70.2%

22.5% \*10%-50%

7.3% 0%-20%

4.5% 0%-5%



\* Percent Passing the #40 sieve can be increased to no greater than 75% if the percent passing the #100 sieve does not exceed 10% and the #200 does not exceed 5%.

\*\* Based on empirical relationship by Hazen (1911) relating permeability to the D<sub>10</sub> grain size.

Accuracy diminishes with >5% passing the #200 Sieve or permeability values <.3 ft/day.

Relationship invalid when D<sub>10</sub> < .1mm or D<sub>10</sub> > 3mm



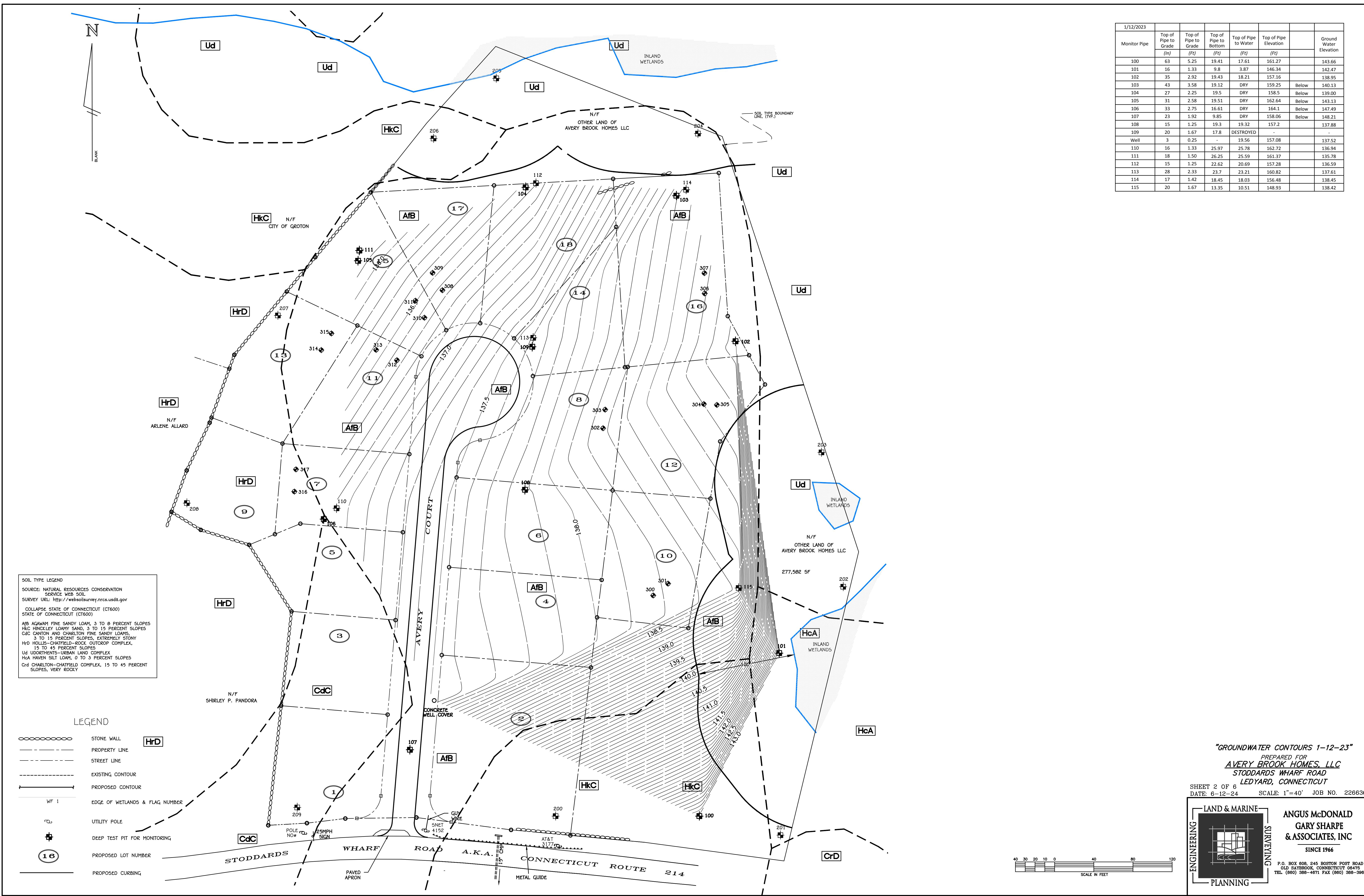
ANGUS McDONALD  
GARY SHARPE  
& ASSOCIATES, INC.

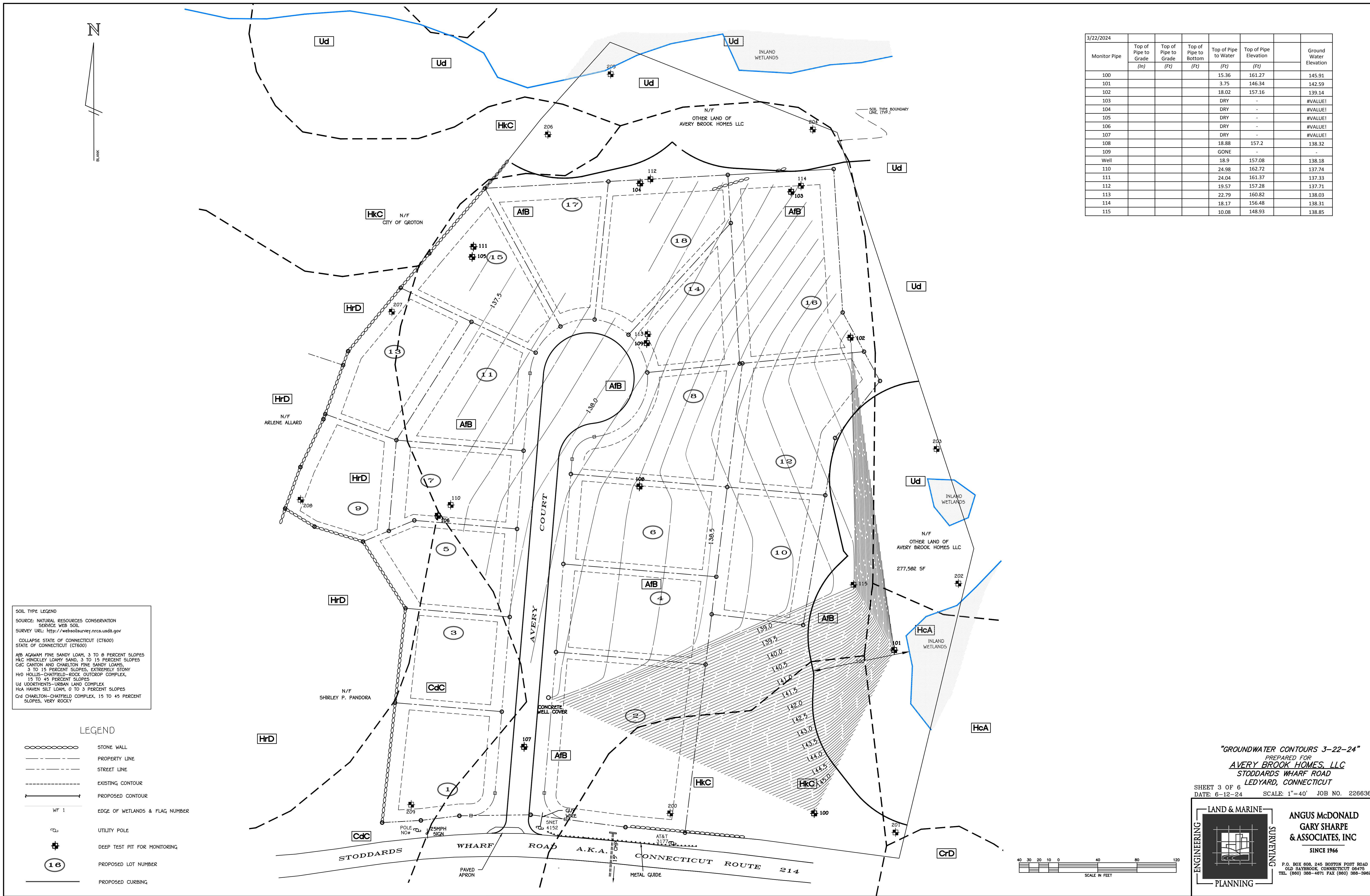
SINCE 1966

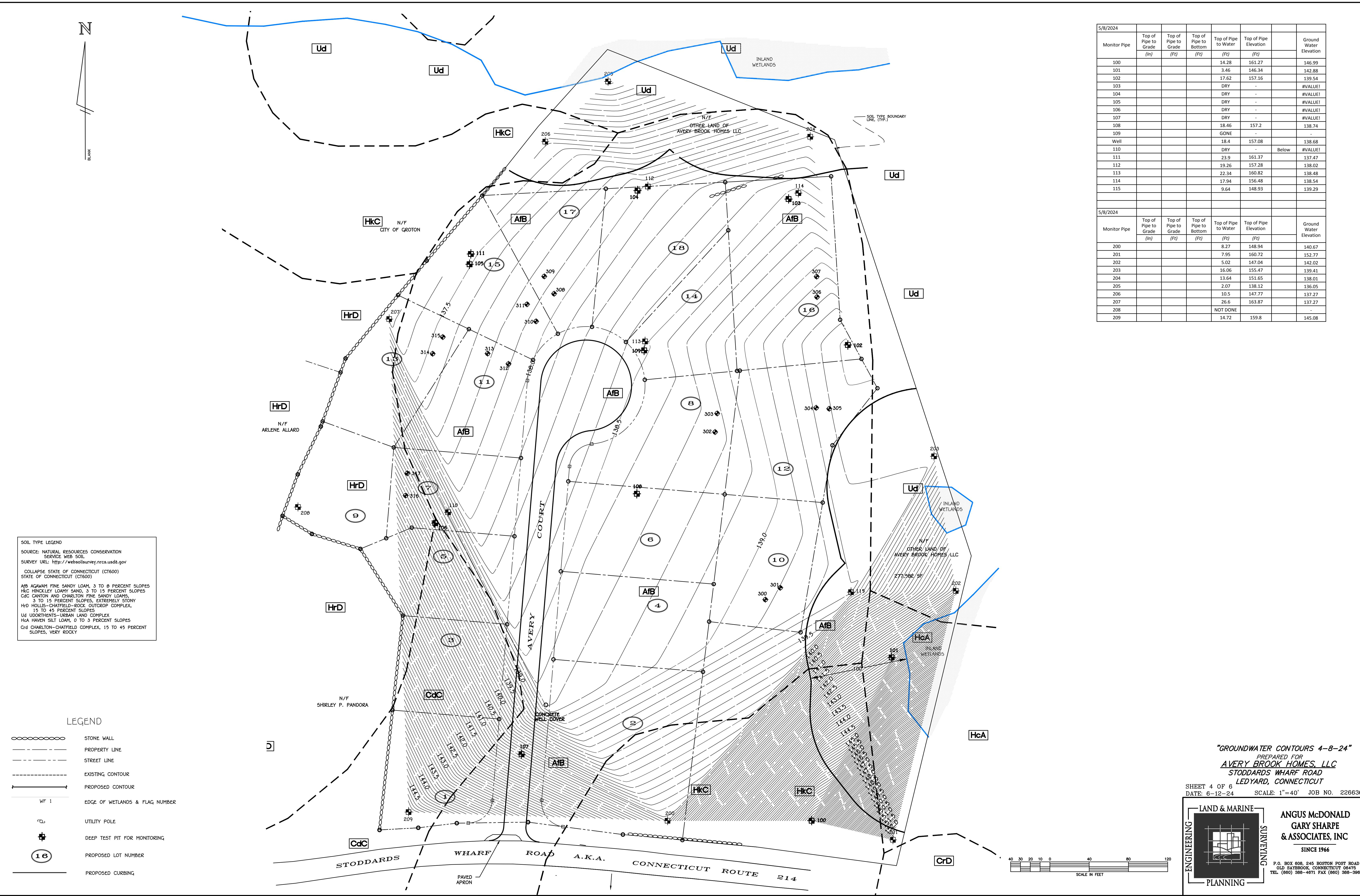
## Appendix C

# Ground Water Monitoring / Ground Water Contour Maps

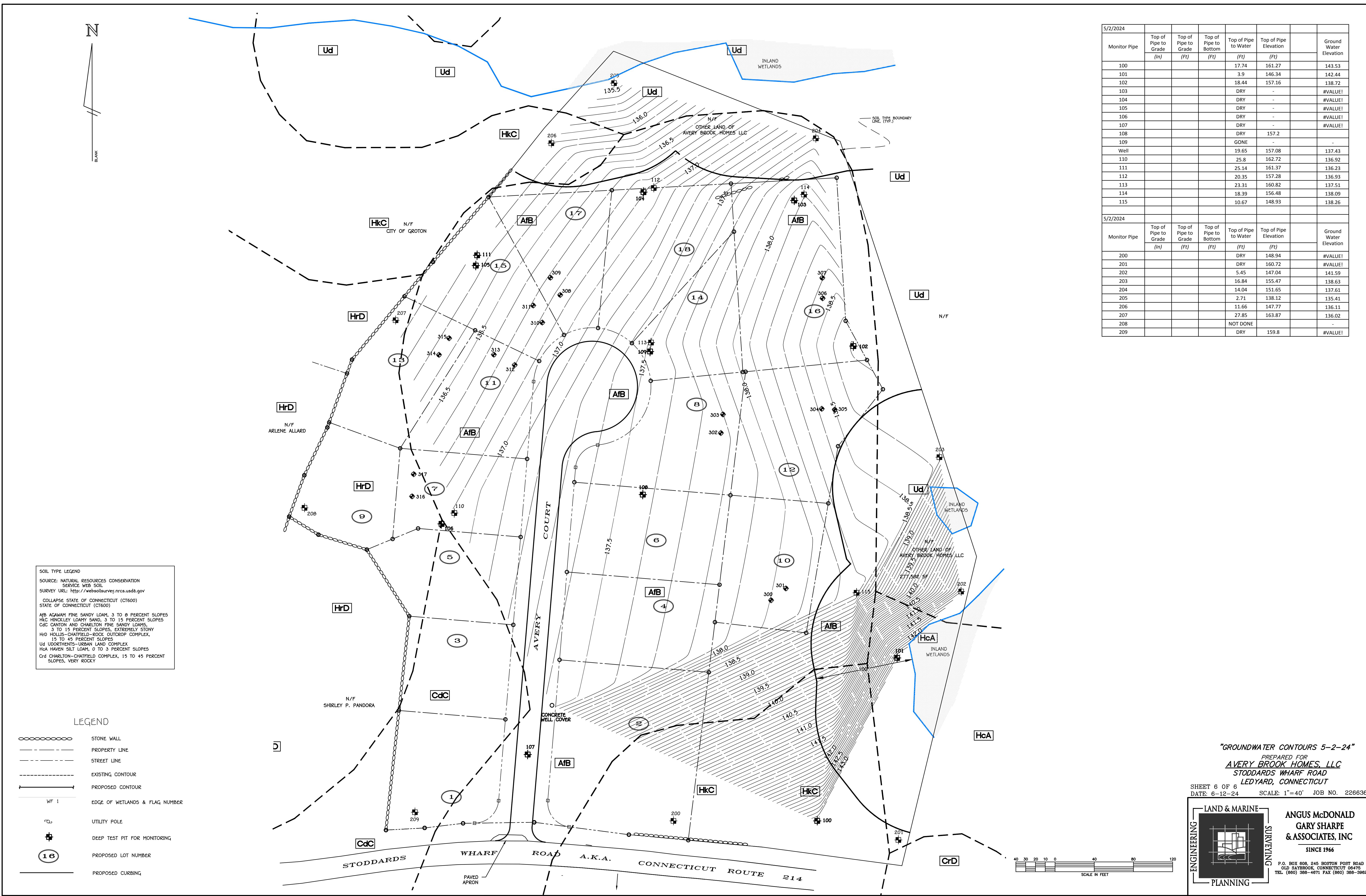














ANGUS McDONALD  
GARY SHARPE  
& ASSOCIATES, INC.

SINCE 1966

## Appendix D

# 12-8-2022 Test Hole Logs

**TEST HOLE DATA**

DATE: 12-8-2022

PRESENT: STUART FAIRBANK (ALMGPS)

FERN TREMBLAY (ALM/GPS)

PETER GARDNER (OWNER)

TP 100

0-9" TOPSOIL

9-34" ORANGE BROWN FINE SILTY LOAM

34-175" LIGHT GRAY BROWN MEDIUM LOAMY SAND

W/ GRAVEL & ROCKS

TUBE @ 47"

BAG @ 42-48"

NO MOTTLING NO WATER NO LEDGE

TP 101

0-9" TOPSOIL

9-16" TAN FINE SILTY LOAM

16-36" DARK BROWN MEDIUM-COARSE LOAMY

SAND & GRAVEL

36-96" GRAY BROWN MEDIUM LOAMY SAND

POCKET OF FINE GRAY SAND 36-45"

NORTH SIDE OF TEST HOLE

TUBE @ 38"

BAG @ 30-36"

MOTTLING @21" WATER @ 26" NO LEDGE

TP 102

0-9" TOPSOIL

9-34" ORANGE BROWN FINE SILTY LOAM

34-175" LIGHT BROWN MEDIUM-COARSE

SAND & GRAVEL W/ STONES

TUBE @ 48"

BAG @ 42-48"

BAG @180-186"

NO MOTTLING WATER @ 204" NO LEDGE

TP 103  
0-10" TOPSOIL  
10-31" ORANGE BROWN FINE SILTY LOAM  
31-198" LIGHT BROWN BANDED MEDIUM-COARSE  
SAND & GRAVEL W/ STONES

TUBE @ 48"  
BAG @ 42-48"  
BAG @ 165-171"

NO MOTTLING NO WATER NO LEDGE

TP 104  
0-17" TOPSOIL  
7-37" ORANGE BROWN FINE SILTY LOAM  
37-210" LIGHT BROWN BANDED MEDIUM-COARSE  
SAND & GRAVEL W/ STONES

TUBE @ 48"  
BAG @ 42-48"

NO MOTTLING NO WATER NO LEDGE

TP 105  
0-9" TOPSOIL  
9-32" ORANGE BROWN FINE SILTY LOAM  
32-216" LIGHT BROWN BANDED MEDIUM-COARSE  
SAND & GRAVEL W/ STONES

TUBE @ 48"  
BAG @ 42-48"

NO MOTTLING NO WATER NO LEDGE

TP 106  
0-9" TOPSOIL  
9-23" ORANGE BROWN FINE SILTY LOAM  
23-204" LIGHT BROWN BANDED MEDIUM-COARSE  
SAND & GRAVEL W/ STONES

TUBE @ 57"  
BAG @ 55-60"

NO MOTTLING NO WATER NO LEDGE

TP 107  
0-12" TOPSOIL  
12-35" DARK BROWN FINE SILTY LOAM  
35-91" BROWN MEDIUM-COARSE BANDED  
SAND & GRAVEL W/ STONES

NO MOTTLING NO WATER LEDGE @ 91"

TP 108  
0-13" TOPSOIL  
13-39" ORANGE BROWN FINE SILTY LOAM  
39-210" LIGHT BROWN BANDED MEDIUM-COARSE  
SAND & GRAVEL W/ STONES

TUBE @ 48"  
BAG @ 46-50"

NO MOTTLING NO WATER NO LEDGE

WELL  
22' DEEP (30' NORTH TP 107)  
WATER @ 19'

TP 109  
0-11" TOPSOIL  
11-36" ORANGE BROWN FINE SILTY LOAM  
36-194" LIGHT BROWN BANDED MEDIUM-COARSE  
SAND & GRAVEL W/ STONES

TUBE @ 52"  
BAG @ 46-52"

NO MOTTLING NO WATER NO LEDGE



ANGUS McDONALD  
GARY SHARPE  
& ASSOCIATES, INC.

SINCE 1966

## Appendix E

# Onsite Wastewater Technology Testing Report

# Onsite Wastewater Technology Testing Report

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**Massachusetts Alternative Septic System Test Center**  
**Air Station Cape Cod, Massachusetts 02542**  
**Telephone: 508-563-6757**  
**MASSTC@barnstablecountymty.org**

**M**assachusetts  
**A**lternative  
**S**eptic  
**S**ystem  
**T**est  
**C**enter

-- May 2021—

## **Performance Evaluation** **Geomatrix™ GST 6212**

**January 2019 – March 2021**

Technology Vendor

**Geomatrix™ Systems LLC**  
**114 Mill Rock Road East**  
**Old Saybrook, CT 06475**  
**geomatrixsystems.com**

I certify that I represent the Massachusetts Alternative Septic System Test Center, a project of the Barnstable County Department of Health and Environment, Barnstable County Massachusetts. I further certify that I am authorized to report the testing results for this proprietary treatment product. I attest that the details described in this report regarding the test protocol and results are true and accurate to the best of my knowledge.



**George Heufelder, M.S., R.S.  
Barnstable County Department of Health and Environment  
Massachusetts Alternative Septic System Test Center**

## Section 1.0 Introduction

The Massachusetts Alternative Septic System Test Center (MASSTC) is located at the Otis Air National guard military base in Falmouth, Massachusetts. The Test Center is operated by the Barnstable County Department of Health and Environment.

The mission of MASSTC is to provide a location for the verification and testing of onsite wastewater treatment technologies and components. MASSTC conducts testing under various protocols, some of which are widely recognized. Of note, the National Sanitation Foundation International (NSF) has employed MASSTC to conduct its standard protocol ANSI/NSF Standard 40 on a number of onsite septic system technologies. In addition, MASSTC has performed a number of verification tests in accordance with a nutrient testing protocol jointly developed with industry, NSF, and the United States Environmental Protection Agency (USEPA) known as the Environmental Technology Verification Program (ETV). Finally, MASSTC has been used to conduct the nitrogen reduction standard NSF/ANSI Standard 245. The Center also conducts independent research for the Commonwealth of Massachusetts and assists the onsite industry by providing a platform and facility for research and development of wastewater treatment products.

This report describes the GST 6212 product hydraulic response and treatment performance over 109 weeks (testing continues through to the date of this report). For this evaluation, the same influent and discharge parameter requirements specified in NSF/ANSI Standard 40 were used and more data points were collected, additionally the present test was conducted over a more extensive time period than required in the NSF/ANSI Standard 40. A comparison of the present test metrics, the NSF/ANSI Standard 40, and the USEPA ETV Program are provided in Table 1. Of particular note is that the duration of this reported test was four times that of the aforementioned standard and allowed the evaluation of the system to span all seasons. In addition, stress test laundry loads specified in the ANSI/NSF 40 Standard were added instead of being substituted to daily hydraulic loads and the present test included a period of extended stress representing two types of added stress compared with Standard 40.

## Section 2.0 Test Cell Construction

The GST Leaching System (GST) was installed using patented removable forms that create three-dimensional leaching “fingers” along the side of a central distribution channel. Each finger is filled with washed stone aggregate, alternating, and then surrounded by ASTM C-33 sand (Figure 1). Once the form was filled to 12 inches, it was removed, and a distribution pipe was positioned down the central channel to distribute effluent to the GST. The GST was placed above 12 inches of ASTM C33 sand. The entire system was constructed within a lined test cell such that all percolate passing through the system could be sampled.

Observation ports were installed at the stone-sand interface for monitoring the ponding depth throughout the study period. A 1500-gallon septic tank was installed with a distribution box which conveyed the septic tank effluent to the GST. A central underdrain within the containment liner served as a sample collection point and was flushed weekly on Fridays to avoid compromising regular samples (since no samples were taken for the two following days). This flushing schedule was modified as necessary during stress loading to avoid sampling days required during those events.

**Table 1:** Differences between ANSI/NSF Standard 40, USEPA ETV, and the present test;

|                               | <b>ANSI/NSF 40</b>                                                                    | <b>USEPA ETV</b>                                                                                                                                                                               | <b>MASSTC Test</b>                                                                                                                                                                                                              |
|-------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Testing duration</b>       | 26-34 weeks                                                                           | 52 weeks                                                                                                                                                                                       | 109 weeks                                                                                                                                                                                                                       |
| <b>Data days</b>              | 96 (5x per week)                                                                      | 16 (12 samples taken each calendar month no less than ten days after the preceding sample and 4 supplemental samples immediately preceding or following one of the monthly samples)            | 100 (1x per week for 17 weeks, every other week for 11 weeks, and 1x per month for 40 weeks, <5x per week for 8 weeks (stress test), approx. 2x per month for 24 weeks, and 5x per week for 9 weeks)                            |
| <b>Start-up</b>               | 3 weeks if requested                                                                  | Vendor-specified                                                                                                                                                                               | None (results do not change when first 3 weeks excluded)                                                                                                                                                                        |
| <b>Timeframe requirements</b> | May occur in any seasons spanning the 6-month test- not prescribed by protocol.       | Spanned all seasons for cold weather performance verification.                                                                                                                                 | Spanned all seasons for cold weather performance verification.                                                                                                                                                                  |
| <b>Stress Test</b>            | Four phases: wash days, working parent, and power failure.                            | Not performed                                                                                                                                                                                  | Five phases: wash days (added in addition to design load), working parent, power failure, and extended stress (loading at twice the hydraulic loading rate every day for three months)                                          |
| <b>Analytic parameters</b>    | TSS, BOD <sub>5-day</sub> , cBOD <sub>5-day</sub> , pH, temperature, Dissolved Oxygen | TSS, cBOD <sub>5-day</sub> , COD, temperature, pH, FOG, TKN, NO <sub>3</sub> <sup>-</sup> +NO <sub>2</sub> <sup>-</sup> , NH <sub>3</sub> , Alkalinity, TP, SP, Fecal coliform, <i>E. coli</i> | TSS, BOD <sub>5-day</sub> /cBOD <sub>5-day</sub> , pH, Fecal coliform, NH <sub>4</sub> <sup>+</sup> , NO <sub>2</sub> <sup>-</sup> , NO <sub>3</sub> <sup>-</sup> , TKN, TN (by calculation), TP, Dissolved Oxygen, temperature |
| <b>Hydraulic analysis</b>     | Visual inspection for surface breakout; no hydraulic function analysis                | None specified                                                                                                                                                                                 | Ponding measurements collected twice weekly from a proximal and distal observation port                                                                                                                                         |

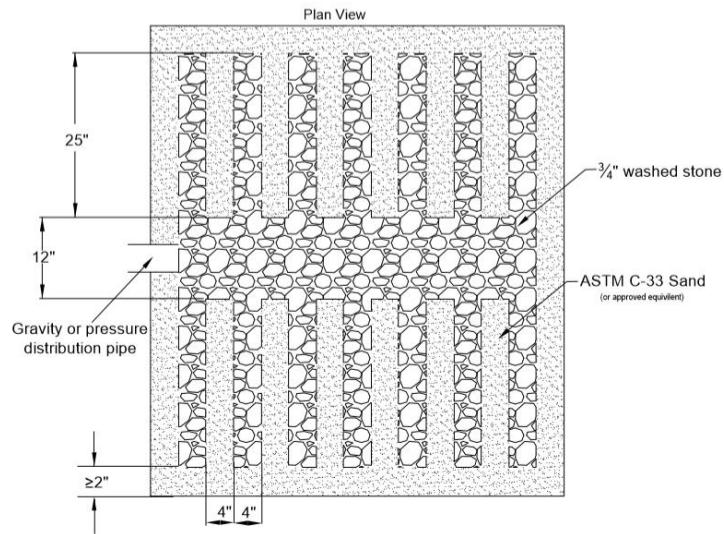


Figure 1. Plan view of the GST (series 62) product. Twelve-inch height of system was used in the test (source Geomatrix™ LLC)

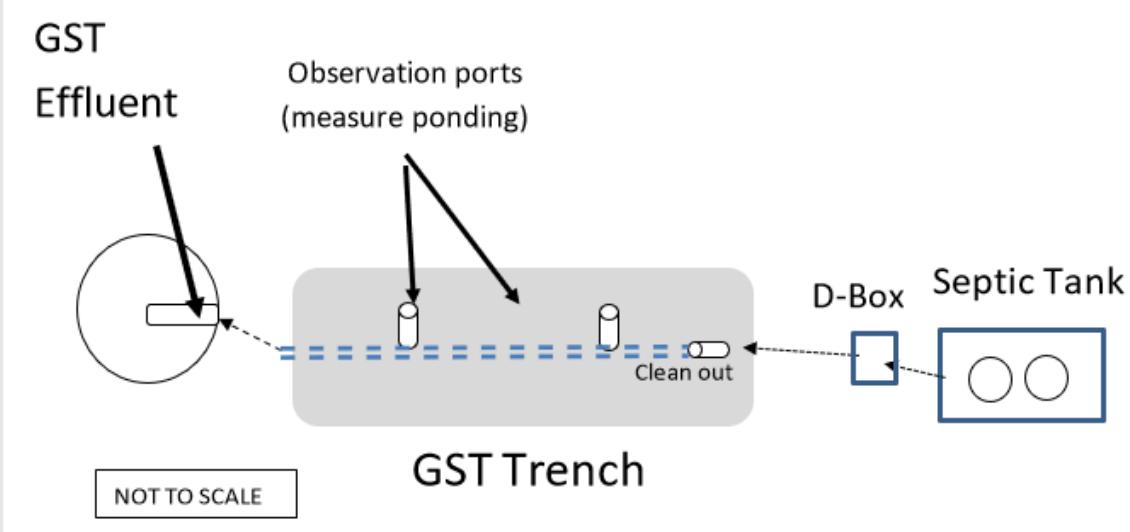


Figure 2 Experimental design of GST trench. Ports indicate location of ponding observations.

## Section 3.0 Sampling protocol and schedule

Raw wastewater was supplied in thirty discrete doses totaling 300 gallons per day to the septic tank in accordance with the following schedule: 0600 – 0900h 35% of daily flow, 1100 – 1400 25% of daily flow, and 1700 – 2000 h 40% of daily flow. The GST component received 150 gallons per day from the septic tank, while the other 150 gallons was diverted elsewhere. Each dose to the septic tank during these periods did not exceed 10 gallons which follows the ANSI/NSF Standard 40 requirement; we define this as the “normal” hydraulic load. Wastewater treatment performance was evaluated using parameters of ANSI/NSF Standard 40 tests (cBOD<sub>5-day</sub> and TSS) and supplemental tests for nutrients, as described in the introduction. Final effluent was collected from the bottom drain over a 24-hour period using an ISCO™ composite sampler. Hydraulic performance was determined using ponding observations from two ports in the GST (Figure 2). All sample collection and ponding measurements were taken by staff of MASSTC/Barnstable County Department of Health and Environment. All analyses were performed using Standard Methods at laboratories certified by the Commonwealth of Massachusetts including the Barnstable County Department of Health and Environment Laboratory.

Twenty-four-hour composite samples were taken weekly for five-day Carbonaceous Biological Oxygen Demand (cBOD<sub>5-day</sub>), Total Suspended Solids) TSS, NH<sub>4</sub><sup>+</sup>, NO<sub>2</sub><sup>-</sup>, NO<sub>3</sub><sup>-</sup>, Total Kjeldahl Nitrogen (TKN), and Total Phosphorus (TP) from January 31, 2019 through May 22, 2019. From June through August of 2019, sampling was reduced to every two weeks. The system was sampled once a month from October 2019 through May 2020. Total nitrogen values reported are by calculation of TKN plus nitrate-nitrite. Fecal coliform concentrations were collected from the system twice a week from January 31 through May 22, 2019 and was reduced to approximately once per week from May 28 through October 16, 2019 and further reduced to twice a month from November through January 2020. Fecal coliform was analyzed at least once a month from February through May of 2020. Fecal coliform and field parameters including temperature, pH and dissolved oxygen were taken as grab samples, while all other chemical parameters and biochemical oxygen demands (BOD<sub>5-day</sub> and cBOD<sub>5-day</sub>) were obtained from 24-hour composites samples. For any samples indicating levels of cBOD<sub>5-day</sub> or TSS below the detection limit of 2 mg/L, one-half of the detection limit (1.0 mg/L) was reported and used in calculations.

Four stress tests were performed from June through August of 2020. The first stress test was a wash day stress occurring from June 2 through June 6, 2020 and consisted of three wash days with 24 hours between each wash day for a total of five consecutive days. During the wash days, the system was dosed normally plus three wash loads (one wash cycle and two rinse cycles each) in the first two daily doses. This differs from the stress tests performed under NSF STD 40 in that, for NSF STD 40, the normal hydraulic load is discontinued and the wash loads are *substituted* for the normal hydraulic loads. The second stress test was the working parent stress test performed June 15 through June 20, 2020. During this stress, the system was dosed with 40% of its daily hydraulic capacity between 6:00 am and 9:00 am. Between 5:00 pm and 8:00 pm, the system is dosed with the remaining 60% of its daily hydraulic capacity, which included one wash load. The third stress test was the power/equipment failure test which was performed from July 3 through July 6, 2020. The power failure test as described in the standard was originally designed for mechanical units requiring electric power. Since the GST requires no power, the test is simply comprised of turning flow to the system off as prescribed in the test. Accordingly, flow was turned off on July 3, 2020 at 8 p.m. for 48 hours. Flow was restored to the system on July 6, 2020 and was dosed with 60% of the daily load between 6 a.m. and 9 a.m. The vacation stress test was the final stress and was performed from July 20 through July 27, 2020. For this stress, flow to the system is discontinued for eight consecutive days and then flow is restored and 60% of the daily load (including

three wash loads) is delivered to the system between 5 p.m. and 8 p.m. During the stress test in the summer of 2020, final effluent was analyzed for fecal coliform, TSS, and cBOD<sub>5-day</sub> concentrations on June 2, June 8-12, June 15, June 24-26, June 29, July 8-10, July 13-14, July 28-30. Samples were also analyzed for nutrients on June 25, July 14, and July 29, 2020.

After the four stress test phases, the system was loaded with twice the normal design flow from August 26, 2020 through December 29, 2020 to simulate extended stress. During the extended stress test, effluent was analyzed nine times for fecal coliform and five times for cBOD<sub>5-day</sub> and TSS. From January 4 through March 3, 2021, effluent from the GST was analyzed each week for Fecal coliforms and 5 days a week for cBOD<sub>5-day</sub> and TSS.

Ponding observations were taken from each of the two ports twice weekly from February 2019 through March 2021 by measuring the liquid level with a measuring tape. We translated ponding measurements into the amount of area hydraulically in use by determining what portion of the system would be in use/wetted given the level of ponding. We have reported hydraulic function using raw ponding level data and the amount of surface area in use during a ponding observation.

## **Section 4.0 Results**

### **Section 4.1 Influent Characteristics**

Wastewater influent levels were measured throughout the effluent sampling period, however at a greater sampling frequency than effluent. During the non-stress period, January 2019 – March 2021, over 350 influent samples were taken. Biochemical Oxygen Demand Levels (BOD<sub>5-day</sub>) averaged 192 mg/L (185–199 mg/L, p=.05, n=359). TSS level averaged 157 mg/L (149 – 165 mg/L, p=.05, n=359). The range in pH was 6.6 – 7.4 pH units. The geometric mean fecal coliform density was  $2.7 \times 10^6$  cfu/100 ml. Influent temperatures varied seasonally and ranged from 5.5 – 22.9 C°. Other chemical parameters measured included TN (calculated by the addition of nitrate-nitrite + Total Kjeldahl Nitrogen), ammonia, TP, dissolved oxygen (mg/L), and alkalinity. All influent parameters met the requirements specified in national testing protocols.

### **Section 4.2 Treatment performance results**

The GST test was initiated during the winter months to simulate worst possible conditions for start-up performance. The system was loaded at non stress levels (full design loading) from January 2019 through May 2020 and January through March 2021. A stress test in four phases (wash day, power failure, vacation, and working parent) was performed during June and July 2020. In August 2020, and extended stress test was started and the system was loaded at twice the daily load every day through December 2020.

A summary of all data is presented in Table 2 and all data points are presented in the appendices. There were no data exclusions; that is no data were excluded from the statistical analyses.

Table 2 Summary of GST water quality analysis collected by MASSTC (2019-01-30 through 2021-03-03).

|                                 | cBOD/BOD (mg/L) | TSS (mg/L) | Ammonia (mg/L) | Total Nitrogen (mg/L) | Total Phosphorus (mg/L) | Fecal coliform (cfu)    |
|---------------------------------|-----------------|------------|----------------|-----------------------|-------------------------|-------------------------|
| <b>GST product trench (n=)</b>  | 2.0 (101)       | 2.4 (100)  | 15.6 (41)      | 35.5 (41)             | 3.2 (41)                | $2.2 \times 10^3$ (109) |
| <i>confidence limits p=0.05</i> | 1.9 - 2.2       | 1.8 - 2.7  | 14.2 - 16.9    | 34.6 - 36.4           | 3.1 - 3.3               | Geometric Mean          |
| <b>Influent (n=)</b>            | 192 (359)       | 157 (359)  | 29.7 (297)     | 43.1 (262)            | 4.8 (86)                | $2.7 \times 10^6$ (359) |
| <i>confidence limits p=0.05</i> | 185 - 199       | 149 - 165  | 29.0 - 30.0    | 42.6 - 44.0           | 4.5 - 5.2               | Geometric Mean          |

The GST product removed ~98% of the secondary wastewater constituents of  $BOD_{5\text{-day}}$  and TSS. In addition, there was a three  $\log_{10}$  removal (99.9 %) of fecal coliform, the commonly accepted surrogate for human pathogen removal.

#### Section 4.2 Treatment Performance following wash days, working parent, power failure, and vacation stress testing

Sample data taken following the above-referenced stress tests show no significant difference when compared with non-stress periods (Table 3). In addition to the secondary treatment contaminants, nutrient concentrations from the GST were analyzed once following each stress event (Table 3).

Table 3. Summary of influent and discharge data taken following four stress events. Data from all samples following the stress events are combined.

|                         | cBOD/BOD (mg/L) | TSS (mg/L) | Ammonia (mg/L) | Total Nitrogen (mg/L) | Total Phosphorus mg/L | Fecal coliform (cfu)   |
|-------------------------|-----------------|------------|----------------|-----------------------|-----------------------|------------------------|
| GST product trench (n=) | 1.0 (24)        | 1.5 (24)   | 3.7 (4)        | 40.7 (4)              | 1.5 (4)               | $3.9 \times 10^2$ (24) |
| confidence limits p=.05 | 0.8 - 1.2       | 1.0 - 2.0  | 0.0 - 8.5      | 31.1 - 50.3           | 1.0 - 2.0             | Geometric Mean         |
| Influent (n=)           | 186 (37)        | 160 (37)   | 28.6 (23)      | 43.7 (24)             | 1.5 (10)              | $1.8 \times 10^6$ (32) |
| confidence limits p=.05 | 166 - 206       | 126 - 194  | 26.1 - 31.1    | 41.7 - 45.7           | 1.2 - 1.8             | Geometric Mean         |

TSS were not detected from the GST during the first three stress tests and only increased to 4 mg/L after the vacation stress test (Figure 3). Coincident TSS concentrations in the influent wastewater source ranged from 82-330 mg/L. Changes in fecal coliform concentrations from the GST during the stress test showed a similar pattern as the TSS concentrations. The peak density of fecal coliform following the first four phases of the stress tests was 16,000 cfu/100 ml, with a geometric mean of all 23 post-stress observations equal to 390 cfu/ 100ml During the stress tests, fecal coliform concentration in the raw wastewater had a geometric mean of  $1.8 \times 10^6$  cfu/100 ml.

The cBOD<sub>(5-day)</sub> levels were below detection levels in the GST for all portions of the stress test except for after the vacation portion of the stress test when the concentration was 3 mg/L (Figure 3). During the stress test, the BOD in the wastewater source ranged from 100 to 250 mg/L, BOD.

### Section 4.3 Treatment Performance during extended stress

*Table 4. Summary of GST water quality analysis collected by MASSTC during a period of extended stress (2020-08-26 through 2020-12-30).*

|                                 | cBOD/BOD (mg/L) | TSS (mg/L) | Ammonia (mg/L) | Total Nitrogen (mg/L) | Total Phosphorus (mg/L) | Fecal coliform (cfu)   |
|---------------------------------|-----------------|------------|----------------|-----------------------|-------------------------|------------------------|
| <b>GST product trench (n=)</b>  | 2.0 (5)         | 1.7 (5)    | 3.8 (5)        | 29.2 (5)              | 4.0 (5)                 | $3.0 \times 10^4$ (9)  |
| <i>confidence limits p=0.05</i> | 3.1 – 4.5       | 1.5 – 1.9  | 3.1 – 4.5      | 27.9 – 30.5           | 3.8 – 4.2               | Geometric Mean         |
| <b>Influent (n=)</b>            | 161(83)         | 123(83)    | 27.0(60)       | 41.4(45)              | 5.4(19)                 | $2.8 \times 10^6$ (83) |
| <i>confidence limits p=0.05</i> | 152 – 171       | 115 – 130  | 25.8 – 28.4    | 39.0 – 43.8           | 5.7 – 5.7               | Geometric Mean         |

There were no significant differences in Total Nitrogen, cBOD<sub>5-Day</sub>, or Fecal coliform concentrations between normal use and this period of extended stress. Ammonia and TSS concentrations were significantly lower during extended stress than during normal use, and Total Phosphorus is significantly higher during extended stress than during the periods of normal use.

### Section 4.4 Hydraulic performance results

No breakout of effluent was observed during the test. The ponding in the GST ranged from no observed ponding to 6.8 inches of ponded water. We estimate that less than 25% of the effective soil absorption surface was used during the normal use and first four stress test phases of this test. After the period of extended stress, ponding increased and we estimate that less than 60% of the effective soil absorption was used.

## Section 5.0 Summary

Under the conditions of this test, the GST produced a percolate that exceeds secondary treatment standards (30 mg/L Carbonaceous Biochemical Oxygen Demand and Total Suspended Solids). Throughout the test, which included five stress periods, the percolate did not exceed 10 mg/L cBOD<sub>5-day</sub>, or 20 mg/L TSS. For the entire test period including the five stress events, less than 25% of the effective soil absorption area was utilized.

# **Data Appendices**

## **Key**

NH<sub>4</sub> – ammonium (mg/L)

BOD – 5-day Biochemical Oxygen Demand (mg/L)

cBOD – 5-day Carbonaceous Biochemical Oxygen Demand (mg/L)

DO – Dissolved Oxygen (mg/L)

NO<sub>2</sub> – Nitrite nitrogen (mg/L)

NO<sub>3</sub> – Nitrate nitrogen (mg/L)

Fecal Coli – Fecal coliform (colony forming units/100 mL)

pH – pH units

Temp – Temperature in degrees Celsius

TKN – Total Kjeldahl nitrogen

TP – Total Phosphorus

TSS – Total Suspended Solids (mg/L)

| Sample Date |     | Alkalinity | NH <sub>4</sub> | cBOD <sub>5</sub> | DO   | Fecal Coli | NO <sub>3</sub> | NO <sub>2</sub> | pH   | Temp | TKN | TN   | TP  | TSS  |
|-------------|-----|------------|-----------------|-------------------|------|------------|-----------------|-----------------|------|------|-----|------|-----|------|
| 2019-01-31  | GST |            | 50              | 6.5               | 10.3 | 210,000    | 0.74            | 0.46            | 7.5  | 0.62 | 47  | 48.2 | 1.5 | 7    |
| 2019-02-05  | GST |            |                 |                   |      | 340,000    |                 |                 |      |      |     |      |     |      |
| 2019-02-07  | GST | 220        | 29              | 10                | 8.73 | 770,000    | 0.05            | 0.03            | 7.3  | 2.99 | 34  | 34.1 | 2.7 | 9    |
| 2019-02-11  | GST |            |                 |                   | 8.92 | 32,000     |                 |                 | 7.06 | 3.37 |     |      |     |      |
| 2019-02-14  | GST |            | 23              | 7.2               | 8.23 | 200,000    | 0.67            | 0.03            | 7.04 | 3.15 | 30  | 30.7 | 2.5 | 7    |
| 2019-02-19  | GST |            |                 |                   |      | 30,000     |                 |                 |      |      |     |      |     |      |
| 2019-02-20  | GST |            | 36              | 4.7               | 8.21 | 13,000     | 0.79            | 0.03            | 6.96 | 3.26 | 35  | 35.8 | 3.6 | 8    |
| 2019-02-25  | GST |            |                 |                   | 10.7 | 5,600      |                 |                 | 6.06 | 3.46 |     |      |     |      |
| 2019-02-27  | GST |            | 31              | 4.9               | 5.75 | 2,500      | 4.1             | 0.03            | 6.7  | 3.2  | 32  | 36.1 | 3.2 | 5    |
| 2019-03-04  | GST |            |                 |                   | 4.47 | 13,000     |                 |                 | 6.83 | 3.13 |     |      |     |      |
| 2019-03-06  | GST |            | 35              | 4.9               | 6.58 | 4,500      | 1.6             | 0.03            | 6.72 | 2.84 | 36  | 37.6 | 3.8 | 6    |
| 2019-03-11  | GST |            |                 |                   | 4.05 | 4,700      |                 |                 | 6.41 | 2.78 |     |      |     |      |
| 2019-03-13  | GST |            | 27              | 5.7               | 9.19 | 2,800      | 1.9             | 0.03            | 6.41 | 2.81 | 27  | 28.9 | 3.2 | 6    |
| 2019-03-18  | GST |            |                 |                   | 6.68 | 7,700      |                 |                 | 6.98 | 4.17 |     |      |     |      |
| 2019-03-20  | GST |            | 32              | 6.5               | 4.84 | 4,000      | 1.3             | 0.11            | 6.69 | 3.62 | 32  | 33.4 | 3.8 | 3    |
| 2019-03-25  | GST |            |                 |                   | 6.28 | 730        |                 |                 | 6.56 | 4.51 |     |      |     |      |
| 2019-03-27  | GST |            | 33              | 3.3               | 7.02 | 1,200      | 1.9             | 0.13            | 6.84 | 4.69 | 30  | 32   | 3.9 | 4    |
| 2019-04-01  | GST |            |                 |                   | 7.72 | 8,900      |                 |                 | 7.05 | 5.49 |     |      |     |      |
| 2019-04-03  | GST |            | 36              | 3.6               | 5.72 | 5,300      | 0.98            | 0.11            | 6.85 | 5.81 | 36  | 37.1 | 4   | 7    |
| 2019-04-03  | GST |            |                 |                   | 5.72 |            |                 |                 | 6.85 | 5.81 |     |      |     |      |
| 2019-04-08  | GST |            |                 |                   | 5.22 | 600        |                 |                 | 6.71 | 6.32 |     |      |     |      |
| 2019-04-10  | GST |            | 35              | 7.8               | 4.06 | 450        | 5               | 0.16            | 6.72 | 7.8  | 33  | 38.2 | 4.3 | 4    |
| 2019-04-16  | GST |            |                 |                   | 5.34 | 72         |                 |                 | 6.63 | 8.6  |     |      |     |      |
| 2019-04-18  | GST |            | 23              | 1                 | 4.13 | 120        | 9.4             | 0.44            | 6.67 | 8.9  | 32  | 41.8 | 4.3 | 2    |
| 2019-04-22  | GST |            |                 |                   | 3.64 | 54         |                 |                 | 6.5  | 9.8  |     |      |     |      |
| 2019-04-24  | GST |            | 30              | 1                 | 3.66 | 2,300      | 8.6             | 0.68            | 6.42 | 10.1 | 31  | 40.3 | 4.7 | 4    |
| 2019-04-29  | GST |            |                 |                   | 5.78 | 3,800      |                 |                 | 6.4  | 10.6 |     |      |     |      |
| 2019-05-01  | GST |            | 20              | 1                 | 4.2  | 8,500      | 16              | 0.82            | 6.47 | 10.4 | 24  | 40.8 | 3.8 | 1    |
| 2019-05-06  | GST |            |                 |                   | 3.55 | 38,000     |                 |                 | 6.42 | 10.7 |     |      |     |      |
| 2019-05-09  | GST |            | 15              | 1                 | 4.62 | 4,100      | 19              | 1.2             | 6.38 | 10.8 | 16  | 36.2 | 3.3 | 1    |
| 2019-05-14  | GST |            |                 |                   | 4.61 | 32,000     |                 |                 | 6.25 | 11.5 |     |      |     |      |
| 2019-05-15  | GST |            | 12              | 3.4               | 2.66 | 140,000    | 20              | 3               | 6.34 | 11.4 | 14  | 37   | 3.8 | 3    |
| 2019-05-20  | GST |            |                 |                   | 2.77 | 2,700      |                 |                 | 6.14 | 12.1 |     |      |     |      |
| 2019-05-22  | GST |            | 11              | 6.2               | 3.73 | 20,000     | 20              | 4.9             | 6.22 | 12.8 | 16  | 40.9 | 3.8 | 0.75 |
| 2019-05-28  | GST |            |                 |                   | 5.66 | 3,900      |                 |                 | 6.71 | 14.1 |     |      |     |      |
| 2019-06-05  | GST |            | 17              | 6.1               | 1.87 | 9,200      | 14              | 2.4             | 6.46 | 15.2 | 15  | 31.4 | 3.1 | 8    |
| 2019-06-12  | GST |            |                 |                   | 4.37 | 11,000     |                 |                 | 6.45 | 16.8 |     |      |     |      |
| 2019-06-19  | GST |            | 13              | 6.1               | 2.89 | 6,600      | 22              | 3.2             | 6.26 | 17.1 | 16  | 41.2 | 3.7 | 11   |
| 2019-06-26  | GST |            |                 |                   | 3.52 | 3,000      |                 |                 | 6.16 | 18   |     |      |     |      |
| 2019-07-02  | GST |            | 12              | 8.5               | 3.8  | 33,000     | 23              | 0.32            | 6.16 | 19.3 | 16  | 39.3 | 2.1 | 7.5  |
| 2019-07-10  | GST |            |                 |                   | 3.32 | 14,000     |                 |                 | 6.11 | 20.8 |     |      |     |      |

|            |     |  |      |     |      |        |      |      |      |      |     |      |     |     |
|------------|-----|--|------|-----|------|--------|------|------|------|------|-----|------|-----|-----|
| 2019-07-17 | GST |  | 12   | 1   | 3.54 | 3,200  | 30   | 1.2  | 6.09 | 22   | 14  | 45.2 | 3.7 | 5   |
| 2019-07-24 | GST |  |      |     | 5.18 | 6,100  |      |      | 5.95 | 22.6 |     |      |     |     |
| 2019-07-31 | GST |  | 1.7  | 1   | 3.77 | 10,000 | 43   | 0.93 | 5.27 | 22.9 | 3.4 | 47.3 | 3.6 | 4.7 |
| 2019-08-07 | GST |  |      |     | 4.16 | 3,200  |      |      | 5.65 | 23.6 |     |      |     |     |
| 2019-08-14 | GST |  | 2.3  | 1   | 4.69 | 690    | 47   | 0.22 | 5.16 | 23.2 | 3.2 | 50.4 | 3.6 | 5   |
| 2019-08-14 | GST |  |      |     | 4.67 |        |      |      | 6.28 | 21.3 |     |      |     |     |
| 2019-08-21 | GST |  |      |     | 4.48 | 2,100  |      |      | 4.96 | 23.4 |     |      |     |     |
| 2019-08-28 | GST |  |      |     | 5.5  | 2,200  |      |      | 4.77 | 22.7 |     |      |     |     |
| 2019-09-04 | GST |  |      |     | 8.04 | 1,300  |      |      | 6.27 | 21.9 |     |      |     |     |
| 2019-09-18 | GST |  |      |     | 7.98 | 9,400  |      |      | 5.5  | 19.2 |     |      |     |     |
| 2019-09-25 | GST |  |      |     | 7.71 | 1,100  |      |      | 5.33 | 20.2 |     |      |     |     |
| 2019-10-02 | GST |  |      |     | 3.87 | 11,000 |      |      | 5.79 | 19.7 |     |      |     |     |
| 2019-10-09 | GST |  | 3.8  | 1   | 8.11 | 7,600  | 27   | 0.21 | 5.96 | 16.6 | 5.3 | 32.5 | 4.2 | 2   |
| 2019-10-09 | GST |  |      |     | 8.11 |        |      |      | 5.96 | 16.6 |     |      |     |     |
| 2019-10-16 | GST |  |      |     | 6.95 | 430    |      |      | 5.48 | 16.5 |     |      |     |     |
| 2019-10-16 | GST |  |      |     | 7.78 |        |      |      | 5.62 | 15.8 |     |      |     |     |
| 2019-11-07 | GST |  |      |     | 8.37 | 130    |      |      | 5.18 | 14.4 |     |      |     |     |
| 2019-11-14 | GST |  | 0.36 | 1   | 6.99 | 310    | 0.38 | 0.03 | 4.41 | 12.6 | 1.1 | 1.51 | 3.1 | 1   |
| 2019-12-05 | GST |  |      |     | 7.12 | 870    |      |      | 6.23 | 8.9  |     |      |     |     |
| 2019-12-12 | GST |  | 5.3  | 1   | 6.56 | 99     | 15   | 0.23 | 6.03 | 8.5  | 5   | 20.2 | 1.6 | 1   |
| 2019-12-19 | GST |  |      |     | 5.13 | 3,700  |      |      | 5.99 | 8    |     |      |     |     |
| 2020-01-09 | GST |  | 13   | 6.6 | 3.78 | 29,000 | 11   | 0.29 | 6.37 | 6.5  | 15  | 26.3 | 3.1 | 3.6 |
| 2020-01-30 | GST |  |      |     | 6.3  | 990    |      |      | 6    | 5.4  |     |      |     |     |
| 2020-02-11 | GST |  | 7.1  | 1   | 6.19 | 9      | 25   | 0.29 | 5.83 | 5.4  | 8.7 | 34   | 3.8 | 1   |
| 2020-02-25 | GST |  |      |     | 6.17 | 250    |      |      | 6.25 | 5.3  |     |      |     |     |
| 2020-03-10 | GST |  | 10   | 1   | 5.21 | 680    | 23   | 0.23 | 6.09 | 6.1  | 12  | 35.2 | 1.5 | 1   |
| 2020-04-29 | GST |  | 7.8  | 1   | 5.59 | 1,200  | 19   | 0.16 | 5.65 | 8.3  | 8.5 | 27.7 | 3   | 2.4 |
| 2020-05-13 | GST |  |      |     | 5.75 | 310    |      |      | 4.98 | 10.4 |     |      |     |     |
| 2020-05-27 | GST |  | 5.6  | 1   | 3.31 | 100    | 32   | 0.16 | 5    | 13.3 | 7.6 | 39.8 | 1   | 2   |

#### STRESS TEST DATA

|            |     |  |      |   |      |     |    |      |      |      |     |      |     |   |
|------------|-----|--|------|---|------|-----|----|------|------|------|-----|------|-----|---|
| 2020-06-02 | GST |  |      | 1 | 4.37 | 5   |    |      | 3.57 | 15.1 |     |      |     | 1 |
| 2020-06-08 | GST |  |      | 1 | 6.97 | 31  |    |      | 5.01 | 16.6 |     |      |     | 1 |
| 2020-06-09 | GST |  |      | 1 | 6.17 | 130 |    |      | 5.13 | 16.4 |     |      |     | 1 |
| 2020-06-10 | GST |  |      | 1 | 5.92 | 270 |    |      | 4.91 | 16.7 |     |      |     | 1 |
| 2020-06-11 | GST |  | 0.27 | 1 | 7.09 | 120 | 46 | 0.17 | 5.47 | 16.9 | 2.4 | 48.6 | 1.2 | 1 |
| 2020-06-12 | GST |  |      | 1 | 8.62 | 30  |    |      | 5.28 | 17.4 |     |      |     | 1 |
| 2020-06-15 | GST |  |      | 1 | 5.18 | 370 |    |      | 4.22 | 17   |     |      |     | 1 |
| 2020-06-22 | GST |  |      | 1 | 7.45 | 220 |    |      | 3.45 | 19.3 |     |      |     | 1 |
| 2020-06-23 | GST |  |      | 1 | 5.32 | 500 |    |      | 3.47 | 18.9 |     |      |     | 1 |
| 2020-06-24 | GST |  |      | 1 | 4.32 | 110 |    |      | 3.87 | 19   |     |      |     | 1 |
| 2020-06-25 | GST |  | 2.1  | 1 | 4.62 | 400 | 23 | 0.2  | 4.07 | 19.3 | 4.3 | 27.5 | 1.4 | 1 |
| 2020-06-26 | GST |  |      | 1 | 4.4  | 260 |    |      | 3.99 | 19.3 |     |      |     | 1 |
| 2020-06-29 | GST |  |      | 1 | 4.25 | 510 |    |      | 4.63 | 19.7 |     |      |     | 1 |

|            |     |     |   |      |        |         |      |      |      |     |      |      |     |     |
|------------|-----|-----|---|------|--------|---------|------|------|------|-----|------|------|-----|-----|
| 2020-07-08 | GST |     |   | 1    | 5.02   |         |      | 3.42 | 20.1 |     |      |      |     | 1   |
| 2020-07-09 | GST |     |   | 1    | 4.66   | 1,500   |      | 3.69 | 20.1 |     |      |      |     | 1   |
| 2020-07-10 | GST |     |   | 1    | 4.64   | 380     |      | 3.3  | 20.2 |     |      |      |     | 1   |
| 2020-07-13 | GST |     |   | 1    | 5.34   | 540     |      | 3.3  | 20.8 |     |      |      |     | 1   |
| 2020-07-14 | GST | 1.4 |   | 1    | 4.46   | 120     | 34   | 0.15 | 3.39 | 21  | 4.9  | 39.1 | 1.4 | 1   |
| 2020-07-28 | GST |     |   | 3    | 3.46   | 16,000  |      | 5.11 | 22.4 |     |      |      |     | 4   |
| 2020-07-29 | GST | 11  | 1 | 3.33 | 14,000 | 34      | 0.6  | 5.5  | 22.5 | 13  | 47.6 | 1.4  |     | 4   |
| 2020-07-30 | GST |     |   | 1    | 3.04   | 4,100   |      | 5.27 | 22.8 |     |      |      |     | 3.2 |
| 2020-07-31 | GST |     |   | 1    | 3.16   | 390     |      | 5.23 | 22.9 |     |      |      |     | 5.2 |
| 2020-08-03 | GST |     |   | 1    | 3.26   | 2,200   |      | 3.99 | 22.8 |     |      |      |     | 1   |
| 2020-08-04 | GST |     |   | 1    | 3.71   | 2,900   |      | 3.84 | 22.9 |     |      |      |     | 1   |
| 2020-08-19 | GST |     |   |      | 4.7    | 2,700   |      | 5.11 | 22.5 |     |      |      |     |     |
| 2020-09-02 | GST | 10  | 4 | 2.78 | 20,000 | 30      | 0.41 | 5.78 | 22.2 | 12  | 42.4 | 4.8  |     | 1   |
| 2020-09-16 | GST |     |   |      | 2.5    | 140,000 |      | 6.25 | 21.5 |     |      |      |     |     |
| 2020-09-30 | GST | 1.5 | 1 | 3.2  | 2,800  | 32      | 0.57 | 5.98 | 20.3 | 2.7 | 35.3 | 4.5  |     | 2   |
| 2020-10-14 | GST |     |   |      | 3.25   | 1,200   |      | 5.66 | 18.6 |     |      |      |     |     |
| 2020-10-28 | GST | 2.3 | 1 | 2.67 | 8,800  | 26      | 0.82 | 5.93 | 17.3 | 3.5 | 30.3 | 4.5  |     | 1   |
| 2020-11-12 | GST |     |   |      | 2.66   | 2,900   |      | 5.69 | 15.2 |     |      |      |     |     |
| 2020-11-23 | GST |     |   |      | 3.39   | 2,200   |      | 5.71 | 13.4 |     |      |      |     |     |
| 2020-11-24 | GST | 3.5 | 1 | 3.48 |        | 23      | 0.54 | 5.57 | 13.2 | 4.5 | 28   | 3.7  |     | 1   |
| 2020-12-09 | GST |     |   |      | 3.1    | 87,000  |      | 6.12 | 11.3 |     |      |      |     |     |
| 12/22/2020 | GST | 7.9 | 5 | 2.48 | 41,000 | 13      | 0.58 | 6.34 | 9.2  | 9.6 | 23.2 | 3.3  |     | 2.8 |

#### NORMAL LOADING RESTARTED

|            |     |     |   |      |       |       |      |      |     |    |      |     |  |     |
|------------|-----|-----|---|------|-------|-------|------|------|-----|----|------|-----|--|-----|
| 2021-01-04 | GST |     |   | 1    | 3.09  |       |      | 6.12 | 8.3 |    |      |     |  | 1   |
| 2021-01-05 | GST |     |   | 1    | 2.98  |       |      | 6.05 | 8.2 |    |      |     |  | 1   |
| 2021-01-06 | GST |     |   | 1    | 3.19  | 980   |      | 5.98 | 8.2 |    |      |     |  | 20  |
| 2021-01-07 | GST |     |   | 1    | 3.11  |       |      | 6.12 | 7.8 |    |      |     |  | 1   |
| 2021-01-08 | GST |     |   | 1    | 3.04  |       |      | 6.14 | 8   |    |      |     |  | 1   |
| 2021-01-11 | GST |     |   | 1    | 2.44  |       |      | 6.26 | 7.5 |    |      |     |  | 1   |
| 2021-01-12 | GST |     |   | 1    | 2.46  |       |      | 6.21 | 7.4 |    |      |     |  | 1   |
| 2021-01-13 | GST |     |   | 1    | 3.97  | 6,500 |      | 6.22 | 7   |    |      |     |  | 1   |
| 2021-01-14 | GST |     |   | 1    | 2.32  |       |      | 6.22 | 7.1 |    |      |     |  | 1   |
| 2021-01-15 | GST |     |   | 1    | 2.46  |       |      | 6.1  | 7.1 |    |      |     |  | 1   |
| 2021-01-19 | GST |     |   | 1    | 4.66  |       |      | 6    | 7.3 |    |      |     |  | 1   |
| 2021-01-20 | GST | 8.8 | 1 | 3.94 | 3,900 | 21    | 0.55 | 5.9  | 6.9 | 10 | 31.6 | 4.1 |  | 1   |
| 2021-01-21 | GST |     |   | 1    | 4.33  |       |      | 5.91 | 7.1 |    |      |     |  | 1   |
| 2021-01-22 | GST |     |   | 1    | 3.72  |       |      | 5.89 | 7   |    |      |     |  | 1   |
| 2021-01-25 | GST |     |   | 1    | 3.35  |       |      | 6.03 | 6.6 |    |      |     |  | 1   |
| 2021-01-26 | GST |     |   | 1    | 2.76  |       |      | 5.89 | 6.1 |    |      |     |  | 1   |
| 2021-01-27 | GST |     |   | 1    | 2.78  | 1,200 |      | 5.84 | 6.3 |    |      |     |  | 1   |
| 2021-01-28 | GST |     |   | 1    | 6.45  |       |      | 5.83 | 5.9 |    |      |     |  | 1   |
| 2021-01-29 | GST |     |   | 1    | 4.23  |       |      | 5.61 | 5.8 |    |      |     |  | 2   |
| 2021-02-01 | GST |     |   | 1    | 3.13  |       |      | 5.84 | 5.7 |    |      |     |  | 2.4 |

|                           |     |       |            |      |      |                     |      |      |      |      |      |      |          |      |
|---------------------------|-----|-------|------------|------|------|---------------------|------|------|------|------|------|------|----------|------|
| 2021-02-02                | GST |       |            | 3    | 3.71 |                     |      | 5.89 | 5.4  |      |      |      |          | 1    |
| 2021-02-03                | GST |       |            | 1    | 2.95 |                     |      | 5.9  | 5.4  |      |      |      |          |      |
| 2021-02-04                | GST |       |            | 1    | 3.81 |                     |      | 5.84 | 5.3  |      |      |      |          | 1    |
| 2021-02-05                | GST |       |            | 1    | 7.95 |                     |      | 5.83 | 4.4  |      |      |      |          | 1    |
| 2021-02-08                | GST |       |            | 1    | 2.95 |                     |      | 6.04 | 5.3  |      |      |      |          | 1    |
| 2021-02-09                | GST |       |            | 3    | 3.54 |                     |      | 5.94 | 5.3  |      |      |      |          | 1    |
| 2021-02-10                | GST |       |            | 3    | 3.01 | 6,500               |      | 6    | 5.3  |      |      |      |          | 1    |
| 2021-02-11                | GST |       |            | 3    | 3.51 |                     |      | 6.29 | 5.1  |      |      |      |          | 1    |
| 2021-02-12                | GST |       |            | 3    | 2.84 |                     |      | 6.01 | 5.2  |      |      |      |          | 1    |
| 2021-02-16                | GST |       |            | 1    | 2.85 |                     |      | 6.22 | 5.1  |      |      |      |          | 1    |
| 2021-02-17                | GST |       |            | 1    | 3.15 | 3,100               |      | 6.23 | 4.9  |      |      |      |          | 1    |
| 2021-02-18                | GST |       |            | 1    | 2.94 |                     |      | 6.15 | 5    |      |      |      |          | 1    |
| 2021-02-19                | GST |       |            | 1    | 7.49 |                     |      | 6.53 | 4.6  |      |      |      |          | 1    |
| 2021-02-22                | GST |       |            | 1    | 8.46 |                     |      | 6.31 | 4.2  |      |      |      |          | 1    |
| 2021-02-23                | GST |       |            | 1    | 3.63 |                     |      | 6    | 4.8  |      |      |      |          | 1    |
| 2021-02-24                | GST |       |            | 1    | 5    | 560                 |      | 5.95 | 4.6  |      |      |      |          | 1    |
| 2021-02-25                | GST |       |            | 1    | 3.04 |                     |      | 5.96 | 4.8  |      |      |      |          | 1    |
| 2021-02-26                | GST |       |            | 1    | 7.68 |                     |      | 6.19 | 4.7  |      |      |      |          | 1    |
| 2021-03-01                | GST |       |            | 1    | 4.13 |                     |      | 6.19 | 5.3  |      |      |      |          | 1    |
| 2021-03-02                | GST |       |            | 1    | 3.56 |                     |      | 6.15 | 5.3  |      |      |      |          | 1    |
| 2021-03-03                | GST |       |            | 1    | 5.02 | 480                 |      | 5.89 | 5.3  |      |      |      |          | 1    |
| 2021-03-18                | GST |       |            |      | 3.64 | 850                 |      | 6.14 | 5.7  |      |      |      |          |      |
| 2021-04-01                | GST |       |            |      | 2.72 | 840                 |      | 5.99 | 7.9  |      |      |      |          |      |
| 2021-04-15                | GST |       |            |      | 3.65 |                     |      | 5.95 | 9.2  |      |      |      |          |      |
|                           |     |       |            |      |      | <b>GEOME<br/>AN</b> |      |      |      |      |      |      |          |      |
| Count                     |     | 1     | 41         | 101  | 147  | 109                 | 41   | 41   | 147  | 147  | 41   | 41   | 41       | 100  |
| Average                   |     | 220.0 | 15.6       | 2.0  | 4.8  | 2187.2              | 17.7 | 0.6  | 5.8  | 11.5 | 17.1 | 35.5 | 3.2      | 2.4  |
| standard deviation        |     | 0     | 12.7<br>93 | 2.04 | 1.9  |                     | 13.3 | 0.99 | 0.87 | 6.74 | 12.3 | 8.78 | 1.0<br>6 | 2.81 |
| confidence interval (95%) |     |       | 1.34<br>76 | 0.14 | 0.11 |                     | 1.4  | 0.1  | 0.05 | 0.37 | 1.3  | 0.92 | 0.1<br>1 | 0.19 |
| Upper limit               |     |       | 16.9       | 2.2  | 4.9  |                     | 19.1 | 0.8  | 5.9  | 11.9 | 18.4 | 36.4 | 3.3      | 2.6  |
| Lower limit               |     |       | 14.2       | 1.9  | 4.7  |                     | 16.3 | 0.5  | 5.8  | 11.2 | 15.8 | 34.6 | 3.1      | 2.2  |

| <b>Sample Date</b> | <b>Alkalinity</b> | <b>NH4</b> | <b>BOD5</b> | <b>DO</b> | <b>Fecal Coli</b> | <b>pH</b> | <b>Temp</b> | <b>TKN</b> | <b>TN</b> | <b>TP</b> | <b>TSS</b> |
|--------------------|-------------------|------------|-------------|-----------|-------------------|-----------|-------------|------------|-----------|-----------|------------|
| 2019-01-30         | 140               | 33         | 74          | 2.9       | 4600000           | 7.23      | 7.56        | 39         | 39        | 4.2       | 53         |
| 2019-01-31         | 140               | 30         | 110         | 1.6       | 4600000           | 7.16      | 6.87        | 40         | 40        | 5.5       | 190        |
| 2019-02-01         | 150               | 31         | 120         | 3.11      |                   | 7.4       | 6.05        | 45         | 45        | 5.3       | 130        |
| 2019-02-02         | 150               | 29         | 160         | 2.15      |                   | 7.29      | 7.16        | 42         | 42        | 5.1       | 160        |
| 2019-02-04         |                   |            | 150         | 1.79      | 9900000           | 7.17      | 6.92        |            |           |           | 150        |
| 2019-02-05         |                   | 27         | 230         | 1.78      | 9400000           | 7.22      | 7.04        | 40         | 40        |           | 150        |
| 2019-02-06         |                   |            | 180         | 3.45      | 7500000           | 7.13      | 7.2         |            |           |           | 180        |
| 2019-02-07         | 220               | 31         | 180         | 4.3       | 5800000           | 7.04      | 6.52        | 45         | 45        | 4.5       | 190        |
| 2019-02-11         |                   |            | 240         | 1.86      | 5200000           | 6.93      | 6.79        |            |           |           | 170        |
| 2019-02-12         |                   | 30         | 270         | 1.96      | 7200000           | 7.05      | 6.48        | 54         | 54        |           | 220        |
| 2019-02-13         |                   |            | 200         | 3.98      | 6700000           | 7.31      | 6.28        |            |           |           | 220        |
| 2019-02-14         | 170               | 28         | 110         | 2.31      | 11000000          | 7.15      | 6.39        | 45         | 45        | 5.3       | 150        |
| 2019-02-19         |                   | 32         | 190         | 2.47      | 5000000           | 7.08      | 6.52        | 49         | 49        |           | 200        |
| 2019-02-20         | 180               | 27         | 160         | 1.77      | 3800000           | 7.22      | 6.58        | 49         | 49        | 6.9       | 220        |
| 2019-02-21         |                   | 31         | 410         | 2.22      | 5200000           | 7.35      | 6.89        | 57         | 57        |           | 430        |
| 2019-02-25         |                   |            | 250         | 2.14      | 2300000           | 7.07      | 6.94        |            |           |           | 260        |
| 2019-02-26         |                   |            | 200         | 2.01      | 3800000           | 6.97      | 6.52        |            |           |           | 230        |
| 2019-02-27         |                   | 33         | 200         | 1.74      | 2600000           | 6.97      | 6.01        | 47         | 47        | 5.8       | 230        |
| 2019-02-28         |                   | 37         | 180         | 0.62      | 4300000           | 7.27      | 6.38        | 47         | 47        |           | 240        |
| 2019-03-04         |                   |            | 220         | 2.7       | 1400000           | 6.75      | 5.81        |            |           |           | 130        |
| 2019-03-05         |                   | 23         | 170         | 1.9       | 1500000           | 6.62      | 5.98        | 30         | 30        |           | 160        |
| 2019-03-06         | 100               | 23         | 150         | 0.76      | 1200000           | 7.21      | 5.87        | 33         | 33        | 4.1       | 110        |
| 2019-03-07         |                   | 22         | 140         | 0.33      | 960000            | 6.85      | 6.02        | 31         | 31        |           | 210        |
| 2019-03-11         |                   |            | 270         | 0.2       | 3300000           | 7.21      | 6.3         |            |           |           | 250        |
| 2019-03-12         |                   | 29         | 130         | 0.74      | 3400000           | 7.02      | 5.93        | 42         | 42        |           | 280        |
| 2019-03-13         | 170               | 31         | 410         | 0.82      | 5000000           | 6.91      | 5.95        | 48         | 48        | 6.3       | 330        |
| 2019-03-14         |                   | 33         | 200         | 0.34      | 4700000           | 6.94      | 6.09        | 38         | 38        |           | 310        |
| 2019-03-18         |                   |            | 430         | 0.35      | 4400000           | 6.97      | 6.43        |            |           |           | 350        |
| 2019-03-19         | 150               | 34         | 270         | 0.39      | 4700000           | 6.92      | 5.51        | 47         | 47        |           |            |
| 2019-03-20         | 190               | 39         | 250         | 0.58      | 7000000           | 7.35      | 6.39        | 51         | 51        | 7.1       | 170        |
| 2019-03-21         |                   | 35         | 190         | 0.54      | 520000            | 7.25      | 6.12        | 48         | 48        |           | 140        |
| 2019-03-25         |                   |            | 330         | 1.22      | 3900000           | 6.82      | 6.77        |            |           |           | 240        |
| 2019-03-26         |                   | 35         | 350         | 0.59      |                   | 6.77      | 6.64        | 46         | 46        |           | 260        |
| 2019-03-27         | 190               | 35         | 330         | 0.47      | 4000000           | 6.8       | 6.86        | 42         | 42        | 6.6       | 220        |
| 2019-03-28         |                   | 32         | 360         | 0.58      | 2300000           | 6.77      | 7.28        | 52         | 52        |           | 270        |
| 2019-04-01         | 170               | 35         | 350         |           | 6900000           |           |             | 54         | 54        | 5.8       | 350        |
| 2019-04-02         |                   |            | 260         | 0.07      |                   | 7.03      | 7.1         |            |           |           | 150        |
| 2019-04-03         | 160               | 35         | 160         | 0.26      | 1300000           | 6.93      | 7.29        | 50         | 50        | 6         | 290        |
| 2019-04-04         |                   |            | 180         | 0.28      | 2500000           | 6.91      | 7.44        |            |           |           | 230        |
| 2019-04-05         | 200               | 35         | 350         | 0.63      |                   | 6.67      | 7.33        | 45         | 45        | 6.8       | 330        |
| 2019-04-08         | 180               | 41         | 330         | 1.69      | 2300000           | 6.97      | 7.18        | 53         | 53        | 8         | 250        |
| 2019-04-09         | 180               | 30         | 150         | 0.14      |                   | 6.92      | 7.45        | 41         | 41        | 5.5       | 110        |
| 2019-04-10         | 230               | 31         | 130         | 0.93      | 2700000           | 7.43      | 8.5         | 42         | 42        | 4.8       | 120        |
| 2019-04-11         | 220               | 31         | 240         | 0.11      | 3800000           | 7.01      | 9           | 42         | 42        | 5.6       | 120        |
| 2019-04-16         | 160               | 31         | 190         | -0.02     | 3500000           | 6.72      | 9.8         | 39         | 39        |           | 140        |
| 2019-04-17         |                   |            | 320         | -0.03     | 3100000           | 7.17      | 10.5        |            |           |           | 300        |
| 2019-04-18         | 190               | 29         | 220         | -0.02     | 2400000           | 7.17      | 9.9         | 42         | 42        |           | 240        |
| 2019-04-22         |                   |            | 260         | 0.08      | 2800000           | 6.81      |             |            |           |           | 270        |
| 2019-04-23         | 150               | 22         | 380         | 0.08      | 3800000           | 6.93      | 10.7        | 39         | 39        |           | 250        |
| 2019-04-24         |                   |            |             | 0.04      |                   | 7.1       | 10.3        |            |           |           |            |
| 2019-04-25         | 280               | 24         | 270         | -0.04     | 4400000           | 6.8       | 11.06       | 42         | 42        |           | 250        |
| 2019-04-29         |                   |            |             | 0.02      | 670000            | 7.01      | 11.3        |            |           |           |            |
| 2019-04-30         | 170               | 26         | 220         | 0.07      | 3700000           | 6.96      | 11.2        | 38         | 38        |           | 220        |
| 2019-05-01         |                   | 18         | 170         | -0.01     | 3900000           | 7.07      | 11.4        | 24         | 24        | 3         | 120        |
| 2019-05-02         | 150               | 19         | 200         |           | 3000000           |           |             | 28         | 28        |           | 60         |
| 2019-05-06         |                   |            |             |           | 5300000           |           |             |            |           |           |            |
| 2019-05-07         | 190               | 31         | 410         |           | 4900000           |           |             | 52         | 52        |           | 390        |
| 2019-05-09         | 180               | 33         | 240         |           | 7500000           |           |             | 47         | 47        | 5.4       | 210        |
| 2019-05-14         | 220               | 35         | 320         |           | 4800000           |           |             | 54         | 54        |           | 290        |

| Sample Date | Alkalinity | NH4 | BOD5 | DO | Fecal Coli | pH | Temp | TKN | TN | TP  | TSS |
|-------------|------------|-----|------|----|------------|----|------|-----|----|-----|-----|
| 2019-05-15  |            | 33  | 220  |    | 2000000    |    |      | 51  | 51 | 5.8 | 170 |
| 2019-05-16  | 230        | 36  | 250  |    | 2400000    |    |      | 58  | 58 |     | 310 |
| 2019-05-20  |            |     |      |    | 5300000    |    |      |     |    |     |     |
| 2019-05-21  | 170        | 28  | 260  |    | 5000000    |    |      | 42  | 42 |     | 60  |
| 2019-05-22  |            | 31  | 290  |    | 7700000    |    |      | 52  | 52 | 4.8 | 220 |
| 2019-05-23  | 160        | 28  | 280  |    | 7200000    |    |      | 46  | 46 |     | 210 |
| 2019-05-28  | 160        | 26  | 170  |    | 5900000    |    |      | 42  | 42 |     | 250 |
| 2019-05-30  | 160        | 29  | 180  |    | 7500000    |    |      | 48  | 48 |     | 320 |
| 2019-06-04  | 190        | 34  | 160  |    | 17000000   |    |      | 46  | 46 |     | 72  |
| 2019-06-05  |            | 44  | 280  |    | 8000000    |    |      | 58  | 58 | 6.9 | 190 |
| 2019-06-11  | 180        | 31  | 210  |    | 7700000    |    |      | 51  | 51 |     | 270 |
| 2019-06-12  | 160        | 28  | 190  |    | 5300000    |    |      | 43  | 43 |     | 220 |
| 2019-06-13  | 190        | 31  | 150  |    | 6500000    |    |      | 47  | 47 |     | 200 |
| 2019-06-18  | 180        | 27  | 190  |    | 6500000    |    |      | 46  | 46 |     | 220 |
| 2019-06-19  | 190        | 30  | 151  |    | 6400000    |    |      | 46  | 46 | 4.9 | 190 |
| 2019-06-20  | 190        | 27  | 150  |    | 3600000    |    |      | 43  | 43 |     | 200 |
| 2019-06-25  | 190        | 28  | 240  |    | 3900000    |    |      | 46  | 46 |     | 220 |
| 2019-06-26  |            |     |      |    | 4600000    |    |      |     |    |     |     |
| 2019-06-27  | 190        | 32  | 130  |    | 9400000    |    |      | 39  | 39 |     | 130 |
| 2019-07-02  | 180        | 29  | 230  |    | 5700000    |    |      | 43  | 43 | 6.7 | 290 |
| 2019-07-09  | 130        | 25  | 150  |    | 5700000    |    |      | 39  | 39 |     | 120 |
| 2019-07-10  | 150        | 29  | 140  |    | 2500000    |    |      | 18  | 18 |     | 110 |
| 2019-07-11  | 160        | 27  |      |    | 2200000    |    |      | 42  | 42 |     |     |
| 2019-07-16  |            | 27  | 94   |    | 14000000   |    |      | 43  | 43 |     |     |
| 2019-07-17  | 220        | 34  | 76   |    | 5700000    |    |      | 48  | 48 | 4.8 | 150 |
| 2019-07-18  |            | 28  | 134  |    | 4400000    |    |      | 44  | 44 |     | 97  |
| 2019-07-23  |            | 35  | 190  |    | 9300000    |    |      | 46  | 46 |     | 20  |
| 2019-07-25  |            | 26  | 82   |    | 6600000    |    |      | 38  | 38 |     | 66  |
| 2019-07-30  |            | 39  | 170  |    | 11000000   |    |      | 60  | 60 |     | 380 |
| 2019-07-31  | 220        | 34  | 120  |    | 9900000    |    |      | 55  | 55 | 5.2 | 210 |
| 2019-08-01  |            | 32  | 110  |    | 9300000    |    |      | 47  | 47 |     | 210 |
| 2019-08-06  |            | 36  | 167  |    | 8500000    |    |      | 53  | 53 |     | 220 |
| 2019-08-07  | 220        | 32  | 110  |    | 9000000    |    |      | 49  | 49 |     | 140 |
| 2019-08-08  |            |     |      |    | 11000000   |    |      |     |    |     |     |
| 2019-08-13  | 210        | 38  | 140  |    | 630000     |    |      | 45  | 45 |     | 100 |
| 2019-08-14  | 210        | 37  | 140  |    | 9900000    |    |      | 51  | 51 | 5.5 | 190 |
| 2019-08-15  | 220        | 33  | 135  |    | 3000000    |    |      | 52  | 52 |     | 360 |
| 2019-08-20  | 190        | 28  | 210  |    | 11000000   |    |      | 44  | 44 |     | 130 |
| 2019-08-21  | 200        | 31  | 0    |    | 5100000    |    |      | 41  | 41 |     | 120 |
| 2019-08-22  | 180        | 28  |      |    | 6300000    |    |      | 46  | 46 |     | 130 |
| 2019-08-27  | 160        | 28  | 200  |    | 2000000    |    |      | 44  | 44 |     | 250 |
| 2019-08-28  | 170        | 15  | 120  |    | 6000000    |    |      | 46  | 46 |     | 240 |
| 2019-08-29  | 170        | 22  | 86   |    | 3500000    |    |      | 34  | 34 |     | 180 |
| 2019-09-03  |            |     |      |    | 4200000    |    |      |     |    |     |     |
| 2019-09-04  | 180        | 30  | 240  |    | 1300000    |    |      | 44  | 44 |     | 140 |
| 2019-09-05  | 140        | 26  | 260  |    | 3500000    |    |      | 45  | 45 |     | 210 |
| 2019-09-10  | 150        | 28  | 200  |    | 4600000    |    |      | 40  | 40 |     | 230 |
| 2019-09-12  | 170        | 28  |      |    | 3200000    |    |      | 42  | 42 |     | 240 |
| 2019-09-16  | 180        | 34  | 170  |    | 7500000    |    |      | 43  | 43 |     |     |
| 2019-09-17  | 170        | 31  | 240  |    | 9800000    |    |      | 43  | 43 |     | 18  |
| 2019-09-18  | 160        | 34  | 150  |    | 6800000    |    |      | 47  | 47 |     | 140 |
| 2019-09-19  | 150        | 35  |      |    | 11000000   |    |      | 48  | 48 |     | 260 |
| 2019-09-24  | 180        | 28  | 140  |    | 5300000    |    |      | 38  | 38 |     | 79  |
| 2019-09-25  |            |     |      |    | 10000000   |    |      |     |    |     |     |
| 2019-09-26  | 200        | 29  | 190  |    | 6100000    |    |      | 48  | 48 |     | 280 |
| 2019-10-01  | 150        | 24  | 400  |    | 5900000    |    |      | 49  | 49 |     | 500 |
| 2019-10-02  | 170        | 30  | 170  |    | 3200000    |    |      | 46  | 46 |     | 120 |
| 2019-10-03  | 160        | 31  | 270  |    | 4900000    |    |      | 45  | 45 |     | 210 |

| Sample Date | Alkalinity | NH4 | BOD5 | DO | Fecal Coli | pH | Temp | TKN | TN    | TP  | TSS |
|-------------|------------|-----|------|----|------------|----|------|-----|-------|-----|-----|
| 2019-10-07  | 180        | 40  | 300  |    |            |    |      | 58  | 58    |     | 120 |
| 2019-10-08  | 150        | 27  | 101  |    | 3100000    |    |      | 40  | 40    |     | 60  |
| 2019-10-09  | 150        | 27  | 120  |    | 3600000    |    |      | 40  | 40    | 5.2 | 130 |
| 2019-10-10  |            |     | 130  |    |            |    |      |     |       |     |     |
| 2019-10-11  | 150        | 29  | 120  |    |            |    |      | 41  | 41    |     | 110 |
| 2019-10-14  | 120        | 26  | 130  |    |            |    |      | 40  | 40    |     | 130 |
| 2019-10-15  | 150        | 27  | 95   |    | 3300000    |    |      | 35  | 35    |     | 83  |
| 2019-10-16  | 140        | 25  | 200  |    | 4400000    |    |      | 43  | 43    |     | 190 |
| 2019-10-17  | 160        | 27  | 110  |    |            |    |      | 40  | 40    |     | 160 |
| 2019-10-22  | 180        | 27  | 150  |    | 5700000    |    |      | 38  | 38    |     | 190 |
| 2019-10-24  | 140        | 26  | 160  |    | 7700000    |    |      | 40  | 40    |     | 160 |
| 2019-10-29  |            | 18  | 84   |    | 4700000    |    |      | 26  | 26    |     | 130 |
| 2019-10-31  | 180        | 29  | 180  |    | 5400000    |    |      | 37  | 37    |     | 150 |
| 2019-11-05  | 170        | 29  | 240  |    | 8500000    |    |      | 47  | 47    |     | 260 |
| 2019-11-07  |            | 24  | 240  |    | 7200000    |    |      | 40  | 40    |     | 180 |
| 2019-11-12  |            | 29  | 270  |    | 5100000    |    |      | 43  | 43    |     | 46  |
| 2019-11-14  | 120        | 28  | 260  |    | 5500000    |    |      | 38  | 38    | 4.6 | 76  |
| 2019-11-19  | 93         | 17  | 170  |    | 7400000    |    |      | 26  | 26    |     | 25  |
| 2019-11-21  | 190        | 28  | 130  |    | 8900000    |    |      | 38  | 37    |     | 100 |
| 2019-11-26  | 150        | 22  | 310  |    | 2400000    |    |      | 39  | 39    |     | 180 |
| 2019-12-02  |            |     |      |    | 1300000    |    |      |     |       |     |     |
| 2019-12-03  | 170        | 20  | 160  |    | 1900000    |    |      | 32  | 32    |     | 180 |
| 2019-12-04  |            |     |      |    | 2000000    |    |      |     |       |     |     |
| 2019-12-05  | 150        | 24  | 160  |    | 4200000    |    |      | 34  | 34    |     | 150 |
| 2019-12-09  |            |     |      |    | 1900000    |    |      |     |       |     |     |
| 2019-12-10  | 160        | 23  | 180  |    | 1600000    |    |      | 34  | 34    |     | 170 |
| 2019-12-11  |            |     |      |    | 1300000    |    |      |     |       |     |     |
| 2019-12-12  | 110        | 25  | 197  |    | 2500000    |    |      | 34  | 34    | 3   | 130 |
| 2019-12-17  | 160        | 25  | 270  |    | 2800000    |    |      | 39  | 39    |     | 200 |
| 2019-12-18  |            |     |      |    | 1100000    |    |      |     |       |     |     |
| 2019-12-19  | 190        | 27  | 100  |    | 1900000    |    |      | 36  | 34    |     | 100 |
| 2019-12-23  | 99         | 26  | 400  |    | 700000     |    |      | 41  | 41    |     | 200 |
| 2019-12-26  | 130        | 24  | 150  |    | 1400000    |    |      | 36  | 36    |     | 170 |
| 2019-12-30  | 150        | 29  | 140  |    | 300000     |    |      | 40  | 40    |     | 140 |
| 2020-01-02  | 98         | 21  | 130  |    |            |    |      | 36  | 36    |     | 220 |
| 2020-01-07  | 180        | 27  | 110  |    | 2800000    |    |      | 37  | 37    |     | 88  |
| 2020-01-09  | 250        | 36  | 140  |    | 2700000    |    |      | 44  | 44    | 4.8 | 120 |
| 2020-01-14  | 210        | 30  | 150  |    | 2000000    |    |      | 42  | 42    |     | 120 |
| 2020-01-16  | 210        | 35  |      |    | 4200000    |    |      | 46  | 46    |     | 170 |
| 2020-01-21  | 180        | 29  | 200  |    | 2500000    |    |      | 37  | 37    |     | 210 |
| 2020-01-23  | 140        | 28  | 160  |    | 1700000    |    |      | 39  | 39    |     | 120 |
| 2020-01-24  | 220        | 27  | 190  |    |            |    |      | 41  | 42.13 |     | 140 |
| 2020-01-28  | 140        | 33  | 200  |    | 820000     |    |      | 40  | 40    |     | 130 |
| 2020-01-30  | 150        | 34  | 410  |    | 1300000    |    |      | 44  | 44    |     | 170 |
| 2020-02-04  | 130        | 31  | 150  |    | 1100000    |    |      | 45  | 45    |     | 190 |
| 2020-02-06  | 140        | 30  | 280  |    | 640000     |    |      | 43  | 43    |     | 44  |
| 2020-02-11  | 140        | 29  | 110  |    | 1100000    |    |      | 45  | 45    | 4.6 | 230 |
| 2020-02-13  | 140        | 28  | 180  |    | 940000     |    |      | 44  | 44    |     | 170 |
| 2020-02-18  | 150        | 33  | 320  |    | 1700000    |    |      | 50  | 50    |     | 170 |
| 2020-02-20  | 140        | 33  | 200  |    | 4200000    |    |      | 44  | 44    |     | 84  |
| 2020-02-25  | 140        | 31  | 180  |    | 5200000    |    |      | 45  | 45    |     | 160 |
| 2020-02-27  | 160        | 32  | 300  |    | 3900000    |    |      | 45  | 45    |     | 110 |
| 2020-03-03  | 120        | 30  | 250  |    | 2600000    |    |      | 45  | 45    |     | 200 |
| 2020-03-05  | 130        | 34  | 220  |    | 2800000    |    |      | 45  | 45    |     | 96  |
| 2020-03-10  | 140        | 36  | 240  |    | 2900000    |    |      | 54  | 54    | 1.9 | 130 |
| 2020-03-12  | 160        | 37  | 250  |    | 6500000    |    |      | 55  | 55    |     | 190 |
| 2020-03-17  | 130        | 30  | 230  |    | 1400000    |    |      | 46  | 46    |     | 150 |
| 2020-03-19  | 140        | 24  | 12   |    | 600000     |    |      | 43  | 43    |     | 130 |
| 2020-04-16  |            |     |      |    |            |    |      | 43  | 43.1  |     |     |
| 2020-04-28  |            |     | 200  |    |            |    |      | 39  | 39    |     | 130 |

| <b>Sample Date</b> | <b>Alkalinity</b> | <b>NH4</b> | <b>BOD5</b> | <b>DO</b> | <b>Fecal Coli</b> | <b>pH</b> | <b>Temp</b> | <b>TKN</b> | <b>TN</b> | <b>TP</b> | <b>TSS</b> |
|--------------------|-------------------|------------|-------------|-----------|-------------------|-----------|-------------|------------|-----------|-----------|------------|
| 2020-04-29         |                   | 31         | 150         |           | 860000            |           |             | 45         | 45        | 3.5       | 170        |
| 2020-04-30         | 150               | 32         | 160         |           | 1600000           |           |             | 48         | 48        |           | 180        |
| 2020-05-05         | 140               | 31         | 200         |           |                   |           |             | 50         | 50        |           | 280        |
| 2020-05-07         | 160               | 34         | 150         |           | 1100000           |           |             | 54         | 54        |           | 170        |
| 2020-05-12         | 150               | 30         | 180         |           |                   |           |             | 47         | 47        |           | 200        |
| 2020-05-13         | 150               | 33         | 210         |           | 1000000           |           |             | 53         | 53.34     |           | 220        |
| 2020-05-14         | 150               | 33         | 180         |           | 1100000           |           |             | 53         | 53        |           | 210        |
| 2020-05-19         | 140               | 31         | 150         |           |                   |           |             | 48         | 48        |           | 140        |
| 2020-05-21         |                   |            | 170         |           |                   |           |             |            |           |           | 90         |
| 2020-05-26         |                   |            | 150         |           |                   |           |             | 42         | 42        |           | 68         |
| 2020-05-27         | 130               |            |             |           |                   |           |             |            |           |           |            |
| 2020-06-02         |                   |            | 250         |           | 1700000           |           |             | 43         | 43        |           | 170        |
| 2020-06-03         |                   |            |             |           |                   |           |             |            |           |           | 1.1        |
| 2020-06-04         |                   | 29         | 260         |           | 1500000           |           |             | 44         | 44        |           | 140        |
| 2020-06-08         |                   |            | 200         |           | 420000            |           |             |            |           |           | 190        |
| 2020-06-09         |                   |            | 200         |           | 1600000           |           |             | 40         | 40        |           | 150        |
| 2020-06-10         |                   | 24         | 220         |           | 990000            |           |             | 42         | 42        | 1.3       | 310        |
| 2020-06-11         | 130               | 5.5        | 150         |           | 1500000           |           |             | 36         | 36        |           | 130        |
| 2020-06-12         |                   |            | 250         |           | 3800000           |           |             |            |           |           | 200        |
| 2020-06-15         |                   |            | 200         |           | 2200000           |           |             |            |           |           | 330        |
| 2020-06-16         |                   |            | 230         |           |                   |           |             | 40         | 40        |           | 300        |
| 2020-06-17         |                   |            |             |           |                   |           |             |            |           |           | 1.4        |
| 2020-06-18         |                   | 27         | 410         |           | 5200000           |           |             | 55         | 55        |           | 530        |
| 2020-06-22         |                   |            | 160         |           | 1000000           |           |             |            |           |           | 170        |
| 2020-06-23         |                   | 23         | 110         |           | 1400000           |           |             | 37         | 37        |           | 68         |
| 2020-06-24         | 140               | 24         | 100         |           | 1600000           |           |             | 35         | 35        | 1.4       | 96         |
| 2020-06-25         |                   | 29         | 150         |           | 2000000           |           |             | 40         | 41.77     | 1.4       | 64         |
| 2020-06-26         |                   |            | 200         |           | 800000            |           |             |            |           |           | 82         |
| 2020-06-29         |                   |            | 140         |           | 3300000           |           |             |            |           |           | 140        |
| 2020-06-30         |                   |            | 180         |           |                   |           |             | 45         | 45        |           | 140        |
| 2020-07-01         |                   | 28         | 160         |           | 1100000           |           |             | 39         | 39        | 2.8       | 110        |
| 2020-07-07         |                   |            | 170         |           |                   |           |             | 47         | 47        |           | 170        |
| 2020-07-08         |                   | 28         | 180         |           | 3600000           |           |             | 45         | 45        | 1.4       | 140        |
| 2020-07-09         | 150               | 29         | 150         |           | 1400000           |           |             | 42         | 42.6      |           | 140        |
| 2020-07-10         |                   |            | 160         |           | 2700000           |           |             |            |           |           | 110        |
| 2020-07-13         |                   |            | 200         |           | 680000            |           |             |            |           |           | 240        |
| 2020-07-14         |                   | 28         | 210         |           | 1700000           |           |             | 48         | 48        | 1.5       | 240        |
| 2020-07-15         |                   | 29         | 360         |           | 1900000           |           |             | 51         | 51        |           | 420        |
| 2020-07-20         | 190               | 32         | 160         |           |                   |           |             | 41         | 43.1      |           | 72         |
| 2020-07-21         |                   |            | 180         |           |                   |           |             |            |           |           | 36         |
| 2020-07-22         | 180               | 30         | 170         |           | 1900000           |           |             | 40         | 42.02     | 1.5       | 70         |
| 2020-07-23         | 190               | 28         | 100         |           | 2500000           |           |             | 40         | 40        |           | 56         |
| 2020-07-24         | 170               | 32         | 190         |           | 2500000           |           |             | 46         | 47.22     |           | 160        |
| 2020-07-27         | 190               | 30         | 120         |           | 1600000           |           |             | 43         | 44.98     |           | 86         |
| 2020-07-28         |                   | 32         | 150         |           | 3100000           |           |             |            |           |           | 160        |
| 2020-07-29         |                   | 35         | 170         |           | 2500000           |           |             | 49         | 49        | 1.6       | 130        |
| 2020-07-30         |                   | 33         | 150         |           | 2900000           |           |             |            |           |           | 62         |
| 2020-07-31         |                   | 37         | 210         |           | 1400000           |           |             |            |           |           | 150        |
| 2020-08-03         |                   | 36         | 130         |           | 3900000           |           |             | 50         | 50        |           | 120        |
| 2020-08-04         |                   | 29         | 150         |           | 1600000           |           |             |            |           |           | 56         |
| 2020-08-05         |                   | 20         | 120         |           | 1200000           |           |             | 28         | 28        | 1         | 60         |
| 2020-08-06         | 170               | 25         | 130         |           | 2200000           |           |             | 34         | 35.23     |           | 62         |
| 2020-08-07         |                   | 25         | 140         |           | 2200000           |           |             |            |           |           | 74         |
| 2020-08-10         |                   | 40         | 190         |           | 2500000           |           |             | 53         | 53        |           | 120        |
| 2020-08-11         |                   | 35         | 170         |           | 5200000           |           |             |            |           |           | 110        |
| 2020-08-12         |                   | 39         | 200         |           | 2700000           |           |             |            |           | 1.5       | 120        |
| 2020-08-13         |                   | 43         | 190         |           | 2400000           |           |             |            |           |           | 140        |
| 2020-08-14         |                   | 43         | 190         |           | 3300000           |           |             |            |           |           | 120        |
| 2020-08-17         |                   | 45         | 210         |           | 1400000           |           |             |            |           |           | 140        |

| Sample Date | Alkalinity | NH4 | BOD5 | DO | Fecal Coli | pH | Temp | TKN | TN    | TP  | TSS |
|-------------|------------|-----|------|----|------------|----|------|-----|-------|-----|-----|
| 2020-08-18  |            | 41  | 190  |    | 960000     |    |      |     |       |     | 98  |
| 2020-08-19  |            | 38  | 180  |    | 1200000    |    |      | 46  | 46    | 1.4 | 86  |
| 2020-08-20  |            | 39  | 160  |    | 4600000    |    |      |     |       |     | 150 |
| 2020-08-21  |            | 42  | 190  |    | 4900000    |    |      |     |       |     | 160 |
| 2020-08-24  | 230        | 37  | 170  |    | 2600000    |    |      | 52  | 53.18 |     | 150 |
| 2020-08-25  |            | 39  | 190  |    | 1400000    |    |      |     |       |     | 140 |
| 2020-08-26  | 240        | 38  | 210  |    | 6400000    |    |      | 55  | 62.26 | 6.2 | 240 |
| 2020-08-27  |            | 41  | 220  |    | 5900000    |    |      |     |       |     | 190 |
| 2020-08-28  | 230        | 38  | 220  |    |            |    |      | 60  | 61.1  |     | 190 |
| 2020-08-31  | 220        | 33  | 150  |    | 5400000    |    |      | 47  | 47.31 |     | 100 |
| 2020-09-01  |            | 33  | 97   |    | 8700000    |    |      |     |       |     | 52  |
| 2020-09-02  | 230        | 36  | 180  |    | 6100000    |    |      | 50  | 50.86 | 6.6 | 130 |
| 2020-09-03  |            | 32  | 160  |    | 5900000    |    |      |     |       |     | 140 |
| 2020-09-04  | 180        | 26  | 150  |    | 3500000    |    |      | 39  | 40.06 |     | 76  |
| 2020-09-07  |            |     | 140  |    |            |    |      |     |       |     | 110 |
| 2020-09-08  |            | 21  | 150  |    | 5800000    |    |      | 33  | 33    |     | 120 |
| 2020-09-09  |            | 24  | 140  |    | 4000000    |    |      | 36  | 38.46 | 4.9 | 130 |
| 2020-09-10  |            | 24  | 180  |    | 6400000    |    |      |     |       |     | 110 |
| 2020-09-11  |            | 20  | 140  |    | 3300000    |    |      |     |       |     | 74  |
| 2020-09-14  | 260        | 44  | 260  |    | 4700000    |    |      | 62  | 64.83 |     | 150 |
| 2020-09-15  |            | 31  | 290  |    | 5400000    |    |      |     |       |     | 210 |
| 2020-09-16  | 200        | 30  | 310  |    | 8200000    |    |      | 48  | 50.4  | 6.5 | 250 |
| 2020-09-17  |            | 30  | 150  |    | 2700000    |    |      |     |       |     | 180 |
| 2020-09-18  | 200        | 29  | 170  |    | 2800000    |    |      | 44  | 46.86 |     | 160 |
| 2020-09-21  |            | 19  | 120  |    | 3000000    |    |      | 30  | 30    |     | 82  |
| 2020-09-22  |            | 17  | 120  |    | 2600000    |    |      |     |       |     | 100 |
| 2020-09-23  | 190        | 19  | 130  |    | 3400000    |    |      | 31  | 32.16 | 4.1 | 120 |
| 2020-09-24  | 200        | 30  | 130  |    | 3400000    |    |      | 45  | 46.11 |     | 160 |
| 2020-09-25  |            | 30  | 120  |    | 1600000    |    |      |     |       |     | 140 |
| 2020-09-28  | 190        | 26  | 110  |    | 4300000    |    |      | 39  | 40.06 |     | 110 |
| 2020-09-29  |            | 26  | 130  |    | 4000000    |    |      |     |       |     | 130 |
| 2020-09-30  | 190        | 26  | 150  |    | 2900000    |    |      | 39  | 40.82 | 5.8 | 160 |
| 2020-10-01  | 200        | 27  | 110  |    | 1900000    |    |      | 38  | 39.3  |     | 120 |
| 2020-10-02  |            | 26  | 87   |    | 2100000    |    |      |     |       |     | 110 |
| 2020-10-05  | 190        | 27  | 93   |    | 2500000    |    |      | 36  | 37.26 |     | 98  |
| 2020-10-06  |            | 26  | 140  |    | 1900000    |    |      |     |       |     | 100 |
| 2020-10-07  |            | 26  | 120  |    | 2100000    |    |      | 38  | 39.44 | 5.2 | 130 |
| 2020-10-08  |            | 26  | 110  |    | 2200000    |    |      |     |       |     | 96  |
| 2020-10-09  |            | 26  | 140  |    | 2900000    |    |      |     |       |     | 130 |
| 2020-10-12  |            |     | 98   |    |            |    |      |     |       |     | 96  |
| 2020-10-13  |            | 24  | 110  |    | 3900000    |    |      | 37  | 37    |     | 94  |
| 2020-10-14  |            | 23  | 120  |    | 3600000    |    |      | 34  | 35.15 | 5.6 | 110 |
| 2020-10-15  |            | 25  | 140  |    | 3200000    |    |      |     |       |     | 110 |
| 2020-10-16  |            | 25  | 170  |    | 2800000    |    |      |     |       |     | 120 |
| 2020-10-19  |            | 41  | 200  |    | 11000000   |    |      | 60  | 60    |     | 180 |
| 2020-10-20  |            | 26  | 190  |    | 5800000    |    |      |     |       |     | 140 |
| 2020-10-21  |            | 25  | 110  |    | 4500000    |    |      | 36  | 37.18 | 5.2 | 87  |
| 2020-10-22  |            | 29  | 120  |    | 8300000    |    |      |     |       |     | 100 |
| 2020-10-23  |            | 30  | 160  |    | 1800000    |    |      |     |       |     | 110 |
| 2020-10-26  |            | 30  | 160  |    | 5500000    |    |      | 42  | 42    |     | 130 |
| 2020-10-27  |            | 27  | 170  |    | 11000000   |    |      |     |       |     | 110 |
| 2020-10-28  | 190        | 28  | 130  |    | 8200000    |    |      | 37  | 38.34 | 5.2 | 110 |
| 2020-10-29  | 180        | 26  | 170  |    | 1400000    |    |      | 37  | 38.22 |     | 130 |
| 2020-10-30  |            | 21  | 210  |    | 2500000    |    |      |     |       |     | 74  |
| 2020-11-02  |            | 24  | 110  |    | 4300000    |    |      | 30  | 30    |     | 62  |
| 2020-11-03  |            | 25  | 120  |    | 5400000    |    |      |     |       |     | 90  |
| 2020-11-04  |            | 24  | 100  |    | 6600000    |    |      | 32  | 33.3  | 4.7 | 100 |
| 2020-11-05  |            | 23  | 91   |    | 4400000    |    |      |     |       |     | 98  |

| Sample Date | Alkalinity | NH4 | BOD5 | DO  | Fecal Coli | pH | Temp | TKN | TN     | TP  | TSS |
|-------------|------------|-----|------|-----|------------|----|------|-----|--------|-----|-----|
| 2020-11-09  |            |     | 150  |     | 3700000    |    |      | 45  | 45     |     | 160 |
| 2020-11-10  |            | 27  | 130  |     |            |    |      | 39  | 40.01  | 5.4 | 86  |
| 2020-11-11  |            |     | 200  |     |            |    |      |     |        |     | 130 |
| 2020-11-12  |            |     | 140  |     | 1900000    |    |      |     |        |     | 110 |
| 2020-11-13  |            |     | 160  |     |            |    |      |     |        |     | 120 |
| 2020-11-16  |            |     | 150  |     |            |    |      | 52  | 52     |     | 110 |
| 2020-11-17  |            |     | 190  |     | 1800000    |    |      |     |        |     | 96  |
| 2020-11-18  | 160        | 26  | 250  |     | 2500000    |    |      | 40  | 40.97  | 5.9 | 150 |
| 2020-11-19  |            |     | 210  |     | 2600000    |    |      |     |        |     | 150 |
| 2020-11-20  | 170        | 25  | 160  |     |            |    |      | 37  | 37.92  |     | 130 |
| 2020-11-23  |            |     | 190  |     | 1100000    |    |      | 37  | 37     |     | 150 |
| 2020-11-24  |            | 23  | 200  |     |            |    |      | 39  | 39.87  | 5.1 | 140 |
| 2020-11-25  |            |     | 160  |     |            |    |      |     |        |     | 120 |
| 2020-11-30  |            |     | 200  |     |            |    |      | 37  | 37     |     | 130 |
| 2020-12-01  |            |     |      |     | 1200000    |    |      |     |        |     |     |
| 2020-12-02  |            | 19  | 160  |     | 2400000    |    |      | 36  | 36.99  | 4.5 | 110 |
| 2020-12-03  |            |     |      |     | 1800000    |    |      |     |        |     |     |
| 2020-12-04  |            |     | 200  |     |            |    |      |     |        |     | 120 |
| 2020-12-07  |            |     | 140  |     |            |    |      | 30  | 30     |     | 82  |
| 2020-12-08  |            |     | 160  |     | 720000     |    |      |     |        |     | 100 |
| 2020-12-09  |            | 23  | 260  |     | 930000     |    |      | 42  | 44.55  | 5.6 | 130 |
| 2020-12-10  |            |     | 160  |     | 1100000    |    |      |     |        |     | 98  |
| 2020-12-11  |            |     | 200  |     |            |    |      |     |        |     | 130 |
| 2020-12-12  |            |     | 180  |     |            |    |      |     |        |     | 94  |
| 2020-12-14  |            |     |      |     |            |    |      | 39  | 39     |     |     |
| 2020-12-15  |            |     |      |     | 560000     |    |      |     |        |     |     |
| 2020-12-16  | 180        | 25  | 180  |     | 1700000    |    |      | 41  | 42.725 | 5.2 | 120 |
| 2020-12-17  |            |     |      |     | 830000     |    |      |     |        |     |     |
| 2020-12-18  |            |     | 180  |     |            |    |      |     |        |     | 120 |
| 2020-12-19  |            |     | 210  |     |            |    |      |     |        |     | 160 |
| 2020-12-20  |            |     | 180  |     |            |    |      |     |        |     | 140 |
| 2020-12-21  |            |     | 190  |     | 500000     |    |      | 36  | 36     |     | 110 |
| 2020-12-22  |            | 23  | 220  |     |            |    |      | 38  | 39.278 | 5.6 | 120 |
| 2020-12-28  |            |     |      |     | 320000     |    |      | 37  | 37     |     |     |
| 2020-12-29  |            | 24  | 180  |     | 500000     |    |      | 36  | 36     |     | 100 |
| 2020-12-30  |            | 24  | 180  |     | 650000     |    |      | 37  | 39.06  | 5.1 | 140 |
| 2021-01-03  |            |     | 150  |     |            |    |      |     |        |     | 100 |
| 2021-01-04  |            |     | 210  |     | 280000     |    |      | 38  | 38     |     | 140 |
| 2021-01-05  |            |     | 140  |     |            |    |      |     |        |     | 80  |
| 2021-01-06  |            | 28  | 140  |     | 410000     |    |      | 40  | 42.04  | 5.3 | 96  |
| 2021-01-07  |            |     | 220  |     |            |    |      |     |        |     | 150 |
| 2021-01-08  |            |     | 180  |     |            |    |      |     |        |     | 60  |
| 2021-01-11  |            |     | 260  |     | 480000     |    |      | 46  | 46     |     | 120 |
| 2021-01-12  |            | 29  | 200  |     | 600000     |    |      | 39  | 39     |     | 120 |
| 2021-01-13  | 200        | 32  | 170  |     | 480000     |    |      | 42  | 43.125 | 5.7 | 100 |
| 2021-01-14  |            | 210 | 34   | 130 |            |    |      | 44  | 45.41  |     | 88  |
| 2021-01-16  |            |     | 360  |     |            |    |      |     |        |     | 170 |
| 2021-01-17  |            |     | 240  |     |            |    |      |     |        |     | 120 |
| 2021-01-18  |            |     |      |     |            |    |      |     |        |     | 100 |
| 2021-01-19  |            |     | 220  |     | 310000     |    |      | 40  | 40     |     | 90  |
| 2021-01-20  |            | 28  | 170  |     | 480000     |    |      | 40  | 41.98  | 5.6 | 84  |
| 2021-01-21  |            |     | 160  |     |            |    |      |     |        |     | 76  |
| 2021-01-22  |            |     | 160  |     |            |    |      |     |        |     | 78  |
| 2021-01-25  |            | 23  | 180  |     | 2500000    |    |      | 37  | 37     |     | 100 |
| 2021-01-26  |            | 25  | 230  |     | 1200000    |    |      |     |        |     | 110 |
| 2021-01-27  |            | 26  | 180  |     | 1900000    |    |      | 40  | 41.14  | 5.4 | 86  |
| 2021-01-28  |            | 27  | 180  |     | 290000     |    |      |     |        |     | 120 |
| 2021-01-29  |            | 28  | 160  |     | 48000      |    |      |     |        |     | 68  |

| <b>Sample Date</b> | <b>Alkalinity</b> | <b>NH4</b> | <b>BOD5</b> | <b>DO</b> | <b>Fecal Coli</b> | <b>pH</b> | <b>Temp</b> | <b>TKN</b> | <b>TN</b> | <b>TP</b> | <b>TSS</b> |
|--------------------|-------------------|------------|-------------|-----------|-------------------|-----------|-------------|------------|-----------|-----------|------------|
| 2021-02-02         |                   | 36         | 190         |           | 900000            |           |             | 50         | 51.46     | 5.8       | 110        |
| 2021-02-03         |                   | 31         | 110         |           | 2600000           |           |             | 41         | 42.41     | 4.6       | 66         |
| 2021-02-04         |                   | 39         | 310         |           | 2000000           |           |             |            |           |           | 250        |
| 2021-02-05         |                   | 41         | 330         |           | 590000            |           |             |            |           |           | 160        |
| 2021-02-08         |                   | 43         | 200         |           | 1300000           |           |             | 56         | 56        |           | 66         |
| 2021-02-09         |                   | 39         | 220         |           | 1800000           |           |             | 57         | 59.12     | 6.7       | 92         |
| 2021-02-10         |                   | 43         | 250         |           | 2800000           |           |             | 59         | 60.78     | 7         | 120        |
| 2021-02-11         |                   | 43         | 220         |           | 2500000           |           |             |            |           |           | 130        |
| 2021-02-12         |                   |            | 120         |           |                   |           |             |            |           |           |            |
| 2021-02-16         |                   | 26         | 280         |           | 1100000           |           |             | 40         | 41.19     | 5.5       | 150        |
| 2021-02-17         |                   | 22         | 210         |           | 1600000           |           |             | 33         | 34.86     | 4.2       | 96         |
| 2021-02-18         |                   | 26         | 200         |           | 1300000           |           |             |            |           |           | 110        |
| 2021-02-19         |                   | 26         | 180         |           | 790000            |           |             |            |           |           | 100        |
| 2021-02-22         |                   | 27         | 120         |           | 1900000           |           |             | 37         | 37        |           | 80         |
| 2021-02-23         |                   | 29         | 170         |           | 1900000           |           |             | 36         | 37.31     | 4.9       | 100        |
| 2021-02-24         | 170               | 26         | 260         |           | 3000000           |           |             | 42         | 43.75     | 5.3       | 150        |
| 2021-02-25         |                   | 30         | 250         |           | 1600000           |           |             |            |           |           | 280        |
| 2021-02-26         |                   | 28         | 230         |           | 700000            |           |             |            |           |           | 200        |
| 2021-03-01         |                   | 29         | 250         |           | 2300000           |           |             | 46         | 46        |           | 170        |
| 2021-03-02         |                   | 26         | 220         |           | 2700000           |           |             | 38         | 39.15     | 5.4       | 150        |
| 2021-03-03         |                   | 30         | 260         |           | 4300000           |           |             | 45         | 46.18     | 5.9       | 170        |
| 2021-03-04         |                   | 29         | 250         |           | 3100000           |           |             |            |           |           | 200        |
| 2021-03-05         |                   | 33         | 310         |           | 800000            |           |             |            |           |           | 110        |
| 2021-03-08         |                   | 39         | 270         |           | 2900000           |           |             |            |           |           | 170        |
| 2021-03-09         |                   | 29         | 240         |           | 4000000           |           |             | 49         | 50.18     | 6.6       | 180        |
| 2021-03-10         |                   | 32         | 240         |           | 1600000           |           |             | 51         | 52.26     | 6.2       | 160        |
| 2021-03-11         |                   | 36         | 330         |           | 3600000           |           |             |            |           |           | 260        |
| 2021-03-12         |                   | 32         | 260         |           | 450000            |           |             |            |           |           | 220        |
| 2021-03-15         |                   | 36         | 340         |           | 4000000           |           |             | 54         | 54        |           | 220        |
| 2021-03-16         |                   | 37         | 260         |           | 3800000           |           |             | 52         | 53.31     | 6.9       | 180        |
| 2021-03-17         | 170               | 34         | 230         |           | 3100000           |           |             | 46         | 47.23     | 6.2       | 170        |
| 2021-03-18         |                   | 35         | 330         |           | 1800000           |           |             |            |           |           | 340        |
| 2021-03-19         |                   | 32         | 240         |           | 1000000           |           |             |            |           |           | 210        |
| 2021-03-22         |                   | 25         | 110         |           | 1100000           |           |             | 36         | 36        |           | 100        |



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## Appendix F

# Phosphorous Sorption Capacities

**Lot 1**

|                       |           |       |
|-----------------------|-----------|-------|
| Bedrooms              | 3         |       |
| gpd/Bedroom           | 150       |       |
| gpd                   | 450       |       |
| L/day = (gpd x 3.8) = | 1,710     | L/day |
| P conc to ground      | 12        | mg/L  |
| 1 day P to ground     | 20,520    | mg    |
| 183 days P to ground  | 3,755,160 | mg    |

|                                   |                    |    |
|-----------------------------------|--------------------|----|
| Leachfield type                   | Geomatrix GST 6236 |    |
| Length                            | 30                 |    |
| Width                             | 5.2                |    |
| Height                            | 3                  |    |
| Unfolded area (L x (W+(2 x H)))   | 336                |    |
| Unsaturated soil under leachfield | 9                  | ft |
| Unsaturated soil volume           | 3,024              |    |

|                          |             |                 |
|--------------------------|-------------|-----------------|
| Soil Density             | 110         | lbs/cf          |
| Soil mass                | 151,018,560 | gms             |
| 50% soil mass            | 75,509,280  | gms             |
| soil P sorption          | 6           | mg/100 gms soil |
| 50% soil mass P sorption | 4,530,557   | mg              |

Excess P sorption capacity - discharge = 775,397 mg

## Lot 2

|                       |           |       |
|-----------------------|-----------|-------|
| Bedrooms              | 3         |       |
| gpd/Bedroom           | 150       |       |
| gpd                   | 450       |       |
| L/day = (gpd x 3.8) = | 1,710     | L/day |
| P conc to ground      | 12        | mg/L  |
| 1 day P to ground     | 20,520    | mg    |
| 183 days P to ground  | 3,755,160 | mg    |

|                                   |                    |    |
|-----------------------------------|--------------------|----|
| Leachfield type                   | Geomatrix GST 6236 |    |
| Length                            | 40                 |    |
| Width                             | 5.2                |    |
| Height                            | 3                  |    |
| Unfolded area (L x (W+(2 x H)))   | 448                |    |
| Unsaturated soil under leachfield | 6                  | ft |
| Unsaturated soil volume           | 2,688              |    |

|                          |             |                 |
|--------------------------|-------------|-----------------|
| Soil Density             | 110         | lbs/cf          |
| Soil mass                | 134,238,720 | gms             |
| 50% soil mass            | 67,119,360  | gms             |
| soil P sorption          | 6           | mg/100 gms soil |
| 50% soil mass P sorption | 4,027,162   | mg              |

Excess P sorption capacity - discharge = 272,002 mg

### Lot 3

|                       |           |       |
|-----------------------|-----------|-------|
| Bedrooms              | 3         |       |
| gpd/Bedroom           | 150       |       |
| gpd                   | 450       |       |
| L/day = (gpd x 3.8) = | 1,710     | L/day |
| P conc to ground      | 12        | mg/L  |
| 1 day P to ground     | 20,520    | mg    |
| 183 days P to ground  | 3,755,160 | mg    |

|                                   |                    |    |
|-----------------------------------|--------------------|----|
| Leachfield type                   | Geomatrix GST 6236 |    |
| Length                            | 20                 |    |
| Width                             | 5.2                |    |
| Height                            | 3                  |    |
| Unfolded area (L x (W+(2 x H)))   | 224                |    |
| Unsaturated soil under leachfield | 12                 | ft |
| Unsaturated soil volume           | 2,688              |    |

|                          |             |                 |
|--------------------------|-------------|-----------------|
| Soil Density             | 110         | lbs/cf          |
| Soil mass                | 134,238,720 | gms             |
| 50% soil mass            | 67,119,360  | gms             |
| soil P sorption          | 6           | mg/100 gms soil |
| 50% soil mass P sorption | 4,027,162   | mg              |

Excess P sorption capacity - discharge = 272,002 mg

### Lot 4

|                       |           |       |
|-----------------------|-----------|-------|
| Bedrooms              | 3         |       |
| gpd/Bedroom           | 150       |       |
| gpd                   | 450       |       |
| L/day = (gpd x 3.8) = | 1,710     | L/day |
| P conc to ground      | 12        | mg/L  |
| 1 day P to ground     | 20,520    | mg    |
| 183 days P to ground  | 3,755,160 | mg    |

|                                   |                    |    |
|-----------------------------------|--------------------|----|
| Leachfield type                   | Geomatrix GST 6236 |    |
| Length                            | 30                 |    |
| Width                             | 5.2                |    |
| Height                            | 3                  |    |
| Unfolded area (L x (W+(2 x H)))   | 336                |    |
| Unsaturated soil under leachfield | 9                  | ft |
| Unsaturated soil volume           | 3,024              |    |

|                          |             |                 |
|--------------------------|-------------|-----------------|
| Soil Density             | 110         | lbs/cf          |
| Soil mass                | 151,018,560 | gms             |
| 50% soil mass            | 75,509,280  | gms             |
| soil P sorption          | 6           | mg/100 gms soil |
| 50% soil mass P sorption | 4,530,557   | mg              |

Excess P sorption capacity - discharge = 775,397 mg

**Lot 5**

|                       |           |       |
|-----------------------|-----------|-------|
| Bedrooms              | 3         |       |
| gpd/Bedroom           | 150       |       |
| gpd                   | 450       |       |
| L/day = (gpd x 3.8) = | 1,710     | L/day |
| P conc to ground      | 12        | mg/L  |
| 1 day P to ground     | 20,520    | mg    |
| 183 days P to ground  | 3,755,160 | mg    |

|                                   |                    |    |
|-----------------------------------|--------------------|----|
| Leachfield type                   | Geomatrix GST 6236 |    |
| Length                            | 20                 |    |
| Width                             | 5.2                |    |
| Height                            | 3                  |    |
| Unfolded area (L x (W+(2 x H)))   | 224                |    |
| Unsaturated soil under leachfield | 15                 | ft |
| Unsaturated soil volume           | 3,360              |    |

|                          |             |                 |
|--------------------------|-------------|-----------------|
| Soil Density             | 110         | lbs/cf          |
| Soil mass                | 167,798,400 | gms             |
| 50% soil mass            | 83,899,200  | gms             |
| soil P sorption          | 6           | mg/100 gms soil |
| 50% soil mass P sorption | 5,033,952   | mg              |

Excess P sorption capacity - discharge = 1,278,792 mg

**Lot 6**

|                       |           |       |
|-----------------------|-----------|-------|
| Bedrooms              | 3         |       |
| gpd/Bedroom           | 150       |       |
| gpd                   | 450       |       |
| L/day = (gpd x 3.8) = | 1,710     | L/day |
| P conc to ground      | 12        | mg/L  |
| 1 day P to ground     | 20,520    | mg    |
| 183 days P to ground  | 3,755,160 | mg    |

|                                   |                    |    |
|-----------------------------------|--------------------|----|
| Leachfield type                   | Geomatrix GST 6236 |    |
| Length                            | 22                 |    |
| Width                             | 5.2                |    |
| Height                            | 3                  |    |
| Unfolded area (L x (W+(2 x H)))   | 246                |    |
| Unsaturated soil under leachfield | 11                 | ft |
| Unsaturated soil volume           | 2,710              |    |

|                          |             |                 |
|--------------------------|-------------|-----------------|
| Soil Density             | 110         | lbs/cf          |
| Soil mass                | 135,357,376 | gms             |
| 50% soil mass            | 67,678,688  | gms             |
| soil P sorption          | 6           | mg/100 gms soil |
| 50% soil mass P sorption | 4,060,721   | mg              |

Excess P sorption capacity - discharge = 305,561 mg

**Lot 7**

|                       |           |       |
|-----------------------|-----------|-------|
| Bedrooms              | 3         |       |
| gpd/Bedroom           | 150       |       |
| gpd                   | 450       |       |
| L/day = (gpd x 3.8) = | 1,710     | L/day |
| P conc to ground      | 12        | mg/L  |
| 1 day P to ground     | 20,520    | mg    |
| 183 days P to ground  | 3,755,160 | mg    |

|                                   |                    |    |
|-----------------------------------|--------------------|----|
| Leachfield type                   | Geomatrix GST 6236 |    |
| Length                            | 20                 |    |
| Width                             | 5.2                |    |
| Height                            | 3                  |    |
| Unfolded area (L x (W+(2 x H)))   | 224                |    |
| Unsaturated soil under leachfield | 16                 | ft |
| Unsaturated soil volume           | 3,584              |    |

|                          |             |                 |
|--------------------------|-------------|-----------------|
| Soil Density             | 110         | lbs/cf          |
| Soil mass                | 178,984,960 | gms             |
| 50% soil mass            | 89,492,480  | gms             |
| soil P sorption          | 6           | mg/100 gms soil |
| 50% soil mass P sorption | 5,369,549   | mg              |

Excess P sorption capacity - discharge = 1,614,389 mg

**Lot 8**

|                       |           |       |
|-----------------------|-----------|-------|
| Bedrooms              | 3         |       |
| gpd/Bedroom           | 150       |       |
| gpd                   | 450       |       |
| L/day = (gpd x 3.8) = | 1,710     | L/day |
| P conc to ground      | 12        | mg/L  |
| 1 day P to ground     | 20,520    | mg    |
| 183 days P to ground  | 3,755,160 | mg    |

|                                   |                    |    |
|-----------------------------------|--------------------|----|
| Leachfield type                   | Geomatrix GST 6236 |    |
| Length                            | 20                 |    |
| Width                             | 5.2                |    |
| Height                            | 3                  |    |
| Unfolded area (L x (W+(2 x H)))   | 224                |    |
| Unsaturated soil under leachfield | 12                 | ft |
| Unsaturated soil volume           | 2,688              |    |

|                          |             |                 |
|--------------------------|-------------|-----------------|
| Soil Density             | 110         | lbs/cf          |
| Soil mass                | 134,238,720 | gms             |
| 50% soil mass            | 67,119,360  | gms             |
| soil P sorption          | 6           | mg/100 gms soil |
| 50% soil mass P sorption | 4,027,162   | mg              |

Excess P sorption capacity - discharge = 272,002 mg

**Lot 9**

|                       |           |       |
|-----------------------|-----------|-------|
| Bedrooms              | 3         |       |
| gpd/Bedroom           | 150       |       |
| gpd                   | 450       |       |
| L/day = (gpd x 3.8) = | 1,710     | L/day |
| P conc to ground      | 12        | mg/L  |
| 1 day P to ground     | 20,520    | mg    |
| 183 days P to ground  | 3,755,160 | mg    |

|                                   |                    |    |
|-----------------------------------|--------------------|----|
| Leachfield type                   | Geomatrix GST 6236 |    |
| Length                            | 20                 |    |
| Width                             | 5.2                |    |
| Height                            | 3                  |    |
| Unfolded area (L x (W+(2 x H)))   | 224                |    |
| Unsaturated soil under leachfield | 18                 | ft |
| Unsaturated soil volume           | 4,032              |    |

|                          |             |                 |
|--------------------------|-------------|-----------------|
| Soil Density             | 110         | lbs/cf          |
| Soil mass                | 201,358,080 | gms             |
| 50% soil mass            | 100,679,040 | gms             |
| soil P sorption          | 6           | mg/100 gms soil |
| 50% soil mass P sorption | 6,040,742   | mg              |

Excess P sorption capacity - discharge = 2,285,582 mg

**Lot 10**

|                       |           |       |
|-----------------------|-----------|-------|
| Bedrooms              | 3         |       |
| gpd/Bedroom           | 150       |       |
| gpd                   | 450       |       |
| L/day = (gpd x 3.8) = | 1,710     | L/day |
| P conc to ground      | 12        | mg/L  |
| 1 day P to ground     | 20,520    | mg    |
| 183 days P to ground  | 3,755,160 | mg    |

|                                   |                    |    |
|-----------------------------------|--------------------|----|
| Leachfield type                   | Geomatrix GST 6236 |    |
| Length                            | 30                 |    |
| Width                             | 5.2                |    |
| Height                            | 3                  |    |
| Unfolded area (L x (W+(2 x H)))   | 336                |    |
| Unsaturated soil under leachfield | 8                  | ft |
| Unsaturated soil volume           | 2,688              |    |

|                          |             |                 |
|--------------------------|-------------|-----------------|
| Soil Density             | 110         | lbs/cf          |
| Soil mass                | 134,238,720 | gms             |
| 50% soil mass            | 67,119,360  | gms             |
| soil P sorption          | 6           | mg/100 gms soil |
| 50% soil mass P sorption | 4,027,162   | mg              |

Excess P sorption capacity - discharge = 272,002 mg

### Lot 11

|                       |           |       |
|-----------------------|-----------|-------|
| Bedrooms              | 3         |       |
| gpd/Bedroom           | 150       |       |
| gpd                   | 450       |       |
| L/day = (gpd x 3.8) = | 1,710     | L/day |
| P conc to ground      | 12        | mg/L  |
| 1 day P to ground     | 20,520    | mg    |
| 183 days P to ground  | 3,755,160 | mg    |

|                                   |                    |    |
|-----------------------------------|--------------------|----|
| Leachfield type                   | Geomatrix GST 6236 |    |
| Length                            | 20                 |    |
| Width                             | 5.2                |    |
| Height                            | 3                  |    |
| Unfolded area (L x (W+(2 x H)))   | 224                |    |
| Unsaturated soil under leachfield | 16                 | ft |
| Unsaturated soil volume           | 3,584              |    |

|                          |             |                 |
|--------------------------|-------------|-----------------|
| Soil Density             | 110         | lbs/cf          |
| Soil mass                | 178,984,960 | gms             |
| 50% soil mass            | 89,492,480  | gms             |
| soil P sorption          | 6           | mg/100 gms soil |
| 50% soil mass P sorption | 5,369,549   | mg              |

Excess P sorption capacity - discharge = 1,614,389 mg

**Lot 12**

|                       |           |       |
|-----------------------|-----------|-------|
| Bedrooms              | 3         |       |
| gpd/Bedroom           | 150       |       |
| gpd                   | 450       |       |
| L/day = (gpd x 3.8) = | 1,710     | L/day |
| P conc to ground      | 12        | mg/L  |
| 1 day P to ground     | 20,520    | mg    |
| 183 days P to ground  | 3,755,160 | mg    |

|                                   |                    |    |
|-----------------------------------|--------------------|----|
| Leachfield type                   | Geomatrix GST 6236 |    |
| Length                            | 25                 |    |
| Width                             | 5.2                |    |
| Height                            | 3                  |    |
| Unfolded area (L x (W+(2 x H)))   | 280                |    |
| Unsaturated soil under leachfield | 10                 | ft |
| Unsaturated soil volume           | 2,800              |    |

|                          |             |                 |
|--------------------------|-------------|-----------------|
| Soil Density             | 110         | lbs/cf          |
| Soil mass                | 139,832,000 | gms             |
| 50% soil mass            | 69,916,000  | gms             |
| soil P sorption          | 6           | mg/100 gms soil |
| 50% soil mass P sorption | 4,194,960   | mg              |

Excess P sorption capacity - discharge = 439,800 mg

**Lot 13**

|                       |           |       |
|-----------------------|-----------|-------|
| Bedrooms              | 3         |       |
| gpd/Bedroom           | 150       |       |
| gpd                   | 450       |       |
| L/day = (gpd x 3.8) = | 1,710     | L/day |
| P conc to ground      | 12        | mg/L  |
| 1 day P to ground     | 20,520    | mg    |
| 183 days P to ground  | 3,755,160 | mg    |

|                                   |                    |    |
|-----------------------------------|--------------------|----|
| Leachfield type                   | Geomatrix GST 6236 |    |
| Length                            | 20                 |    |
| Width                             | 5.2                |    |
| Height                            | 3                  |    |
| Unfolded area (L x (W+(2 x H)))   | 224                |    |
| Unsaturated soil under leachfield | 17                 | ft |
| Unsaturated soil volume           | 3,808              |    |

|                          |             |                 |
|--------------------------|-------------|-----------------|
| Soil Density             | 110         | lbs/cf          |
| Soil mass                | 190,171,520 | gms             |
| 50% soil mass            | 95,085,760  | gms             |
| soil P sorption          | 6           | mg/100 gms soil |
| 50% soil mass P sorption | 5,705,146   | mg              |

Excess P sorption capacity - discharge = 1,949,986 mg

**Lot 14**

|                       |           |       |
|-----------------------|-----------|-------|
| Bedrooms              | 3         |       |
| gpd/Bedroom           | 150       |       |
| gpd                   | 450       |       |
| L/day = (gpd x 3.8) = | 1,710     | L/day |
| P conc to ground      | 12        | mg/L  |
| 1 day P to ground     | 20,520    | mg    |
| 183 days P to ground  | 3,755,160 | mg    |

|                                   |                    |    |
|-----------------------------------|--------------------|----|
| Leachfield type                   | Geomatrix GST 6236 |    |
| Length                            | 20                 |    |
| Width                             | 5.2                |    |
| Height                            | 3                  |    |
| Unfolded area (L x (W+(2 x H)))   | 224                |    |
| Unsaturated soil under leachfield | 14                 | ft |
| Unsaturated soil volume           | 3,136              |    |

|                          |             |                 |
|--------------------------|-------------|-----------------|
| Soil Density             | 110         | lbs/cf          |
| Soil mass                | 156,611,840 | gms             |
| 50% soil mass            | 78,305,920  | gms             |
| soil P sorption          | 6           | mg/100 gms soil |
| 50% soil mass P sorption | 4,698,355   | mg              |

Excess P sorption capacity - discharge = 943,195 mg

### Lot 15

|                       |           |       |
|-----------------------|-----------|-------|
| Bedrooms              | 3         |       |
| gpd/Bedroom           | 150       |       |
| gpd                   | 450       |       |
| L/day = (gpd x 3.8) = | 1,710     | L/day |
| P conc to ground      | 12        | mg/L  |
| 1 day P to ground     | 20,520    | mg    |
| 183 days P to ground  | 3,755,160 | mg    |

|                                   |                    |    |
|-----------------------------------|--------------------|----|
| Leachfield type                   | Geomatrix GST 6236 |    |
| Length                            | 20                 |    |
| Width                             | 5.2                |    |
| Height                            | 3                  |    |
| Unfolded area (L x (W+(2 x H)))   | 224                |    |
| Unsaturated soil under leachfield | 16                 | ft |
| Unsaturated soil volume           | 3,584              |    |

|                          |             |                 |
|--------------------------|-------------|-----------------|
| Soil Density             | 110         | lbs/cf          |
| Soil mass                | 178,984,960 | gms             |
| 50% soil mass            | 89,492,480  | gms             |
| soil P sorption          | 6           | mg/100 gms soil |
| 50% soil mass P sorption | 5,369,549   | mg              |

Excess P sorption capacity - discharge = 1,614,389 mg

### Lot 16

|                       |           |       |
|-----------------------|-----------|-------|
| Bedrooms              | 3         |       |
| gpd/Bedroom           | 150       |       |
| gpd                   | 450       |       |
| L/day = (gpd x 3.8) = | 1,710     | L/day |
| P conc to ground      | 12        | mg/L  |
| 1 day P to ground     | 20,520    | mg    |
| 183 days P to ground  | 3,755,160 | mg    |

|                                   |                    |    |
|-----------------------------------|--------------------|----|
| Leachfield type                   | Geomatrix GST 6236 |    |
| Length                            | 24                 |    |
| Width                             | 5.2                |    |
| Height                            | 3                  |    |
| Unfolded area (L x (W+(2 x H)))   | 269                |    |
| Unsaturated soil under leachfield | 10                 | ft |
| Unsaturated soil volume           | 2,688              |    |

|                          |             |                 |
|--------------------------|-------------|-----------------|
| Soil Density             | 110         | lbs/cf          |
| Soil mass                | 134,238,720 | gms             |
| 50% soil mass            | 67,119,360  | gms             |
| soil P sorption          | 6           | mg/100 gms soil |
| 50% soil mass P sorption | 4,027,162   | mg              |

Excess P sorption capacity - discharge = 272,002 mg

**Lot 17**

|                       |           |       |
|-----------------------|-----------|-------|
| Bedrooms              | 3         |       |
| gpd/Bedroom           | 150       |       |
| gpd                   | 450       |       |
| L/day = (gpd x 3.8) = | 1,710     | L/day |
| P conc to ground      | 12        | mg/L  |
| 1 day P to ground     | 20,520    | mg    |
| 183 days P to ground  | 3,755,160 | mg    |

|                                   |                    |    |
|-----------------------------------|--------------------|----|
| Leachfield type                   | Geomatrix GST 6236 |    |
| Length                            | 20                 |    |
| Width                             | 5.2                |    |
| Height                            | 3                  |    |
| Unfolded area (L x (W+(2 x H)))   | 224                |    |
| Unsaturated soil under leachfield | 16                 | ft |
| Unsaturated soil volume           | 3,584              |    |

|                          |             |                 |
|--------------------------|-------------|-----------------|
| Soil Density             | 110         | lbs/cf          |
| Soil mass                | 178,984,960 | gms             |
| 50% soil mass            | 89,492,480  | gms             |
| soil P sorption          | 6           | mg/100 gms soil |
| 50% soil mass P sorption | 5,369,549   | mg              |

Excess P sorption capacity - discharge = 1,614,389 mg

### Lot 18

|                       |           |       |
|-----------------------|-----------|-------|
| Bedrooms              | 3         |       |
| gpd/Bedroom           | 150       |       |
| gpd                   | 450       |       |
| L/day = (gpd x 3.8) = | 1,710     | L/day |
| P conc to ground      | 12        | mg/L  |
| 1 day P to ground     | 20,520    | mg    |
| 183 days P to ground  | 3,755,160 | mg    |

|                                   |                    |    |
|-----------------------------------|--------------------|----|
| Leachfield type                   | Geomatrix GST 6236 |    |
| Length                            | 20                 |    |
| Width                             | 5.2                |    |
| Height                            | 3                  |    |
| Unfolded area (L x (W+(2 x H)))   | 224                |    |
| Unsaturated soil under leachfield | 15                 | ft |
| Unsaturated soil volume           | 3,360              |    |

|                          |             |                 |
|--------------------------|-------------|-----------------|
| Soil Density             | 110         | lbs/cf          |
| Soil mass                | 167,798,400 | gms             |
| 50% soil mass            | 83,899,200  | gms             |
| soil P sorption          | 6           | mg/100 gms soil |
| 50% soil mass P sorption | 5,033,952   | mg              |

Excess P sorption capacity - discharge = 1,278,792 mg

**Lot #94 Stoddards Wharf Road**

|                       |           |       |
|-----------------------|-----------|-------|
| Bedrooms              | 3         |       |
| gpd/Bedroom           | 150       |       |
| gpd                   | 450       |       |
| L/day = (gpd x 3.8) = | 1,710     | L/day |
| P conc to ground      | 12        | mg/L  |
| 1 day P to ground     | 20,520    | mg    |
| 183 days P to ground  | 3,755,160 | mg    |

|                                   |                    |    |
|-----------------------------------|--------------------|----|
| Leachfield type                   | Geomatrix GST 6236 |    |
| Length                            | 60                 |    |
| Width                             | 5.2                |    |
| Height                            | 3                  |    |
| Unfolded area (L x (W+(2 x H)))   | 672                |    |
| Unsaturated soil under leachfield | 4                  | ft |
| Unsaturated soil volume           | 2,688              |    |

|                          |             |                 |
|--------------------------|-------------|-----------------|
| Soil Density             | 110         | lbs/cf          |
| Soil mass                | 134,238,720 | gms             |
| 50% soil mass            | 67,119,360  | gms             |
| soil P sorption          | 6           | mg/100 gms soil |
| 50% soil mass P sorption | 4,027,162   | mg              |

Excess P sorption capacity - discharge = 272,002 mg