



**AMBIT ENGINEERING, INC.** CIVIL ENGINEERS AND LAND SURVEYORS  
801 Islington Street, Suite 31, Portsmouth, NH 03801 Phone (603) 430-9282 Fax 436-2315

16 March 2018

Paul Rasmussen, Chair  
Town of Durham Planning Board  
8 Newmarket Road  
Durham, New Hampshire 03824

**Re: Conditional Use Permit Application**  
**Tax Map 12, 1-8**  
**32 Cedar Point Road**  
**Durham, New Hampshire**

Dear Paul:

This letter transmits a Town of Durham Conditional Use Permit Application request for re-development of the residential lot including the replacement of the existing residential structure, re-configuration of the driveway, replacement of existing retaining walls, a new septic system, a new well, landscaping and associated site grading. Approximately 50% of the proposed re-development is located within the Shoreland Protection Overlay District (SPO), please see attached NHDES Permit Plan-Sheet C2.

The lot currently contains an existing single family residence with a detached garage, a storage shed, decking, and a gravel driveway/parking area. Location and details of the existing septic system are unknown. Please see Standard Boundary and Topographic Survey which is attached.

The proposal includes a single family residential home which will occupy a total footprint of 2,369 sq. ft. The proposed residential structure has been placed in the footprint of the existing residential structure to the greatest extent practicable. The new structure will have an attached garage with an associated pervious paver driveway providing vehicular access to Cedar Point Road. The project also provides for a new Advanced Onsite Solutions (AOS) septic system, utilizing the best septic technology available. As a result, utilizing the AOS system allows for a smaller leachfield, further reducing impacts and disturbance to the SPO.

The re-development of the site results in a decrease of impervious surface on the lot from 34.1% to 26.4%.

The criterion for consideration of a Conditional Use Permit under Section 175-23 of the Town of Durham Zoning Ordinance is outlined below:

1. Site suitability: The site is suitable for the proposed use. This includes:
  - a. Adequate vehicular and pedestrian access for the intended use.

*The proposal includes vehicular and pedestrian access via a pervious paver driveway in a similar location to what currently exists. In addition, the pervious paver driveway and*

***cobblestone apron will provide a clear delineation for vehicular access to the property where it meets Cedar Point Road.***

- b. The availability of adequate public services to serve the intended use including emergency services, pedestrian facilities, schools, and other municipal services.

***The re-development does not propose any changes or alterations to Cedar Point Road or any rights-of-way. Emergency and municipal services will have the same ability to serve the intended use (residential) as what currently exists.***

- c. The absence of environmental constraints (floodplain, steep slope, etc).

***A steep slope located along the southern edge of the property where it meets Little Bay does exist, however; this proposal avoids any work or construction on, or near, this steep slope.***

- d. The availability of appropriate utilities to serve the intended use including water, sewage disposal, stormwater disposal, electricity and similar utilities.

***The lot is currently served by electricity and communication utilities. The proposed re-development includes a new well for water to service the lot, and a new AOS Septic System to provide subsurface sewage disposal on the lot. The proposal includes a reduction of impervious surface on the lot and we anticipate that this will greatly improve the stormwater quality that leaves the site and enters the adjacent tidal wetland resource.***

2. External impacts:

***The proposed project will not have any impacts greater than the impacts of adjacent existing uses as the abutting parcels and other nearby parcels have similar structures. The proposed single family residence replaces an existing single family residence. The re-development use will not increase traffic, noise, odors, vibrations, dust fumes, exterior lighting and glare.***

3. Character of the site development:

***The proposed structure maintains similar distances from shared property boundaries and will be similar in placement and location to the existing structure. The design and specific location of the structure will be in character with other structures located on nearby properties. The proposed structure replaces an aged structure with a new modern structure with updated water supply and subsurface sewage disposal.***

4. Character of the buildings and structures:

***The design and specific location of the structure will be in character with other single family residential structures located on nearby properties.***

5. Preservation of natural, cultural, historic, and scenic resources:

***The proposed structure will not degrade any natural, cultural, historic and scenic resources on the site or on abutting properties.***

6. Impact on property values:

***The proposed project will not cause or contribute to a significant decline in property values of adjacent properties as the abutting properties and other nearby properties currently have similar structures.***

7. Availability of Public Services & Facilities:

***The site is currently served by electric and communication services, on site septic and a well. The proposed project will provide for a new well and septic system, located on site. As a result, there will be no increased demand on any municipal services.***

8. Fiscal Impacts:

***The proposed use will not have a negative fiscal impact on the Town of Durham.***

The Planning Board shall approve a Conditional Use Permit for a use in the SPO only if it finds, with the advice of the Conservation Commission, which all of the following standards have been met in addition to the general standards for conditional uses and any performance standards for the particular use as outlined in 175-72 as below.

1. There is no alternative location on the parcel that is outside of the SPO District that is feasible for the proposed use;

***Approximately 75% of the lot is located within the SPO District, and approximately 50% of the existing structure is located within the same district. There is no alternative location on the lot that is feasible to accommodate an entire re-development of the lot providing a similar and equal use to the property owner. However; the proposal does utilize the area outside of the SPO District to a great extent, specifically a portion of the residential structure, the proposed garage, and the proposed pervious paver driveway.***

2. The amount of soil disturbance will be the minimum necessary for the construction and operation of the facilities as determined by the Planning Board;

***The proposal includes the use of retaining walls to minimize or eliminate the need for grading to construct the proposed home. Since the property does contain a topographical slope from north to south, some grading will be needed to accommodate the new septic and leach field located to the south of the proposed structure. Since the use of the AOS Septic System significantly reduces the size of the leach field, we believe the proposed grading to accommodate the system has been reduced to the minimum necessary to achieve construction goals.***

3. The location, design, construction and maintenance of the facilities will minimize any detrimental impact on the adjacent shoreland and waterbody as well downstream waterbodies, and mitigation activities will be undertaken to counterbalance and adverse impacts, and

***The proposal includes a reduction of impervious surface from 34.1% to 26.4% on the lot and we anticipate that this will greatly improve the stormwater quality that leaves the site and enters the adjacent tidal wetland resource.***

4. Restoration activities will leave the site, as nearly possible in its pre-existing condition and grade at the time of application for the Conditional Use Permit.

***The proposed residential structure has been placed in the footprint of the existing residential structure to the greatest extent practicable, limiting a majority of the site disturbance to the area of the structure that needs to be demolished. The new structure will accommodate for the natural grade change on the lot and the only grading required is to accommodate for the new septic system. This area of grading under existing conditions is currently maintained lawn. Following construction this area will be seeded, stabilized, and will be maintained lawn under the proposed use.***

Please contact me if you have any questions or concerns regarding this application.

Respectfully submitted,

A handwritten signature in black ink, appearing to be 'S. Riker', written over a horizontal line.

Steven D. Riker, CWS  
NH Certified Wetland Scientist/Permitting Specialist  
Ambit Engineering, Inc.



17 August, 2017

**To Whom It May Concern**

**RE: New Hampshire Department of Environmental Services Application for residential site re-development for Manisha P. Heiderscheidt 2010 Revocable Trust, 32 Cedar Point Road, Durham, NH.**

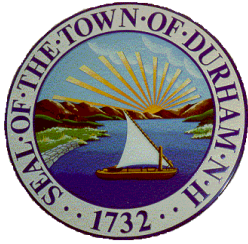
This letter is to inform the New Hampshire Department of Environmental Services and the Town of Durham, in accordance with State Law that Ambit Engineering is authorized to represent me as my agent in the approval process.

Please feel free to call me if there is any question regarding this authorization.

Sincerely,

A handwritten signature in black ink, appearing to read "Benedict G. & Manisha P. Heiderscheidt", with a long horizontal flourish extending to the right.

**Benedict G. & Manisha P. Heiderscheidt, Trustees**  
**Manisha P. Heiderscheidt 2010 Revocable Trust**  
21 Caverno Drive  
Lee, NH 03861  
603-988-8128



**PLANNING DEPARTMENT**

**Town of Durham**

8 Newmarket Road

Durham, NH 03824-2898

Phone (603) 868-8064

[www.ci.durham.nh.us](http://www.ci.durham.nh.us)

**CONDITIONAL USE APPLICATION**

Date: March 16, 2018

**Property information**

Property address/location: 32 Cedar Point Road

Tax map #: 12; lot #(s): 1-8; Zoning District: Residence Coastal/Shoreland Overlay

**Property owner**

Name (include name of individual): Manisha P. Heiderscheidt 2010 Revocable Trust  
Manisha P. Heiderscheidt & Benedict G. Heiderscheidt, Trustees

Mailing address: 21 Caverno Drive, Lee, NH 03824

Telephone #: 603-988-8128 Email: bheiderscheidt@comcast.net

**Engineer, Surveyor, or Other Professional**

Name (include name of individual): Steven D. Riker, CWS Ambit Engineering, Inc.

Mailing address: 200 Griffin Road, Unit 3, Portsmouth, NH 03801

Telephone #: 603-430-9282 Email address: sdr@ambitengineering.com

**Proposed project**

What is the proposed project? The project proposes re-development of the residential lot including the replacement of the existing structure, re-configuration of the driveway, a new septic system, a new well, landscaping and associated grading.

Which provision in the zoning ordinance calls for this conditional use? Section 175-23 and  
Section 175-72.

Justification for granting the conditional use: Please see attached letter.

Have you completed the conditional use checklist? Yes

Have you addressed the eight conditional use criteria? Yes, please see attached letter.

(over)

## Other Information

Please note the following:

- Coordinate with Michael Behrendt, the Durham Town Planner, at 868-8064 or [mbehrendt@ci.durham.nh.us](mailto:mbehrendt@ci.durham.nh.us) about the process and any additional information that may be needed.
- Coordinate with the Karen Edwards, the Planning Department Administrative Assistant, at 868-8064 or [kedwards@ci.durham.nh.us](mailto:kedwards@ci.durham.nh.us) about preparing the list of abutters. All property owners within 300 feet of the site will be notified of the application and public hearing.
- Please be sure to attend all meetings of the Planning Board and the Conservation Commission, if the latter will be making a recommendation.
- The Planning Board may schedule a site walk after the first meeting.
- A public hearing will be held on the application. A sign must be placed on the property at least 10 days prior to the hearing.
- The applicant will need to address the eight general conditional use criteria. For conditional uses within the Wetland or Shoreland Overlay Districts additional criteria must be addressed by the applicant.
- For conditional uses within the Wetland or Shoreland Overlay Districts, the application will be presented to the Conservation Commission for a recommendation.
- See Article VII in the Durham Zoning Ordinance for additional information about conditional uses.

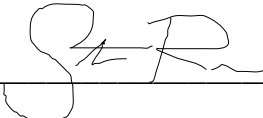
## Submission of application

This application must be signed by the property owner(s) *and/or* the agent.

*I(we) attest to the best of my(our) knowledge that all of the information on this application form and in the accompanying application materials and documentation is true and accurate. As agent, I attest that I am duly authorized to act in this capacity.*

Signature of property owner: \_\_\_\_\_

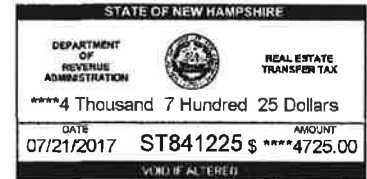
Date: \_\_\_\_\_

Signature of agent:  \_\_\_\_\_

Date: \_\_\_\_\_ March 16, 2018



RETURN TO:  
Trombley Kfoury, P.A.  
166 South River Road, Suite 250  
Bedford, NH 03110



### **WARRANTY DEED**

**KNOW ALL MEN BY THESE PRESENTS**, That we, Timothy Morgan and Lisa A. Desmarais, husband and wife, of 14 Nicole Street, Rochester, County of Strafford, State of New Hampshire 03867,

for consideration paid, grant to Manisha P. Heiderscheidt and Benedict G. Heiderscheidt, Trustees of the Manisha P. Heiderscheidt 2010 Revocable Trust, of 21 Caverno Drive, Lee, County of Strafford, State of New Hampshire 03861,

with Warranty Covenants:

A certain parcel of land, with the buildings and furnishings thereon situated in the Town of Durham, County of Strafford and State of New Hampshire, on the Northerly side of the Piscataqua River, bounded and described as follows:

BEGINNING at an iron pipe driven into the ground at the Northwestern corner of the parcel herein conveyed at the Northeasterly corner of land of Louis and Ruth E. Crafts; thence running Southerly along said Crafts land one hundred fifteen (115) feet, more or less, to an iron pipe at the high water mark at the Piscataqua River; thence running in an Easterly direction along said high water mark seventy-five (75) feet, more or less, to land of William L. Wilby; thence running Northerly along said Wilby land one hundred fifteen (115) feet, more or less, to the Southerly side of a right-of-way hereinafter referred to; thence running along said right-of-way in a Westerly direction seventy-five (75) feet, more or less, to the point of beginning.

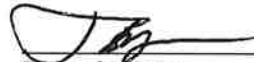
The Deed also conveys to the said Grantees an easement in a proposed right-of-way which will extend along the Northerly side of the premises herein conveyed from the Old Piscataqua Bridge Road to the road known as U.S. Route No. 4, said right-of-way being eighteen (18) feet wide and is to be used in common by the Grantees with other owners of property in the immediate vicinity of the property herein conveyed.

Meaning and intending to describe and convey the same premises conveyed to Timothy Morgan and Lisa A. Desmarais by Quitclaim Deed of Timothy Morgan, which Deed is dated January 22, 2016 and recorded at the Strafford County Registry of Deeds on January 26, 2016 at Book 4354, Page 0584.

THIS IS NOT HOMESTEAD PROPERTY OF THE GRANTORS.

Witness our hands this 21<sup>st</sup> day of July, 2017.

Witness 

  
Timothy Morgan

Witness 

  
Lisa A. Desmarais

STATE OF NEW HAMPSHIRE  
COUNTY OF STRAFFORD

July 21, 2017

Personally appeared Timothy Morgan and Lisa A. Desmarais known to me, or satisfactorily proven to be the persons whose names are subscribed to the within instrument and acknowledged that they executed the same for the purposes therein contained.

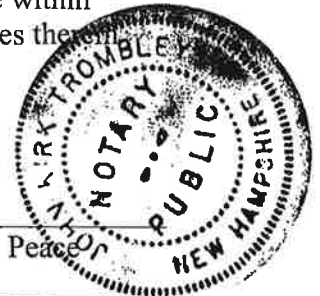
Before me,



Notary Public/Justice of the Peace

My Commission Expires:

**J. KIRK TROMBLEY, Notary Public**  
My Commission Expires June 5, 2018



## **ABUTTER'S LIST**

**JN 2812**

**Client:** Edward Williams

**Project Address:** 24 Cedar Point Road, Durham, NH

<b>MAP</b>	<b>LOT</b>	<b>NAME(S)</b>	<b>PO BOX</b>	<b>STREET ADDRESS</b>	<b>CITY/STATE/ZIP</b>
12	1-15	Michael J. Cleary Revocable Trust Michael J. Cleary, Trustee		26 Cedar Point Road	Durham, NH 03824
12	1-14	Brenda C. Nelson Trust		27 Cedar Point Road	Durham, NH 03824
12	1-13	Christopher D. Dennen & Sarah Dennen-Larson		29 Cedar Point Road	Durham, NH 03824
12	1-12	Donald M. & Karen Roy Jr.		28 Cedar Point Road	Durham, NH 03824
12	1-11	Sullivan Family Revocable Trust		42 Cedar Point Road	Durham, NH 03824
12	1-10	Thomas J. Fleming & Deborah A. Masse		30 Cedar Point Road	Durham, NH 03824
12	1-9	David Gerard & Maria Bowden Gerard		33 Cedar Point Road	Durham, NH 03824
12	1-7	Robert M. Walker		35 Cedar Point Road	Durham, NH 03824
12	1-6	Craig S. Harris		34 Cedar Point Road	Durham, NH 03824
12	1-5	Raymond E. & Teri W. Grizzle		37 Cedar Point Road	Durham, NH 03824
12	1-4	Luis M. Chaves		36 Cedar Point Road	Durham, NH 03824
12	1-3	Ingo Roemer Revocable Trust		40 Cedar Point Road	Durham, NH 03824
12	1-2	Margaret Shea		11 Gibson Road	Hillsborough, NH 03244
12	1-1	Ingo Roemer Revocable Trust		40 Cedar Point Road	Durham, NH 03824
12	1-0	State of NH			



## ADVANCED ONSITE SOLUTIONS LLC

PO Box 248  
Canterbury, NH 03224  
(603)-783-8042  
Toll Free: (866) 900-2415

### ***THE CLEAN SOLUTION™***

Alternative Wastewater Treatment System

Advanced Onsite Solutions LLC (AOS) would like to thank you for your interest in ***THE CLEAN SOLUTION™*** alternative wastewater treatment system. AOS distributes ***THE CLEAN SOLUTION*** system in New Hampshire, Vermont, Maine and Massachusetts.

***THE CLEAN SOLUTION*** is an affordable, ecologically sound alternative wastewater treatment system that replaces the conventional leach field currently required with septic systems. ***THE CLEAN SOLUTION*** accomplishes the biological functions of a leach field in a subterranean tank the size of a septic tank, discharging a treated effluent cleaner than typical treated municipal sewage. ***THE CLEAN SOLUTION*** installations range in capacity from single-family homes and vacation cottages to large community systems and commercial applications. ***THE CLEAN SOLUTION*** has earned a reputation as an environmentally friendly, cost effective, low-maintenance alternative subsurface disposal system.

The information in this booklet is designed to give you a clear understanding of the system, as well as to outline the respective responsibilities of the Home Owner, Designer, and the Installer. Information is updated as necessary to address technological advances or regulatory updates pertaining to the system approval process. To ensure that you have the most current information please contact AOS at 1-866-900-2415.

There are four critical steps to follow when using ***THE CLEAN SOLUTION*** system.

1. The owner must hire a Designer licensed in the state where the system will be installed. ***THE CLEAN SOLUTION*** system must be designed, installed and operated as described in the Innovative/Alternative System approval granted by that state's Department of Environmental Services.
2. Prior to application for state or local approval, a copy of the design plan(s) and supporting documentation must be submitted to AOS for review and approval. This is required to ensure the homeowner(s) has been provided with the required documentation outlining the Sales and Maintenance of the system.
3. In conjunction with the Installer, AOS requires that a certified AOS technician install the components of ***THE CLEAN SOLUTION*** system.
4. The owner of a property where ***THE CLEAN SOLUTION*** system has been installed shall have a valid maintenance contract with AOS or an approved vendor. The minimum length of any contract shall be for a period of two years.



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### CONVENTIONAL SUBSURFACE DISPOSAL SYSTEMS

vs.

### ***THE CLEAN SOLUTION***

In a subsurface disposal system there are basically two processes that break down and treat wastewater. The first process is Anaerobic (without oxygen) in the septic tank, and the second process is Aerobic (with oxygen), which often occurs in the leach field of a conventional subsurface disposal system.

#### **Function of a Septic Tank**

The first component of the subsurface disposal system is the septic tank. The septic tank inlet receives black and gray water from the structure (i.e. house) and allows solids to settle out while lighter matter – like oil and grease – rises to the top. The septic tank is the anaerobic component of a conventional subsurface disposal system, allowing the biological process of breaking down solids into dissolved solids - a necessary step for final aerobic treatment. The septic tank then outlets effluent that has gone through the anaerobic process to a leach field.

#### **Function of a Leach Field**

Since an anaerobic septic tank provides only partial treatment, further aerobic activity is required for complete treatment. The leach field is the component of the subsurface disposal system that provides this aerobic treatment. There are three major types of leach fields currently being used; Pipe and Stone systems, Chamber Systems, and Fabric Based Systems. All three types require airflow through the system to begin the aerobic treatment process. Air is introduced into the leach field either by airflow through the soil or by adding vents. Aerobic treatment creates a biomat /clogging layer (sludge) within the leach field. The biomat is a biological growth which filters out solid particles and dissolved pollutants not processed within the septic tank. As the biomat forms, a clogging layer forms on the soil interface between the stone and the sand blanket. On fabric based systems the clogging layer forms on the fabric as well as the soil interface between the fabric material and soil surface. The development of biomat /clogging layer is a function of the organic loading as well as the loading rate (gallons per day). High strength effluent from restaurants is typically 5 to 10 times stronger than residential effluent and will result in the biomat / clogging layer forming at a faster rate. As the biomat / clogging layer becomes thicker the infiltration rate of the system decreases. As the infiltration rate decreases over time the leach field becomes overloaded (flooded). Once overloaded, the leach field converts from aerobic treatment to anaerobic treatment. At this point the leach field no longer is able to effectively treat the wastewater, which results in polluting groundwater and nearby surface water. Onsite septic systems are a major concern for property owners in sensitive environmental areas.

#### **Function of *THE CLEAN SOLUTION***

***THE CLEAN SOLUTION*** utilizes a septic tank to perform the same function as the septic tank in a conventional subsurface disposal system. ***THE CLEAN SOLUTION*** system differs from a conventional septic system, however, in that the aerobic treatment process occurs within the BioCon™ chamber, instead of in a leach field.





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In the BioCon chamber, air is introduced into the effluent stream. The air (oxygen) and effluent stream (food) then prompts the growth of a biofilm (bacteria) on the media stored in the BioCon chamber. The biofilm breaks down the wastewater, reducing BOD<sub>5</sub> and TSS levels, as well as nitrogen and phosphorus. The biofilm in the BioCon chamber is equivalent to the biomat in the leach field, creating sludge as a byproduct of the treatment process. The treated effluent from the BioCon chamber then flows into a settling chamber. The settling chamber allows excess sludge to settle out of the effluent.

From the settling chamber, clear treated effluent is dispersed into the ground through a dispersal field. The advantage of **THE CLEAN SOLUTION** system is the "Biomat" has been trapped in the settling chamber and is pumped out when the septic tank is serviced. **THE CLEAN SOLUTION** system has provided the aerobic treatment, allowing clear treated effluent to be dispersed into the ground in a much smaller area called a "dispersal field". Because of **THE CLEAN SOLUTION** treatment process, the dispersal field does not suffer the same clogging fate as a conventional leach field. The size of the dispersal field varies from State to State and is typically set by a State's Environmental Department. Call AOS for the appropriate sizing information of the dispersal field.

With a conventional soil based septic system, homeowners are not typically aware of problems lurking in the leach field below the lawn. Owners only become aware that the leach field has reached its effective life span - when the sewer line backs up into the house or the lawn becomes too "soggy" to mow. Remote leach fields go years in failure without anyone noticing the problem. Long before the "soggy" areas are noticed or the sewer backs up into the house, untreated wastewater has entered the groundwater and nearby surface water. When the homeowner reaches the "soggy" lawn point the system needs to be replaced, which is very costly and disruptive. Often the replacement of the leach field results in a major impact to the property's existing landscaping.

With **THE CLEAN SOLUTION**, the system is typically inspected when the septic tank is serviced. The technician inspecting the system is trained in its proper operation and determines if the system is functioning properly. If a problem is encountered, it can often be corrected during the inspection process and long before the "soggy lawn" symptom occurs.

### When to Use **THE CLEAN SOLUTION**

**THE CLEAN SOLUTION** system is well suited for use in any septic system application where the installation of a standard leach field would be expensive or difficult – whether it's a single-family house, multi unit development, or a commercial development. Examples include homes on bodies of water, high water tables, ledge, small lots, housing developments, condo units, restaurants, shopping centers and office complexes. **THE CLEAN SOLUTION** unit is an affordable, completely in-ground system that is ideal for all new installations or failed system replacements.



## ADVANTAGES OF USING ***THE CLEAN SOLUTION***

### **Environmentally Friendly**

- ***THE CLEAN SOLUTION*** system, a tank that is installed in line after the septic tank, provides the same aerobic treatment that a leach field is designed to provide. As a result, a smaller field is required to disperse the treated effluent into the ground.
- ***THE CLEAN SOLUTION*** system helps prevent ground water pollution and protects our natural streams, lakes and wetlands.
- Adaptable for sensitive sites.
- Tests show that ***THE CLEAN SOLUTION*** is more environmentally safe.
- Recharges groundwater with a higher level of treatment than conventional systems.

### **User Friendly**

- Accommodates vacations, low flows and peak loads.
- Landscape friendly - tanks in ground, no raised covers above ground.
- Low operating cost.
- Does not require a pump for gravity systems.
- Reduces costly repairs in the future.

### **Low Maintenance**

- In residential applications, pumping required only every 2 to 3 years depending upon use.
- There are no mechanical or electrical components within the BioCon treatment chamber.
- **Does not require remote operating via phone modem to maintain treatment.**

### **Technical and Installation Support**

- AOS provides one-on-one support throughout the design, installation and startup process.
- AOS staff has experience in designing all types of subsurface disposal systems.
- AOS has on-staff Licensed Designers, Installers, Certified Septic System Evaluators and Wetland Scientists trained in wastewater sampling.
- AOS staff has been involved in onsite wastewater disposal system designs since 1986.
- AOS can provide you value engineering services on projects for cost comparisons.

### **Community Developments**

- Grouping homes together to utilize larger ***CLEAN SOLUTION*** systems, in conjunction with the smaller dispersal field, can substantially reduce cost. The larger systems also permit better land use and can result in maximizing the number of units allowed on a piece of land.

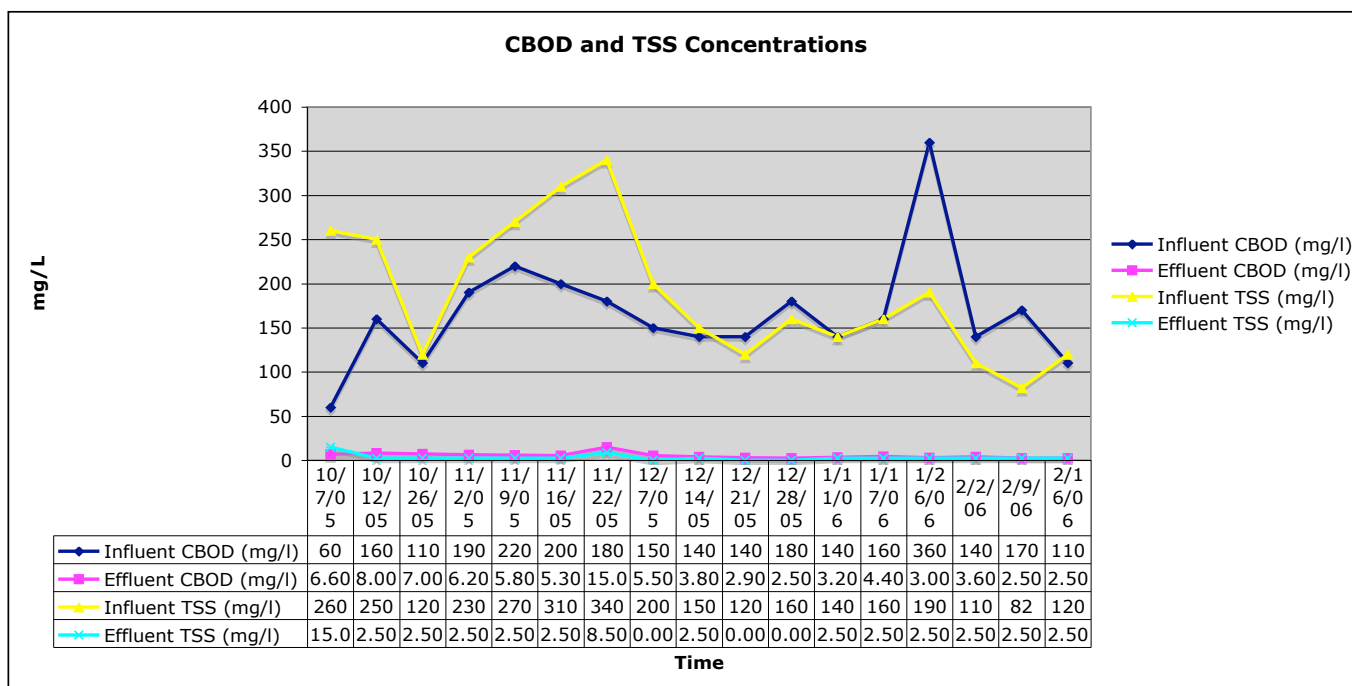
### **Restaurants**

- ***THE CLEAN SOLUTION*** system can be used to treat high strength wastewater.
- Improves efficiency of the subsurface disposal system dispersal field.
- Reduces costly repairs in the future.



## INDEPENDENT TEST RESULTS

In addition to the creativity and flexibility that it gives designers to fit systems into a natural setting while reducing impact to natural buffers, *THE CLEAN SOLUTION* reduces BOD<sub>5</sub> and TSS below 30 mg/l, and in most residential projects the results are in the single digits. The system has been tested at the Massachusetts Alternative Septic Testing Center located at Otis Air National Guard Base on Cape Cod. A measured 550 gal/day from the base facilities are metered into the system each day. Test results average 5.2 mg/l BOD<sub>5</sub>, 3.1 mg/l TSS, levels far superior to municipal plants, typically operating at 30mg/l for both BOD and TSS.



It is important to note the difference between the influent and effluent CBOD, which is a measure of the strength of the wastewater. The influent test BOD is very typical of that from the septic tank in a residential dwelling.

High strength wastewater from a restaurant typically has BOD and TSS levels four to ten times higher than residential wastewater. In wastewater sampling completed by AOS, we have seen wastewater strength as high as 4900 mg/l for BOD, 4000 mg/l for TSS and FOG (Fats-oil-grease) at 930 mg/l. Conventional leach field sizing is based on residential strength wastewater. The organic loading on a conventional soil or fabric based leach field from high strength wastewater increases the rate that the Biomat forms resulting in early failures. **THE CLEAN SOLUTION** system reduces high strength wastewater down to levels typical of treated residential wastewater.



## ADVANCED ONSITE SOLUTIONS LLC

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### WHY USE *THE CLEAN SOLUTION* SYSTEM

#### Cost Effective – Reduced Field Size

- With the increased cost of materials and the difficulty of obtaining quality septic sand and washed stone, designers, installers and developers are seeing *THE CLEAN SOLUTION* system as the best alternative. With a dispersal area 50 to 90% smaller than a conventional field, money is saved on land clearing, grubbing, transporting fill material, and labor to construct a leach field that meets the State's square foot requirements. These savings offset the cost of *THE CLEAN SOLUTION* system, often reducing the overall cost of the septic system to the homeowner.

#### Use Any Field Design

- *THE CLEAN SOLUTION* dispersal field can be constructed using any of the approved field technologies, both proprietary and conventional pipe and stone.

#### Environmentally Friendly

- Local and State Land Use Boards are becoming more aware and concerned with the impacts that developments have on our natural resources, including groundwater and sensitive areas. *THE CLEAN SOLUTION* system produces an effluent quality well above what is considered the acceptable standard, while reducing the overall landscape impacts.
- With a dispersal field smaller than a conventional field, designers, engineers, and site evaluators have increased options for a design that fits into the natural settings of each lot. The reduced size allows the designer to keep trees, rocks and other natural features undisturbed.

#### Developments

- In a cluster development, *THE CLEAN SOLUTION* can reduce the overall project cost by connecting multiple homes to one system. To maximize the cost efficiency, the engineer must weigh the costs of the additional infrastructure required for effluent collection with the savings from using a larger *CLEAN SOLUTION* system to determine the appropriate size of each clustered system.
- *THE CLEAN SOLUTION* is also very effective in new developments where land costs are high. Minimizing the area needed for the leach field may result in the creation of additional building sites.

*THE CLEAN SOLUTION* system is the best alternative when proposing a new development where land costs are high and minimizing the area needed for leach fields may result in additional building sites. It is equally effective in environmentally sensitive areas such as wetlands and water bodies. *THE CLEAN SOLUTION* will help to offset rising field and land costs. The entire AOS staff has experience in all phases of development from conceptual layout through permitting and construction. Please call and have one of our staff members work with you to see how your client can benefit from using *THE CLEAN SOLUTION* system.



## **RESPONSIBILITIES**

The responsibilities for a **CLEAN SOLUTION** installation rest in the partnership between the owner, designer, installer, and AOS. Below is an outline of responsibilities.

### **The Owner**

1. Retains a Licensed Designer to prepare a plan.
2. Reviews plans prepared by Licensed Designer.
3. Reads the conditions outlined in the AOS's *Sales and Maintenance Agreement*.
4. Obtains all necessary permits and approvals required at both the State and Local levels.
5. Executes a sales agreement with AOS at least 3 weeks prior to installation.
6. Executes an Inspection / Maintenance Agreement with AOS.
7. Hires a contractor to install the septic tank(s), pump chamber, pump components and complete all earthwork.
8. Owner and AOS Technician determine location of compressor.
9. Hires a licensed electrician for all required electrical work.
10. Retains Licensed Installer to complete construction.

### **The Licensed Designer**

1. Provides owner with a copy of AOS's *Sales and Maintenance Agreement*.
2. Explains to the owner the difference between **THE CLEAN SOLUTION** system and a conventional wastewater disposal system.
3. Completes all fieldwork required by the State to obtain the necessary construction approvals.
4. Prepares design plans.
5. Contacts AOS to discuss system design parameters.
6. Reviews final design plan with owner for owner sign-off.
7. Provides AOS with a copy of the design plan(s) and supporting documentation for final review and AOS files.
8. If a pump is required for single-family residence, designer to provide contractor with pump operating parameters (gpm, TDH, diameter of discharge line and volume of dose) .
9. Submits final design for local approval if applicable to the State Agency
10. Provides plans "Approved for Construction" to homeowner and homeowner's licensed installer.

### **Advanced Onsite Solutions**

1. Reviews system design parameters with Designer.
2. Prepares standard *Sales and Maintenance* agreement for Owner with system design schematic.
3. Provides Contractor with Purchase Order for tanks provided by AOS outlined in Sales agreement as part of contract price.
4. Coordinates project schedule with Contractor for installation.



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5. AOS Technician to install the following components onsite;
  - a. BioCon Media
  - b. Air transfer system
  - c. Setup Air Compressor
  - d. Internal BioCon plumbing
6. Installation checklist with swing ties to access stacks, with copy of report to Owner.
7. Once the system has been installed and approved for use, AOS to review system, operation and maintenance schedule with Owner.

### The Installer

1. Contracts with owner for all work outside of AOS's responsibilities.
2. Contacts AOS at least 3 weeks prior to installation to plan installation schedules.
3. Provides all subsurface system components and materials outside of AOS's responsibilities. See Sales Agreement and system schematics.
4. Excavates for the septic tank and all AOS tanks to design elevations as shown on approved construction plans.
5. Calls AOS tank supplier with Purchase Order Number to arrange delivery and setting of the AOS tank(s).
6. Constructs the dispersal field in accordance with the approved design.
7. Installs all piping to and from all tanks.
8. Installs the piping from **THE CLEAN SOLUTION** system or pump chamber to dispersal field.
9. **Seals all pipe penetrations and knockouts with a watertight non-shrink mortar.**
10. Digs necessary trenches for the electrical conduits and airlines.
11. **Brings risers to grade. Contractor ensures that all sections of risers are watertight.**
12. Completes all leakage tests if required by designer.
13. Backfills system components, loam, seed and mulch disturbed areas as required by approved design plans.
14. Calls the regional inspector and local inspector when applicable.
15. Obtains Operations Approval for system and provides it to homeowner when applicable.

The above list of responsibilities is a general outline. Additional responsibilities may be required based on specific site conditions or type of use. AOS is not responsible for work completed by the designer or installer. It is the owners(s) responsibility to contract directly with designer and installer.



## **MAINTENANCE and OPERATION FOR SINGLE FAMILY RESIDENTIAL SYSTEMS**

The following maintenance is required. It is the owner's responsibility to see that this maintenance is performed. The owner must maintain a Maintenance Agreement with Advanced Onsite Solutions or an approved vendor.

### **Residential Use (Single Family Home)**

1. If the ISDS (Individual Subsurface Disposal System) is a gravity system **THE CLEAN SOLUTION** system shall be inspected every 2 years by a certified AOS Technician.
2. If the ISDS is utilizing the settling chamber as a pump chamber AOS recommends that **THE CLEAN SOLUTION** system be inspected yearly by a certified AOS Technician.
3. A certified AOS may adjust the above inspection frequency based on use. Seasonal uses will be modified (based on use) after first inspection.
4. Use a local pumper to pump out the septic and settling/pump tanks every 2-years. More or less frequent pumping may be required depending on system use and number of occupants. AOS and the pumper can determine the required frequency. Owner must retain records of pumping.
5. Compressor must run continuously. It should be checked for operation at least once a month.
6. BioCon™ chamber may require pumping between 6 and 8 years. AOS Technician will determine if pumping is necessary during inspection.
7. Compressor Air Filter to be cleaned or replaced yearly.
8. Compressor may be disconnected during the off-season for seasonal uses (less than 6 months)

### **Additional Maintenance Suggestions:**

There is an ongoing concern with pharmaceuticals, medical treatments, and personal care products and how these products affect septic system functions. Although there is not yet enough data to clearly understand the impacts of these products on septic systems, it is known that without the proper balance of bacteria in the septic tank, waste cannot break down as efficiently. AOS recommends that unused pharmaceuticals not be disposed of in the septic system.

Maintenance Contracts are available from AOS. The service will include a detailed inspection of the system and replacement of any failed items within the BioCon Chamber. Tank pumping is not included in the price and must be arranged by the property owner. Failure to have a maintenance agreement with AOS or an approved vendor will void maintenance warranty outlined in the **Sales Agreement**.

## **MAINTENANCE AND OPERATION AGREEMENTS ARE FURTHER DETAILED IN THE SALES AGREEMENT BASED ON INDIVIDUAL STATE REQUIREMENTS.**

**Contact AOS for Maintenance, Operational and Warranty requirements for all commercial projects.**





## THEORY of *THE CLEAN SOLUTION*<sup>TM</sup>

In conventional decentralized septic systems - whether used for individual homes, commercial applications or a community septic system - a septic tank(s) is used to first provide anaerobic (without air) treatment of the waste. This is followed by a leach field to provide aerobic (with air) treatment of the effluent.

Septic tanks work well for capturing and digesting the solids, which are anaerobically fermented over a long period of time, dissolving the solids into liquid waste. However, a septic tank is not designed to treat the contaminants that dissolve in the liquids. These are treated aerobically in the leach field. Municipal systems, which handle very large volumes of wastewater, use different equipment to accomplish the same biological functions as a septic system: primary sedimentation tanks remove solids, and a subsequent aerobic system treats the contaminants dissolved in the liquids. Settled solids are removed from municipal primary and secondary facilities for further treatment.

Every aerobic treatment system, whether a conventional leach field, municipal treatment plant, or ***THE CLEAN SOLUTION***, depends on bacteria to treat the effluent from a solids settling system. In order for the bacteria to reproduce, they require energy (food) and air. By using the contaminants in the effluent as food and atmospheric air, the bacteria metabolize the dissolved solids to carbon dioxide, water, and sludge (colonies of bacteria). The aerobic bacteria also convert ammonia compounds to nitrates.

A large number of bacteria need to come in contact with the food source in order to purify an effluent. Treatment systems utilize different methods to provide the necessary bacteria population. A municipal system mechanically stirs up the bacteria in the secondary treatment process so that they will contact their food and not settle out of the effluent. In a leach field, the sludge (biomat) that forms at the ground interface is a large colony of bacteria through which the dissolved solid stream flows. In ***THE CLEAN SOLUTION*** the bacteria collect in a thin film on the plastic media in the BioCon chamber, and the effluent circulates through the plastic media.

***THE CLEAN SOLUTION*** uses the same biological process as a municipal secondary treatment plant, utilizing the activated sludge process. Solids are settled out and air is added for bacteria respiration in the BioCon. This allows the bacteria to convert the carbonaceous dissolved solids to carbon dioxide, water, and sludge. In addition, the urea and ammonia converts to nitrates and sludge. The sludge created is settled for periodic removal from the system, and a clean, odorless effluent is discharged to the dispersal field.

The major difference between a conventional septic system and ***THE CLEAN SOLUTION*** is where the bacteria (sludge) collect. In a conventional system, the sludge forms in the bottom of the leach field and restricts the effluent flow enough so that the bacteria has time to act. This flow rate through the sludge determines the required field size. In ***THE CLEAN SOLUTION*** system the sludge is formed in the BioCon chamber, resulting in treated, clear effluent discharging to the dispersal field. This field can be greatly reduced in size because there is no further treatment required to reduce BOD and TSS.





## **FREQUENTLY-ASKED QUESTIONS ABOUT *THE CLEAN SOLUTION***

### **Does the system need a real leach field?**

The dispersal field is constructed the same as a conventional field, the only difference is the size. Since ***THE CLEAN SOLUTION*** BioCon and settling chambers perform the same biological functions as a leach field there is no need to have a large leach field to provide aerobic treatment.

### **Can I use other proprietary devices in place of a pipe and stone field?**

Yes. Any approved stone and pipe replacement system is acceptable, however, there are some that would not prove cost effective, but are still compatible with ***THE CLEAN SOLUTION*** system.

### **How do you size chambers or tubes?**

The tubes are sized based on the field print conversion using the total footprint of the field and then judging how many tubes or chambers would be used for that space.

### **How do you vent the field of *The Clean Solution*?**

Typically, ***THE CLEAN SOLUTION*** is vented through the house's existing roof vent. Therefore, a field vent is unnecessary. When using the system on an application without a roof vent, a vent must be installed at or near the tank (i.e. a trailer park or campground must be vented at the tank). Certain proprietary leachfield devices require venting.

### **Are there any additives in the system?**

No, the only thing that ***THE CLEAN SOLUTION*** system needs to run is air, which comes from the small mechanical air compressor.

### **Where does the air compressor go?**

The air compressor can go anywhere above the snow line, but the most ideal place for it is in a garage or basement.

### **How much noise does the air compressor make?**

The air compressor makes less noise than a refrigerator.

### **How much electricity does the air compressor require to run?**

The air compressor requires approximately 80 watts and 1 amp, which can be thought of as the power required for a typical light bulb.

### **How often do I need to maintain the system?**

The system maintenance is done at the same time the septic tank is pumped.

### **What does the system inspection consist of?**

AN AOS-trained technician or vendor inspects the media, effluent quality, dissolved O<sub>2</sub> levels, settling chamber, performs a compression test on the air transfer system, and cleans or replaces the air filter.



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### FREQUENTLY ASKED QUESTIONS (continued)

#### **What if I need to order replacement parts?**

Contact AOS for replacement parts. We will also handle any maintenance or repairs.

#### **Is the system exempt from certain setback rules or to ground water tables?**

**THE CLEAN SOLUTION** system has received variances to State regulations on replacement systems. Variances would be applied for by the designer.

#### **Do I need an effluent pump?**

An effluent pump is only needed if the dispersal field is higher than the outlet of the tank.

**Please call AOS to discuss your specific project needs and information for *THE CLEAN SOLUTION* system model that best fits your needs.**

# THE CLEAN SOLUTION™ ALTERNATIVE SEPTIC SYSTEM MODEL 250ST-RX-H20 FOR X - BEDROOM SINGLE FAMILY HOME

ALL CHAMBERS TO HAVE ACCESS TO FINISH GRADE.  
IF COVER EXCEEDS 24" CONTRACTOR SHALL PROVIDE 30" RISERS AND COVERS TO GRADE.

IF COVER IS BETWEEN 36" AND 48" CONTRACTOR SHALL PROVIDE 36" DIAMETER ACCESS STACKS AND COVERS FOR THE BIOCON AND SETTLING CHAMBERS.

IF COVER IS BETWEEN 48" AND 60" CONTRACTOR SHALL PROVIDE 48" DIAMETER ACCESS STACKS AND COVERS FOR THE BIOCON AND SETTLING CHAMBERS.

IF COVER EXCEEDS 60" CONTACT AOS FOR DESIGN MODIFICATIONS.

AIR COMPRESSOR  
(BY AOS)

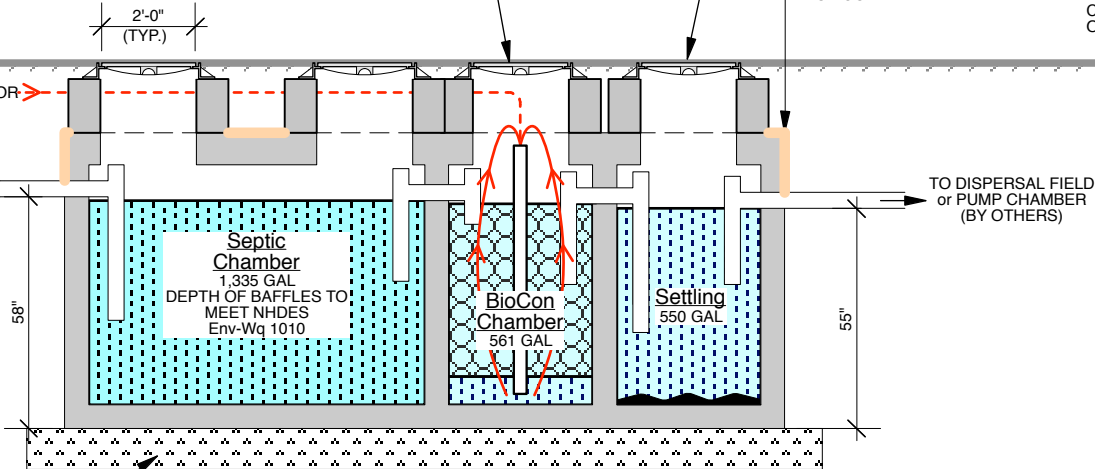
AIR FROM COMPRESSOR

2'-0"  
(TYP.)

24" CAST IRON FRAME  
& COVER 4" TALL  
(4001 B) (TYP.)

INSULATE WITH 2"  
RIGID EPS (R-5) BOARD  
FOR LESS THAN 12"  
OF COVER

OPTIONAL OUTDOOR REMOTE  
ENCLOSURE FOR AIR COMPRESSOR.  
CAN BE POSITIONED A MAXIMUM  
OF 50' FROM BIOCON CHAMBER.



TO DISPERSAL FIELD  
or PUMP CHAMBER  
(BY OTHERS)

TANK TO BE SET ON 12" THICK (MIN) LAYER OF 3/4" CRUSHED STONE, EXTENDING 1-FOOT BEYOND FOOTPRINT OF TANK FOR WET GROUND CONDITIONS. USE 6" THICK LAYER OVER LEDGE.

## Septic/BioCon/Settling

2,500 GAL 3-Compartment H-20 Tank  
(15'-0"L x 7'-0"W x 6'-2"H)

## NOTES:

1. Septic Tank & Settling Compartment and Pump Chamber must be pumped every 2 years. More frequent pumping may be required depending on use.
2. Tank is suitable for drive on use.
3. Contractor to verify tank dimensions prior to setting.
4. Contractor to supply H-20 rated risers to finish grade.  
See above for depth requirements

## Tank from:

Phoenix Precast Products  
Concord, NH 03301  
1-800-639-2199

Site: Tax Map xx Lot No. xx  
Street Address  
City/Town, State, Zip

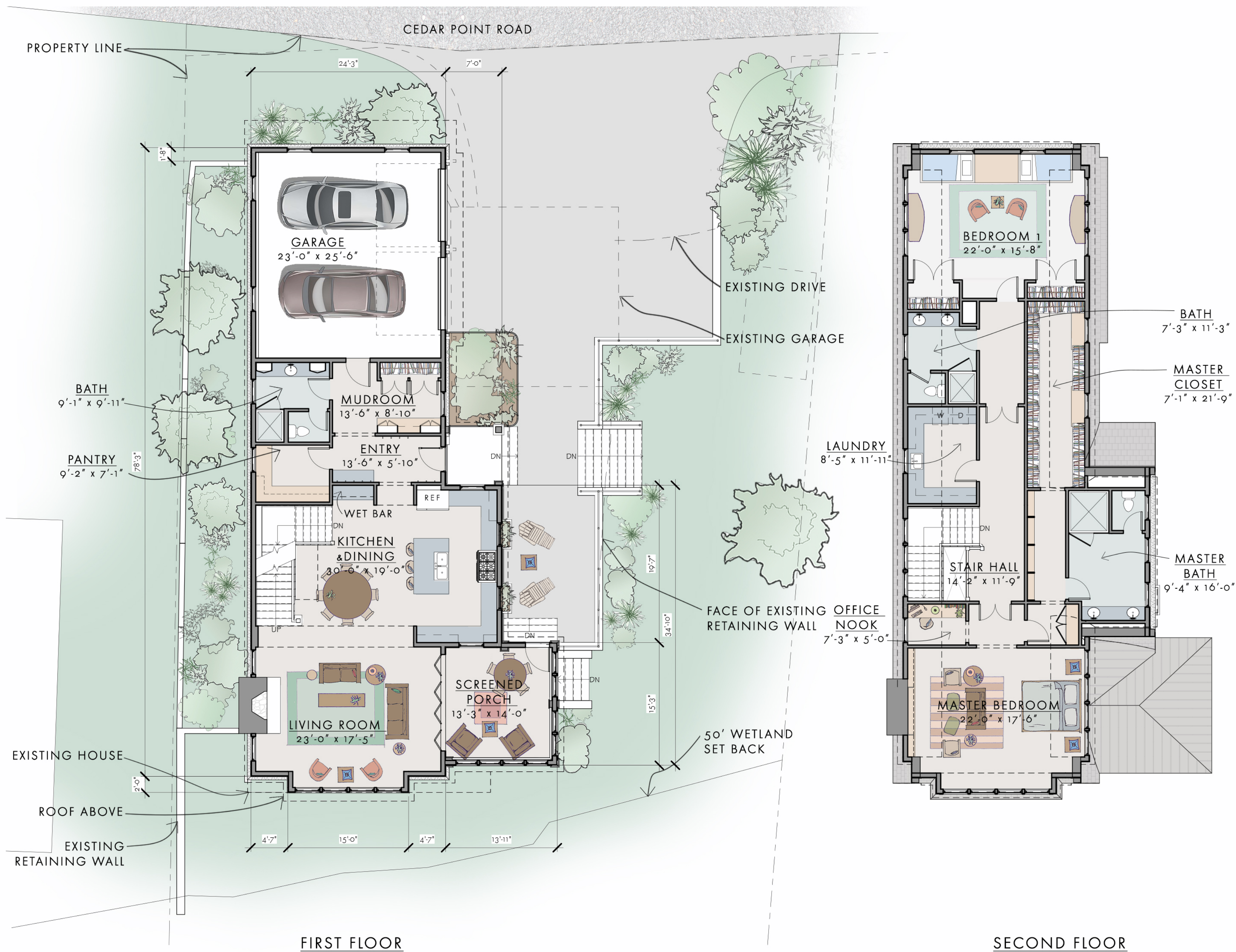
Owner: Name(s)  
Street Address  
City/Town, State, Zip

Date  
XX/XX/2017  
Rev.



**Advanced Onsite Solutions LLC**  
*innovative wastewater solutions with sustainable results*  
P.O.Box 248  
Canterbury, NH 03224  
Phone 603.783.8042





PROPOSED DESIGN DEVELOPMENT REVISIONS  
**HEIDERSCHIEDT RESIDENCE**  
 32 CEDAR POINT ROAD DURHAM, NEW HAMPSHIRE

PROPOSED FLOOR PLANS  
 1/8" = 1'-0"

SHEET **1** OF 3  
 22 JANUARY 2018

TRUE NORTH PROJECT NORTH

PROJECT NO: 201748

**D|A**  
 DeStefano Architects

© 2018





WEST ELEVATION

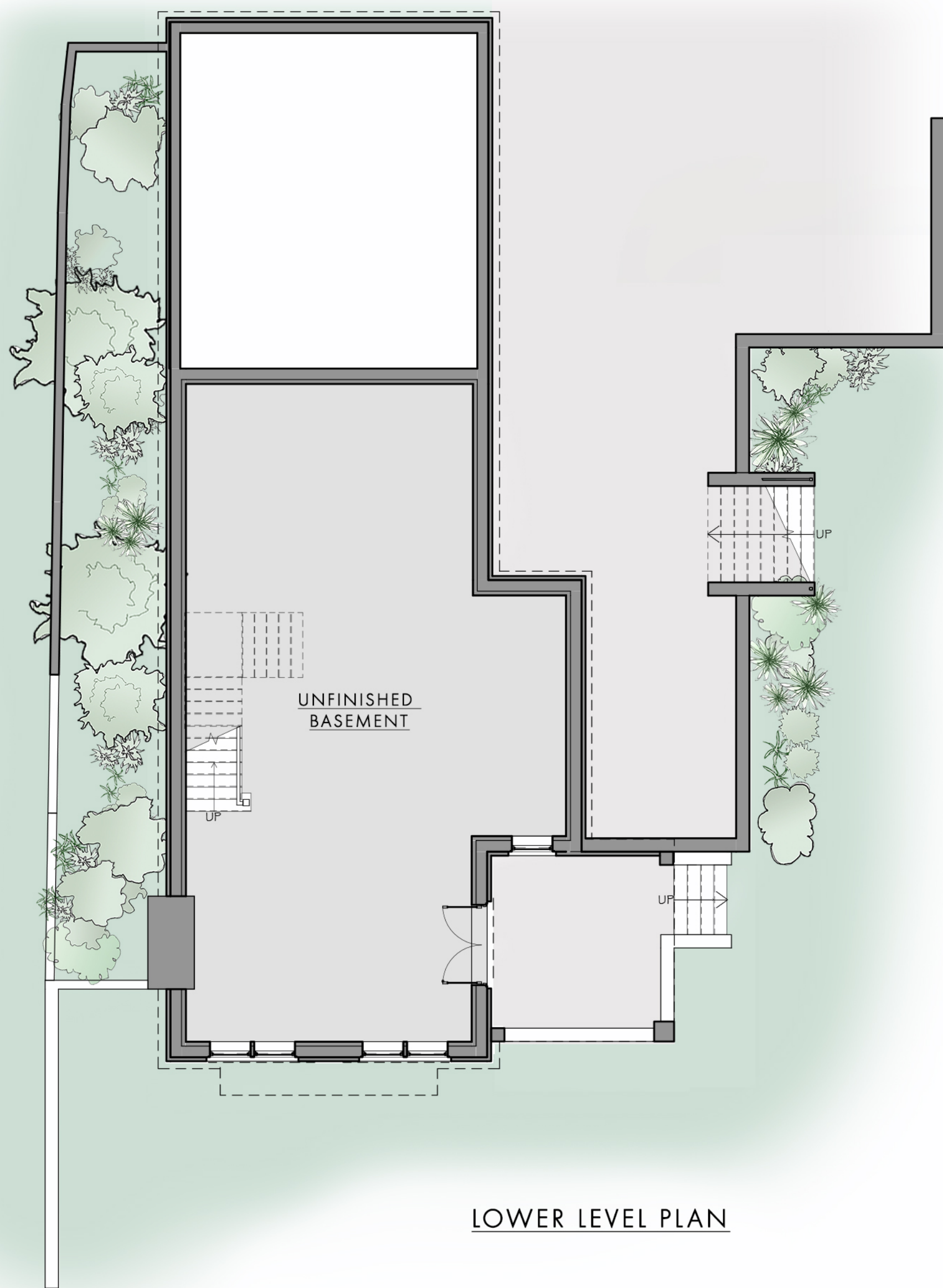
NORTH ELEVATION



EAST ELEVATION

SOUTH ELEVATION





LOWER LEVEL PLAN

