SEWAGE TREATMENT SYSTEM DESIGN

FOR:

Allison Schmidt 5533 Silverpoint Dr Cincinnati, OH 45247 0550-0081-0199-00 0.56 acres

BY: Cindaco Design P.O. Box 19684 Cincinnati, OH 45219 513-909-4768

mmorris@cindaco.com

Site Visit Date: 8/1/23

PERMITTING:

Hamilton County Public Health

DESIGN DETAILS:

Jet J-500PLT with UV (in dose tank) to Infiltrator 1000 gal single compartment dose tank to LPP sand mound with upper and lower drains

DESIGN RATIONALE:

This sewage treatment system is a new STS for a 2 bedroom existing single family residence. For this design, a bedroom is defined as a room with at least 70 sf, multiple means of egress which is not through another room, a closet or area that can be easily finished as a closet, a door or opening that can be easily finished with a door. Each room that meets all four criteria is counted as a bedroom. For every two rooms that meet three of four criteria an additional bedroom will be added to the total count, because these rooms have a high likelihood to be used as a bedroom in the future. 120 gallons per day (qpd) per bedroom is used to calculate the Daily Design Flow per OAC 3701-29-11 (B)(1).

Daily Design Peak Flow: 240 gpd. Peak flow should not be reached on a routine basis.

Average Flow: 188 gpd can be accommodated routinely with typical residential wastewater strength as specified in OAC 3701-29 for households.

Soil Conditions: silty clay loam with moderate subangular-blocky structure, 25% field verified slope, with a perched seasonal water table 14" below grade, and flow restrictive layer 28" below grade. The soil is highly weathered. Conditions therefore requires 24" vertical separation distance and 8" in-situ soil. The soil has 14" in-situ soil, and the infiltrative surface is 0" max below grade, therefore the infiltrative distance is 14". 24" soil credit depth credit is provided by pretreatment. Based on these soil conditions, the Linear Loading Rate (LLR) is 3.5 gpd/LF, and the Soil Infiltrative Loading Rate (SILR) is 0.8 gpd/SF with Pretreated effluent.

Minimum Design Length: 240 gpd ÷ 3.5 gpd/LF = 68.6 LF. 72 LF is provided in this design. This utilizes a 0% length reduction allowed per OAC 3701-29-15 (N)(2)(h).

Minimum Design Area: 240 gpd ÷ 0.8 gpd/SF = 300 SF. 2952 SF is provided in this design.

Based on the existing conditions, current and future use of property, site encumbrances, available systems types, maintenance, cost, etc., Owner chose LPP sand mound with upper and lower drains with Pretreated effluent.

SYSTEM COST INFORMATION:

The property owner has been informed of system options and associated costs. Cindaco Design estimates the system costs as follows Installation Cost: \$45,000-55,000 Annual Operation Cost: \$500-1,000 *This is a general estimate of system cost based on prior experience and is not a bid for installation

CHANGES AND USE OF THIS DESIGN:

This plan is the sole ownership of the designer and may not be altered, changed, used, or manipulated without approval of designer and the permitting health department. Cindaco Design is available to answer questions about design and make adjustments as needed.

SYSTEM INSTALLATION, OPERATION, AND MAINTENANCE:

All system components must be installed, operated, and maintained in accordance with manufacturer specifications, Ohio Department of Health (ODH) product approval, and permitting health department permit terms and conditions. If conflicts exist, consult Cindaco Design. Installation, operation and maintenance manuals: Health Department Installation Manual: https://www.hamiltoncountyhealth.org/wp-content/uploads/HSTS-Manual-Part-1.pdf AS REDLINED Septic Tank / Pretreatment Unit: www.cindaco.com/design/resources JAN 25 2024 Dose Tank: www.cindaco.com/design/resources Pump: www.cindaco.com/design/resources Control Panel(s): www.cindaco.com/design/resources Floats/Transducer: www.cindaco.com/design/resources General operation/maintenance: https://www.epa.gov/septic/how-care-your-septic-system

It is the installation contractor's responsibility to verify that the system can be installed as designed based on the preliminary layout by designer. It is the installation contractor's and property owner's responsibility to inform designer of any changes in site conditions that could effect the installation, operation, or maintenance of the STS. Soil disturbances may affect the performance of soil absorption components, cause the system to fail, or necessitate relocation. If changes are required to the design, redesign fees may apply. It is the owner and installation contractor's responsibility to locate underground utilities. If utilities interfere with with the designed system, construction shall not proceed without approval from designer and the permitting authority. No clearwater connections (downspouts, pool/spa water, foundation drains, cisterns, etc.) shall be connected to the STS. All system components must meet horizontal isolation distances in OAC 3701-29-06 (G)(3)

SYSTEM PROTECTION

Property Owner, Installation Contractor, and General Contractor (if applicable) are responsible to protect all primary and reserve soil absorption areas from disturbance. Only excavate and/or chisel plow soil absorption area when dry and friable to a depth of 12" or the infiltrative surface depth plus 1", whichever is greater. Excavation shall conform to the permitting health department's installation manual. Keep wheeled vehicles off of soil absorption areas at all times. Replacement/reserve area, if designated on plan, is set aside for the future replacement of the system should this system fail. Reserve area shall remain undisturbed indefinitely or until municipal sewers are installed to serve the property or a replacement system is installed. Clearing of soil absorption area shall be performed by hand or with small, tracked equipment with low ground pressure (less than 5 psi) when the soil is dry. Disturbance to the soil due to clearing may invalidate this design. After installation, no paint, chemicals, bleach, etc. shall enter system. See https://www.epa.gov/septic/how-care-your-septic-system for general system care instructions.

DISCLAIMER:

This plan set is not a site plan to be used for constructing anything other than the STS. If an accurate legal site plan is required, contact a professional surveyor. This plan offers no guarantee as to the accuracy of the of the information provided. This plan offers no guarantee for site stability. If site stability may be an issue, consult a geotechnical engineer. This plan is only as accurate as the information provided by the property owner to the designer. If no survey is provided, local GIS is used for the basis of the plan. Easements, right-of-ways, hidden objects, or information not communicated to the designer invalidates the design. It is the property owner's responsibility to review this plan and information provided to verify all site conditions and deign assumptions are correct. If conflicts are found or additional information must be supplied, the owner shall not proceed until the approval is granted. This design shall in no way be taken as a guarantee that the system will function in a satisfactory manor for any given period of time, or that Cindaco Deisgn or any of its agents or employees assume any liability for damages, consequential or direct, which are caused, or which may be caused by a malfunction of the STS.





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DRN BY: MAM JOB # D22-041 DATE: Jan. 23, 2024 SHEET: COVER

5533 SILVERPOINT DR STS - REPLACEMENT SYSTEM -SCHMIDT activities. 5533 Silverpoint Dr, Cincinnati, OH 45247 3. 12" min cover. Suitable Area Shaded 5 Soil pile areas may be used if the pile is removed carefully when dry. 886 305.01 Drain grate Pile Piles (3,0)(2)(12) 80 **#**58 80' D 5333 SILVERPOINT EX. 2 BDRM HOUSE Silverpoint FF~898.00 LL~889.00 WБ **0**54 (5) 902 305.01 FX COMMON Overhead power lines COLLECTOR LINE REMAIN Suitable Soil Area Shown Minus Soil Pile Areas

GENERAL NOTES:

 Caution tape or fencing must be installed around the soil absorption area and reserve area (if applicable) prior to commencement of clearing or earthwork activities.

Unless notes otherwise, all piping is pressure rated schedule 40 PVC (ASTM D2665/D1785), all stainless steel is Grade 304, all sand is ODOT C-33 concrete sand. Refer to plans for other aggregate specs.

All piping shall be bed in gravel or firm in-situ soil, well supported, and backfilled with gravel or native soil in a manor to minimize settling. Maintain 12" min cover.

4. Installer must verify system can be installed per design prior to commencement of installation.

Any modifications proposed by the installer must be approved by the designer and permitting body, and must be noted on the final as-built.

Wheeled vehicles and heavy equipment are prohibited from traveling over the soil absorption and reserve area(s).

 All STS components must maintain a minimum of 10' from property lines, easements, right of way, buildings, hardscapes, driveways, geothermal horizontal closed loop systems, properly sealed wells, intermittent streams, swales, irrigation lines, gray water recycling systems, and utilities.
All STS Components must maintain 50' from surface water, cut banks,

All STS Components must maintain 50' from surface water, cut banks, perennial streams/rivers, wetlands, and vertical open and closed loop geothermal heating/cooling systems.

9. Building sewer shall be a minimum of 10' from water service lines, except when within 5' of the foundation where they enter the building and where lines must cross. Where water service lines and sewer lines cross, provide 12" minimum vertical separation with preference of sewer below water service. Keep water service line joints at least 10' from crossing, and sleeve sewer with 20' of larger diameter Sch 40 pipe with sealed ends.

 Clearwater connections to STS are prohibited (downspouts, foundation drains, drain tiles, cistern overflows, stormwater drains, garage floor drains, exterior floor drains, etc.). Clearwater discharges must be routed away from STS components. Existing connections on replacement systems must be disconnected and rerouted.

11. Pink flags set by designer represent the uppermost lateral.

12. Soil Investigation performed by Clearcreek Environmental.

13. FF and LL elevations are for reference only. See site plan by others.

14. Projects in hamilton County require electrical inspection by Inspection Bureau, Inc. (IBI) 513-381-6080





GRAPHIC SCALE

(IN FEET) 1 inch = 40 ft.

LEGE	ND		
0	Soil boring	location	റ
À	Steep slope	e	21
—x—	Fence		45
—е—	Electric ser	vice	4 문
	Water serv	ice	0 00 00 0
—_G—_	Gas service	e	19 11
—s—	Sanitary se	wer lateral	4×4
—SF—	Silt fence		IN BOS
PR.	Proposed		NO -0
EX.	Existing		CIL 2
FF	First floor		
LL	Lower level	l	
BM	Benchmark	I.	ΙU
R/W	Right of wa	У	
СВ	Catch basir	۱	
YD	Yard drain		
0.C.	On center		
T/W	Top of wall		
B/W	Bottom of v	vall	
E/	Edge of		_ p
C/L	Centerline		7
EG	Existing gra	ade	
FG	Finished gr	ade	
TYP	Typical for	all	
ADF	Average da	aily flow	
DDF	Daily desig	n flow	
GPD	Gallons per	r day	
		DRN BY:	MAM
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DATE: Jan. 23, 2024

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System Parameters				
County	Hamilton			
System Type	Replacement			
Number of Bedrooms (or eq.)	2			
Pretreatment	24	in credit		
Daily Design Flow	240	gpd		
Linear Loading Rate (LLR)	3.50	gpd/ft		
Soil Loading Rate (SLR)	0.8	gpd/sf		
Sand Fill Loading Rate	1.0	gpd/sf		
Soil Limiting Condition	P.S.W.T.	Hi. Wthrd? Yes		
Required Separation Distance	24	in		
Depth to Limiting Condition	14	in		
Depth to Flow Restrictive Layer	28	in		
site slope	25	%		
Up Slope Correction Factor	0.57			
Down Slope Correction Factor	4.00			

System Requirements			
Length Reduction	0%	30% max	
Min Distribution Area Length	68.6 ft	68' 7"	
Actual LLR (using actual length of lateral)	3.33 ft		
Min Distribution Area Width	3.33 ft	3' 4"	
Minimum Basal Area	300.00 sf		
Minimum Basal Width	4.17 ft	4' 2"	

Lateral Design			
Lateral Layout Type	Dual		
Number of Manifolds	1		
Number of Laterals	4		
Actual Length of Laterals (each)	36	ft 36' 0"	
Length of Lateral on Contour	72	ft 72'0"	
Lateral Size(in)/Volume(total)	1	6.48 gal (total)	
Drain Design			
Drains Required	Yes		
	Upslope	<u>Downslope</u>	
Drain Type	Interceptor	Perimeter	
Material Above Filter Fabric	Gravel (#57)	Soil	
Filter Fabric Location (below grade)	4 in	4 in	
Material Below Filter Fabric	Gravel(#57 or #8)	Gravel(#57 or #8)	
Depth at Start of Drain (in)	24	24	
Collector Pipe Type (0.5% min)	Perf. PE or SDR35	Perf. PE or SDR35	
Discharge Pipe Type (0.5% min)	SDR35*	SDR35*	
*Note: All drain piping 4 in diameter. Last 10' and where pipe has <12'' cover to be SCH 40 PVC with stainless steel animal guard at outlet			

Structur	re Design]	Г
Sand depth (upslope E/gravel)	4 in	(6" min_4" min_w/PT)	
Sand depth (upslope E/sand)	2.5 in		
Sand depth (downslope E/gravel)	14.0 in		
Sand depth (downslope E/sand)	15.5 in		s
Gravel depth	6 in	(6" min)	ľ
Top Soil Depth	6 in	(6" min)	
Max Mound Height	27 50 in	()	
Width of Gravel	3 33 ft	3' 4"	lı lı
Width of Sand (at top)	4.33	4' 4"	-
Dist. Width per lateral	1.67 ft	1'8"	F
Length of Gravel	74.00 ft	74' 0"	
Gravel Area	246.67 sf		N
C/Lateral to E/Gravel	0.83 ft	0' 10"	
End of lateral to End of Gravel	1.00 ft	1'0"	
Add'l Sand Factor (upslope)	1.25 Std.	1.25 Manual	F
Add'l Sand Factor (downslope)	2 Std.	2.014 Manual	
Width of Sand Slope (upslope)	0.45 ft	0'5" Std.	
Width of Sand Slope (downslope)	31.22 ft	31' 3" Manual	
Buffer Area-no plow (upslope)	5.00 ft	5'0" 1' min	Т
Buffer Area-no plow (downslope)	1.00 ft	1'0"	C
TE/Sand to E/soil cover (upslope)	5.45 ft	5' 5"	
TE/Sand to E/soil cover (downslope)	33.22 ft	33' 3"	F
C/Lateral to E/Drain (Upslope)	6.78 ft	6'9" 6' min	Ľ
C/Lateral to E/Drain (downslope)	33.55 ft	33' 7" 8' min	Г
Basal Sand Width/Plowed Area	36.00 ft	36' 0"	Г
Width Between Drains	42.00 ft	42' 0"	A
Width Incl. Drains	44.00 ft	44' 0"	P
Width of Sand (side)	3.50 ft	3'6"	ι
			C
Basal Area Length	82.00 ft	82' 0"	C
Limit of Cover (Length)	85.00 ft	85' 0"	A
Limit of Cover (Width)	43.00 ft	43' 0"	
			F
Length of Lateral (each)	36.00 ft	36' 0"	
Lateral to Upslope E/Basal Sand	1.78 ft	1'9"	c
Lateral to Downslope E/Basal Sand	32.55 ft	32' 7"	
Upper Lateral downslope to c/cover	14.72 ft	14' 9"	B
Abbreviations/Notes			
P.S.W.T. = Perched Seasonal Water Table			
E/ = Edge of, TE/ = Top Edge of C/ = Center of			
Laterals shall be shop made with orifices drilled/r	reamed on drill press.		ť
Sand Type: ODOT C-33	Gravel Type: ODOT #57 c	or #8	L

Manifold Size(in)/Length(ft) Lateral Flat or Drainback? Total Drainback Volume* (est) Max Net Dose Volume Min Net Dose Volume Design Net Dose Volume Orifice Size **Orifice Spacing** Orifices per lateral Total Orifices Distribution area Min # of Orifices Distribution area per orifice Flow Rate (est)

Fotal Basal Area Actual LLR Proper Separation Distance Upslope Grade Downslope Grade Design Net Dose Volume* Aggregate Depths:

Pipe Sizes:

Orifice Information:

Basal Area Dimensions: Mound Cover Dimensions:





Pump Selection for a Pressurized System

5533 Silverpoint

Parameters

Discharge Assembly Size	2.00	inches
Transport Length	145	feet
Transport Pipe Class	40	
Transport Line Size	1.50	inches
Distributing Valve Model	None	
Max Elevation Lift	10	feet
Manifold Length	1	feet
Manifold Pipe Class	40	
Manifold Pipe Size	1.50	inches
Number of Laterals per Cell	4	
Lateral Length	35.9	feet
Lateral Pipe Class	40	
Lateral Pipe Size	1.00	inches
Orifice Size	1/8	inches
Orifice Spacing	2	feet
Residual Head	5	feet
Flow Meter	None	inches
'Add-on' Friction Losses	5	feet

Calculations

	0.10	
Minimum Flow Rate per Orifice	0.43	gpm
Number of Orifices per Zone	72	
Total Flow Rate per Zone	31.5	gpm
Number of Laterals per Zone	4	
% Flow Differential 1st/Last Orifice	4.0	%
Transport Velocity	4.9	fps

Frictional Head Losses

Loss through Discharge	1.9	feet
Loss in Transport	8.3	feet
Loss through Valve	0.0	feet
Loss in Manifold	0.0	feet
Loss in Laterals	0.5	feet
Loss through Flowmeter	0.0	feet
'Add-on' Friction Losses	5.0	feet
Pipe Volumes		
Vol of Transport Line	15.3	gals
Vol of Manifold	0.1	gals
Vol of Laterals per Zone	6.4	gals
Total Volume	21.9	gals
Minimum Pump Requirements		
Design Flow Rate	31.5	gpm
Total Dynamic Head	30.8	feet



