



**TOWN OF DURHAM**  
**ZONING BOARD OF ADJUSTMENT**  
 8 NEWMARKET RD  
 DURHAM, NH 03824  
 PHONE: 603/868-8064  
 www.ci.durham.nh.us

RECEIVED  
 Town of Durham  
 JUL 21 2020  
 Planning, Assessing  
 and Zoning

**VARIANCE**

# 352 p. 7/21  
 Check #  
 255

**Prior to seeking a variance, the property owner must have been denied a building permit by the Building Inspector or denied an approval by the Planning Board.**

Name of Applicant IAGO HALE AND ERIN HALE

Address: 74 MILL ROAD

Phone # 1-603-862-4653 Email: iago.hale@unh.edu

Owner of Property Concerned SAME  
 (If same as above, write "Same")

Address: SAME  
 (If same as above, write "Same")

Location of Property: 74 MILL ROAD  
 (Street & Number)

Tax Map & Lot number 006-001-004

A Variance is requested from Article(s) XII.1 Section(s) 175.53 of the Zoning Ordinance to permit:

CHANGE OF USE OF AN EXISTING NON-RESIDENTIAL OUTBUILDING TO AN ACCESSORY APARTMENT. PLEASE SEE ADDENDUM FOR DETAILS.

**All applications must include a statement explaining how the applicant meets each of the five (5) statutory requirements for granting a variance, (A) through (E), which are found on page 2. (See page 3 for guidance.) The Zoning Board of Adjustment may consider the variance application incomplete if these five statements have not been addressed. In addition all applications must be accompanied by adequate plans and exhibits.**

**ADDENDUM TO**  
request for variance to allow an accessory apartment at 74 Mill Road

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## Introduction and background

### 1. Rationale for the variance request

We are requesting this variance in order to rebuild the 530 ft<sup>2</sup> outbuilding on our property, honoring its current footprint and same basic elevations, as an accessory apartment to serve as an aging-in-place residence for Iago's mother. The current building is failing and in need of re-construction. As part of our work to rebuild the structure and upgrade its use to an accessory apartment, we seek to address the longstanding erosion and stormwater management issues on this end of our property.

### 2. Existing site conditions

As shown in **Appendix A (Current Structure)**, the existing single-story outbuilding sits atop an open, walk-in basement area with an unfinished earth floor. The walls of the basement are stacked rock, with the northwest wall (farthest from Mill Road) being the stone abutment of the old Mill Road, before it was moved downstream to its current location. As shown in **Appendix B (Existing Conditions Site Plan - Ross Engineering, LLC)**, the nearest point of the footprint of the current building to the center of the Oyster River is approximately 40'. The intention with the proposed project is to reconstruct the building in its current location with the same type of foundation, ideally shoring up the existing foundation walls to the extent possible to minimize impact to the riparian site.

### 3. Description of planned work

To preserve as much as possible the historic look and site functions of the current outbuilding, the proposed replacement structure will honor its design, as shown in **Appendix C (Proposed Floorplan and Elevations- Placework Architects)**. In addition to matching the height, footprint, and style of the current outbuilding, the elevations of the proposed structure will be nearly identical to those of the current structure on the two sides visible from Mill Road (southwest and southeast). The only foreseen changes to the current building's elevations would involve an entry door on the northwest side, along with additional glazing on the northwest and northeast sides, as would be needed with its change of use to a livable space.

As detailed in **Appendix D (Septic Plan - Ross Engineering, LLC)**, the conversion of the current outbuilding to an accessory apartment would involve multiple site improvements, including:

- 1) Replacing our main house's 30-year-old traditional septic system (4 bedroom) with an increased capacity Advanced Onsite Solutions system with secondary treatment (see **Appendix E** for details), resulting in significantly cleaner effluent;
- 2) Substantially reducing the effluent disposal area on the property, minimizing site impact; and
- 3) Moving our current effluent disposal area 11.7' further away from the stream on the north side of the property and 7.1' further away from hydric B soils.

In addition to these septic-related improvements, this project will provide an opportunity to address the stormwater management issues we currently have in the area of our driveway and existing outbuilding, issues which have contributed to the erosion of the current outbuilding's foundation (see **Appendix A**). Town Engineer April Talon visited the site on July 1 and has initiated the process to mitigate the disproportionate volume of stormwater entering our property from Mill Road, a first step toward developing an appropriate stormwater management plan as part of this project.

## II. Addressing the five statutory requirements (RSA 674:33, I(b))

### 1. *The variance is not contrary to the public interest*

Changing the use of our failing outbuilding to a driveway-level accessory apartment for one of our parents is an active step toward preserving the essential character of the property and the neighborhood. The current outbuilding, sited near the likely location of the 18-19<sup>th</sup> century Chesley Mill on the Oyster River, contributes greatly to the historic feel of the property and the neighborhood. It is only through the requested change of use that it is possible for us to undertake the investment needed for its reconstruction. Built on the current outbuilding's footprint and reproducing its basic elevations, the proposed change of use in no way injures public rights or threatens public health, safety, or welfare.

### 2. *The spirit of the ordinance is observed*

Our understanding of the spirit of the ordinance in question is that it is intended to preserve the open, low-density character of Residential Zones A and B. Compared to properties in Residential Zone C, where accessory apartments are permitted, the lot sizes in Zones RA and RB are smaller, thereby presenting the real risk of accessory buildings impacting the overall proportion of non-built space and negatively impacting abutters (e.g. disrupting views, blocking sunlight, etc.). The following unique attributes of our property, however, make it so that the requested variance can be granted while upholding the spirit of the ordinance:

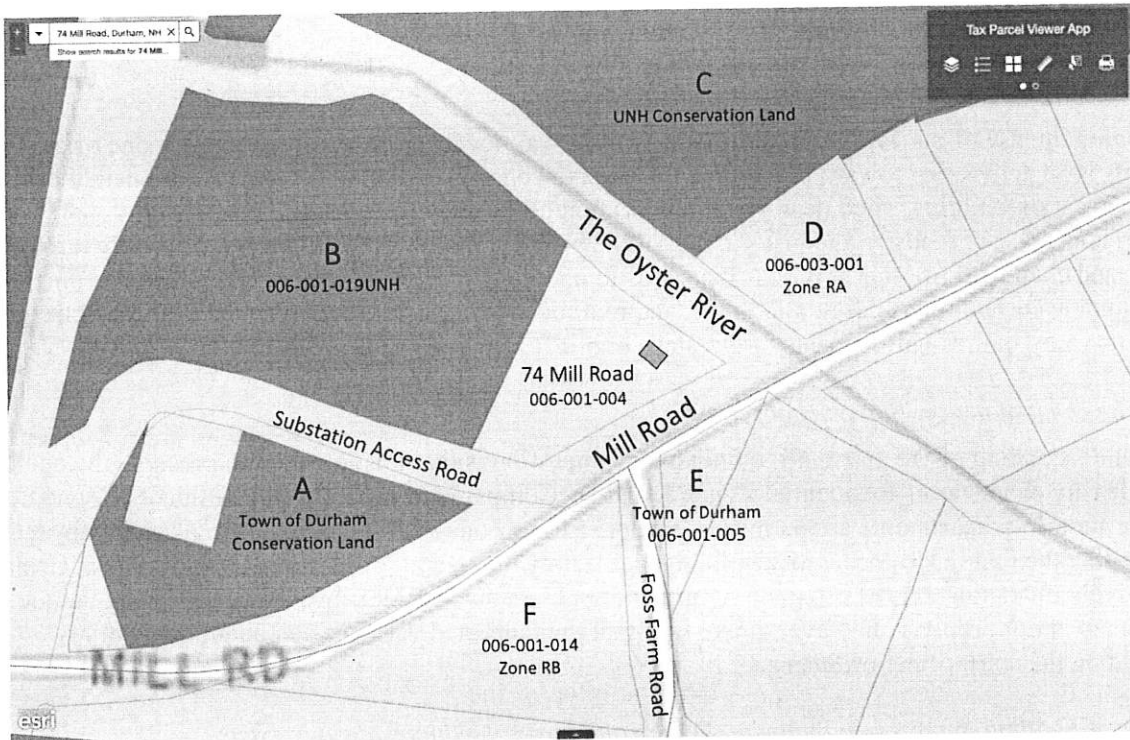
#### a. *A building of the same footprint, height, and basic elevations already exists*

A variance is being requested to change the use of an existing building rather than construct a new building where one does not already exist. Because the number, location, and sizes of the structures on the property would not change as a result of this variance (see page 9), there will be no impact on the overall density of structures on the property nor on the welfare of our abutters.

#### b. *The property has no immediate residential abutters*

Although our property is zoned RB, it is unlike typical RB properties in terms of its layout, namely shallow with long road frontage and no immediate residential abutters. The old part of our main residence, known as the "Chesley Mill House," is one of the very first houses built on Mill Road that stands today; and this long history of the original structure likely lies at the root of our atypical property siting.

As shown in **Figure 1** on the next page, the only immediate abutter is the University of New Hampshire (B), in the form of an unmanaged forest lot cut off from the main campus by the Oyster River and from College Woods by the railroad track. Another abutter is the Town of Durham, in the form of a small conservation wetland forest lot separated from our property by a dirt access road to the adjacent power substation (A) as well as another small triangular lot directly across Mill Road (E). On the other side of the Oyster River is 70 Mill Road, whose residence is substantially higher in elevation than our outbuilding, in addition to being separated from it by substantial vegetation and the river itself. Finally, on the other side of Mill Road, diagonally across the other the end of the property, is 2 Foss Farm Road, whose residence is also substantially higher in elevation than our outbuilding, in addition to being separated from it by substantial vegetation and the road itself.



**Figure 1** Tax parcel map showing abutters surrounding the central property in question, 74 Mill Road. The only immediate abutter is UNH (parcel 006-001-019UNH). There are two abutters on the other side of the Oyster River (UNH and 006-003-001), two on the other side of Mill Road (Town of Durham and 006-001-014), and one on the other side of the dirt access road to the power substation (Town of Durham). The approximate location of the current outbuilding is indicated by the grey rectangle. Source: Strafford Regional Planning Tax Parcels Map Viewer, accessed July 17, 2020.

Because of the unique characteristics of the property and nature of the proposed work, essentially conversion of use of an existing structure, the requested variance can be granted while upholding the spirit of the ordinance.

### 3. *Substantial justice is done*

A structure of the same dimensions and style already exists on the proposed footprint, so the continued existence of such a structure perpetuates the *status quo* and poses no harm to the general public. One could argue that the introduction of another resident onto the property potentially harms the public good in terms of increased general activity on the site (e.g. another car using the driveway); but such an increase in activity would also occur in the case of an attached accessory dwelling unit, for which no variance is required. Therefore, assuming the necessary building permits are obtained, in compliance with local and state regulations regarding construction on the current site, the proposed change in use poses no harm to the general public. The benefit of this variance to our family is not at the expense of the public good.

4. *The values of surrounding properties are not diminished*

As alluded to in the previous point, it is possible for an accessory apartment to diminish the values of abutting properties in two distinct ways, namely via the existence of the structure itself and via its intended use. In this case, because an outbuilding already exists and the proposed accessory apartment will match its current footprint and basic elevations, the variance would essentially allow the preservation of the *status quo* with regard to the structure itself. In other words, the requested variance cannot diminish the value of abutting properties due to obstructed views, blocked sunlight, etc. because, in the end, it is the form of the current structure that will be maintained.

5. *Literal enforcement of the ordinance would result in unnecessary hardship*

Given our desire to provide an aging-in-place residence for Iago's mother, literal enforcement of the variance would require attaching an accessory dwelling unit (ADU) to our current home, "swapping" the footprint of our current outbuilding to enable construction within the shoreland buffer. Before outlining the unnecessary hardships such a course of action would involve, it is important to note two fundamental design constraints we are facing. Perhaps the most important consideration for an aging-in-place residence is *access*. Specifically, in order to ensure the long-term safety of an aging resident and promote activity for as long as possible, it is essential that: 1) The residence be at ground level (i.e. no stairs); and 2) The residence be located as close as possible to the driveway, for ease of getting to and from vehicles. The critical need for proximity to the driveway constrains us to the eastern end of our property, as opposed to attempting attachment of an ADU on the northern or western sides of our home.

Constrained to the eastern end of the property, literal enforcement of the ordinance (i.e. building an attached ADU) would result in unnecessary hardship for the following reasons:

1. *Unnecessary riparian site disturbance* As shown in **Appendix B**, nearly the entire 1993 addition of our main house sits within the 125' shoreland buffer setback from the Oyster River. Therefore, construction of any ADU attached to the driveway-proximate eastern end of our house would require significant site disturbance within the shoreland buffer. Such disturbance would be substantial, given the downhill slope (~6' drop from house to driveway) and the need to provide a ground-level entrance, as explained above. By making use, however, of the current outbuilding's footprint and shoring up its existing foundation as much as possible, such unnecessary disturbance can be avoided. The current outbuilding already sits at ground level, minimizing the need for any additional excavation; and its footprint will already be a site of disturbance due to the need to deconstruct it before we can rebuild. Such deconstruction would be required even for an attached ADU, as it is only because of our grandfathered footprint within the setback that we are able to consider any unit at all, attached or not. By making use of the current footprint, then, site disturbance within the shoreland buffer is likely to be far less than half of what it would be under a literal enforcement of the ordinance.
2. *Loss of value* Construction of an attached ADU, as compared to rebuilding and changing the use of our current outbuilding, will negatively impact our family and our property in a variety of ways, some due to the loss of the outbuilding in its current location and others due to the construction of a new attached unit on the eastern end of our home.

The outbuilding in its current location provides valuable functions which would be lost if its footprint were to be swapped for an attached ADU elsewhere on the property, as described below:

- a. *Loss of privacy and buffer* In its current location, the outbuilding is strategically sited to provide an extremely effective visual and noise barrier between the heavily trafficked Mill Road and our property's access to the Oyster River, a protected recreation spot for our family that contributes immensely to the overall experienced value of our home. Removal of the building for the purpose of spending its footprint elsewhere would result in a detrimental level of exposure to this area. The current building also provides an effective visual barrier between the main living space of our home and the residence at 70 Mill Road (006-003-001) as well as Mill Road itself, permitting wide views of the river from our eastern windows while significantly blocking the sight and noise of traffic.
- b. *Loss of highly accessible storage* The current use of the outbuilding is invaluable to us, namely quickly accessible storage of daily-use recreational equipment (bikes, boats, skis, etc.), yard equipment, toys, and assorted tools. To maintain this important usage in an attached ADU, given our footprint constraints, would require construction of an attached garage with a second-story apartment, something we initially considered until comprehending the critical importance of ground-level entry for an aging-in-place residence. With its walk-in basement area, the footprint of the current outbuilding would allow its continued use as storage (underneath), even as the driveway-level portion of the building changed to residential use. To realize such dual use (e.g. a walk-in basement) out of an attached, ground-level ADU would require significantly greater excavation work and site disturbance, if it could be achieved at all.

Compounding the above hardships that would be sustained by losing the outbuilding in its current location, construction of an attached ADU on the eastern end of the house would negatively impact our family and property in other ways:

1. *Loss of view and light* With a central woodstove bookended by picture windows all along the eastern wall, our first-floor eastern living room is the heart of our home and the center of our family life. Construction of an attached ADU will unavoidably compromise the view of the river from this room, not to mention block sunlight from entering what is already a shaded end of the house (the so-called "eastern wall" really points northeast, as shown in the site plan). One of the primary selling features of the house is its living room with the expansive view of the river; an attached ADU would greatly diminish this.
2. *Harm to and/or loss of the sentinel sugar maple* With a 42" diameter trunk, crown exceeding 50' in diameter, and a height of more than 70', the large sugar maple tree growing just off the north corner of the house (see **Appendix B**) is an historic sentinel tree of incalculable value. Depending on its final footprint, an attached ADU resulting from literal enforcement of the ordinance would result, at minimum, in substantial damage to the root system of that tree.
3. *Reduced visual appeal of the home* Finally, literal enforcement of the ordinance would result in the addition of a unit to the eastern end of what is already a long, somewhat monolithic structure running along Mill Road. As it is, the southeast elevation of our home (facing the road) already pushes the upper limits of the scale of the site. Further expansion will, in our opinion, turn the property into an eyesore, especially as it would come with the added loss of the current outbuilding, with all the historic charm it provides with its small carriage-house

look amidst mature landscaping. An attached ADU would also block the view from the road of the sentinel maple, its sheer scale serving to visually ground the house on the site.

For the reasons listed above, we contend that literal enforcement of the ordinance would result in unnecessary hardship, to no obvious benefit to the general public.



**III. Additional information**

*1. Copy of denied building permit*



**TOWN OF DURHAM**  
8 NEWMARKET RD  
DURHAM, NH 03824-2898

**AUDREY CLINE**  
Zoning Administrator  
Code Enforcement Officer  
Health Officer

TEL: (603) 868-8064  
acline@ci.durham.nh.us

**Decision or Order of the Building Inspector/Code Enforcement Officer**

*175-12. Administrative Appeals.*

*Any person who believes that the Zoning Administrator has made an error in the interpretation or application of the provisions of this Ordinance, may appeal such determination to the Zoning Board of Adjustment as an administrative appeal under the provisions of Section 175-19. If the Board finds that the Zoning Administrator erred in his/her interpretation of the Ordinance, it shall modify or reverse the decision accordingly.*

*175.19. Powers and Duties*

*B. In exercising the above-mentioned powers, the Board may, in conformity with the provisions hereof, reverse or affirm, wholly or partly, or may modify the order, requirements, decision or determination appealed from and may make such order or decision as ought to be made and to that end shall have all the powers of the officer from whom the appeal is taken.*

**Applicant:** Iago Hale, 74 Mill Road, Durham

**Date of order:** July 13, 2020

**Deadline for application for appeal:** August 14, 2020

**Decision or Order of the Building Inspector/Code Enforcement Officer:**

Building Permit Application number 20-226 dated July 8, 2020, for property located at 74 Mill Road, is DENIED as the proposal does not meet the requirements of 175-53. Table of Land Uses of the Durham Zoning Ordinances below:

175-53. Table of Land Uses.

Accessory apartments are not permitted in the RB Zone.

175-7 Definitions.

ACCESSORY APARTMENT – A dwelling unit located in an accessory structure in conjunction with a single-family residence as an accessory use. A single-family residence with an accessory apartment is considered a single-family residence (not a duplex residence).

See Article XX

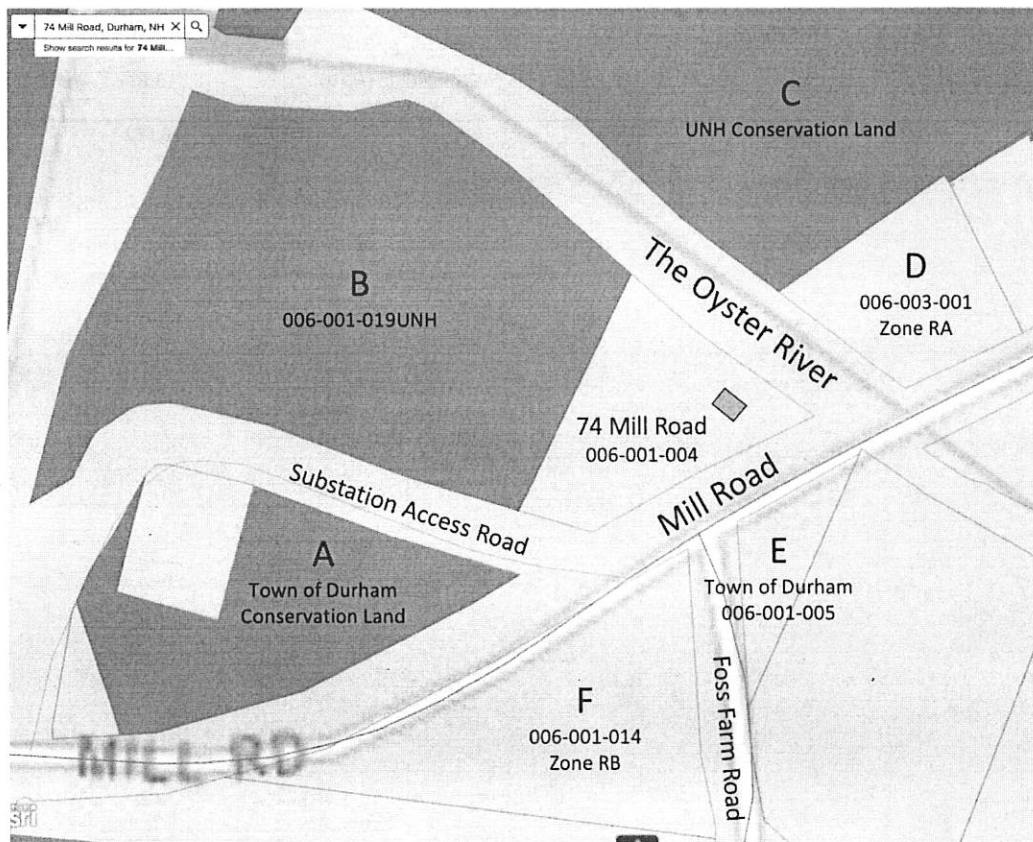
By Durham's Building Inspector/Code Enforcement Officer:

  
Audrey Cline CEO

2. List of property abutters

The following table contains information about the six properties that abut 74 Mill Road. Property labels (A-F) refer to the labels in the annotated Tax Parcels map at the bottom of this page.

| Property | Parcel ID      | Owner Information                             | Address                        | Zoning District   |
|----------|----------------|-----------------------------------------------|--------------------------------|-------------------|
| A        | 006-001-002    | Town of Durham                                | <i>unknown (see map above)</i> | Conservation Land |
| B        | 006-001-019UNH | University of New Hampshire                   | <i>unknown (see map above)</i> | <i>unknown</i>    |
| C        | <i>unknown</i> | University of New Hampshire                   | <i>unknown (see map above)</i> | Conservation Land |
| D        | 006-003-001    | RB McDonough, BK Langlois                     | 70 Mill Road                   | RA                |
| E        | 006-001-005    | Town of Durham                                | 73 Mill Road                   | RB                |
| F        | 006-001-014    | JS Sands Rev Trust, D Merrill-Sands Rev Trust | 2 Foss Farm Road               | RB                |



Source: Strafford Regional Planning Tax Parcels Map Viewer, accessed July 17, 2020.

Please note that, although six separate parcels abut the property, collectively they implicate only four unique owners in need of notification, namely:

1. The University of New Hampshire
2. The Town of Durham
3. RB McDonough and BK Langlois
4. JS Sands Rev Trust and D Merrill-Sands Rev Trust

3. Detailed square footage of existing structures

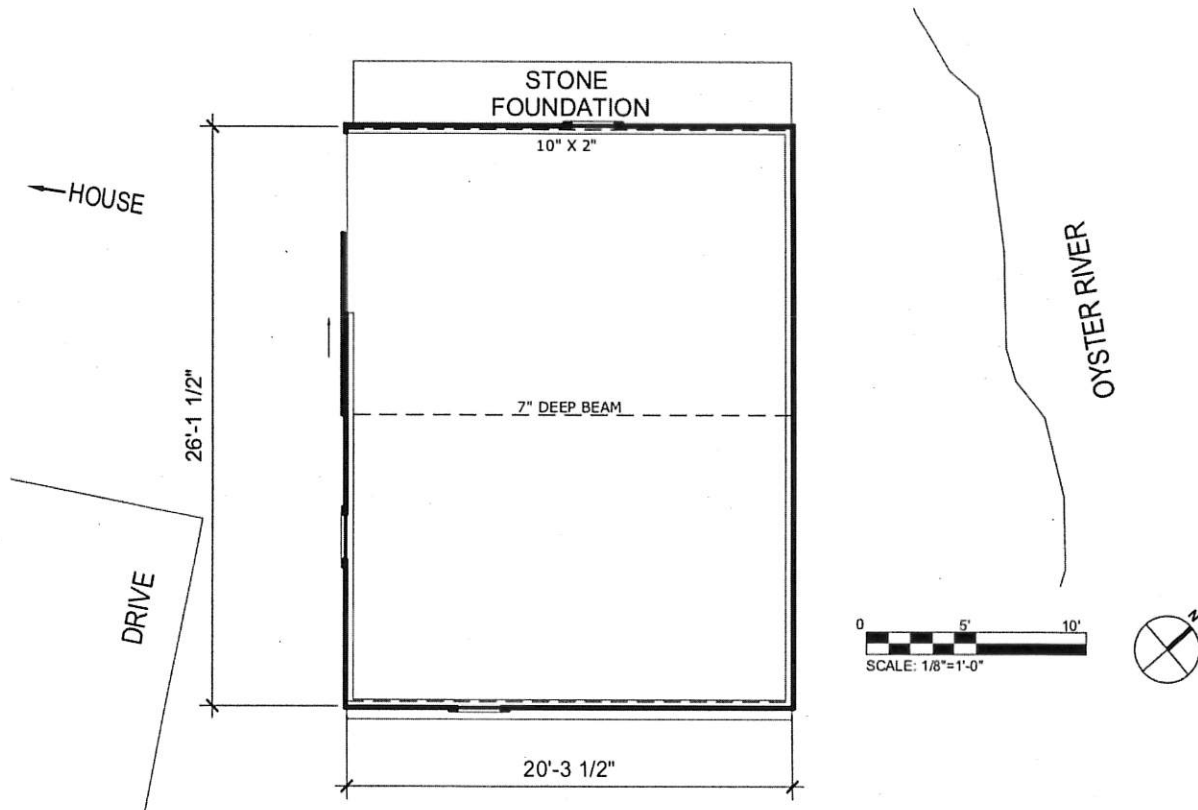
The proposed building project will not change the total square footage of structures on the property. Rather, it would change the current 530 ft<sup>2</sup> of non-living area in the outbuilding to living area. Below is a full accounting of the areas on the property:

| <b>Existing Structures</b>   |                        |                         |
|------------------------------|------------------------|-------------------------|
| <b>Main House</b>            | <b>Total Area (sf)</b> | <b>Living Area (sf)</b> |
| First Floor                  | 1,535                  | 1,535                   |
| Upper Story, Finished        | 896                    | 896                     |
| Three Quarter Story          | 527                    | 395                     |
| Porch, Open Framed           | 64                     | 0                       |
| Attic, Unfinished            | 896                    | 0                       |
| Basement, Unfinished         | 1,348                  | 0                       |
| Deck, Wood                   | 286                    | 0                       |
|                              | <hr/>                  | <hr/>                   |
|                              | 5,552                  | 2,826                   |
| <b>Outbuilding (storage)</b> | 530                    | 0                       |
|                              | <hr/>                  | <hr/>                   |
| <b>TOTAL</b>                 | <b>6,082</b>           | <b>2,826</b>            |

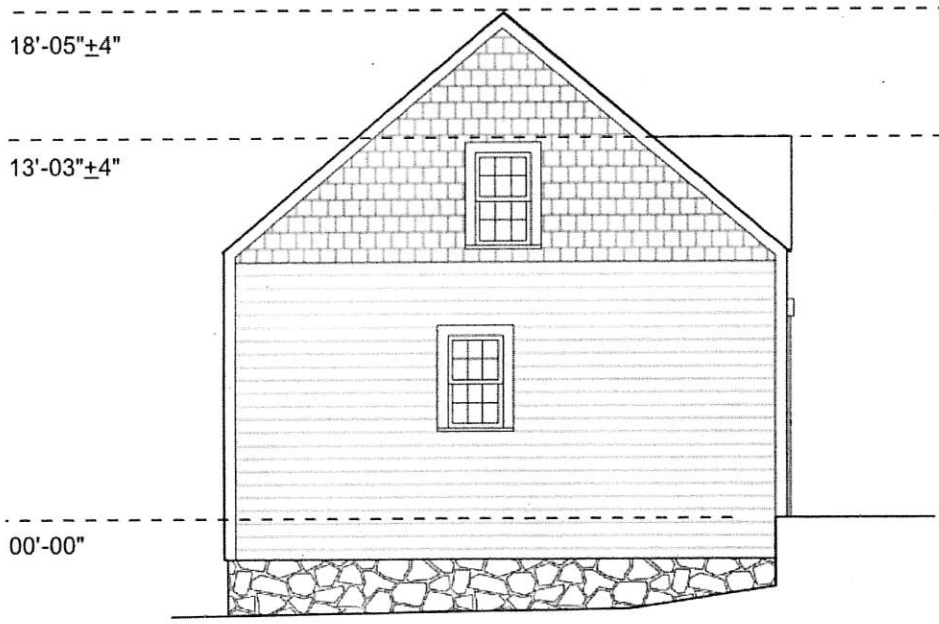
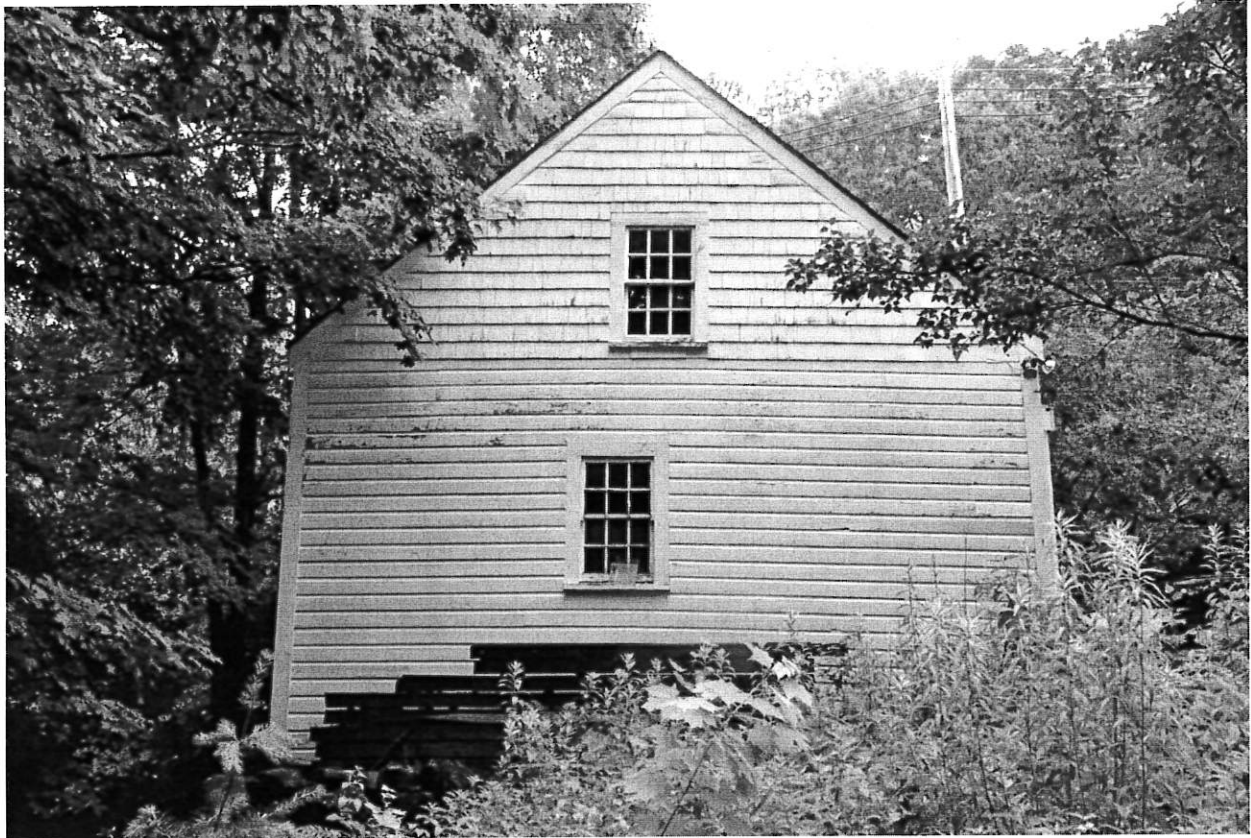
| <b>Proposed Structures</b> |                        |                         |
|----------------------------|------------------------|-------------------------|
| <b>Main House</b>          | <b>Total Area (sf)</b> | <b>Living Area (sf)</b> |
| First Floor                | 1,535                  | 1,535                   |
| Upper Story, Finished      | 896                    | 896                     |
| Three Quarter Story        | 527                    | 395                     |
| Porch, Open Framed         | 64                     | 0                       |
| Attic, Unfinished          | 896                    | 0                       |
| Basement, Unfinished       | 1,348                  | 0                       |
| Deck, Wood                 | 286                    | 0                       |
|                            | <hr/>                  | <hr/>                   |
|                            | 5,552                  | 2,826                   |
| <b>Outbuilding (ADU)</b>   | 530                    | 530                     |
|                            | <hr/>                  | <hr/>                   |
| <b>TOTAL</b>               | <b>6,082</b>           | <b>3,356</b>            |

# Appendix A – Current Structure

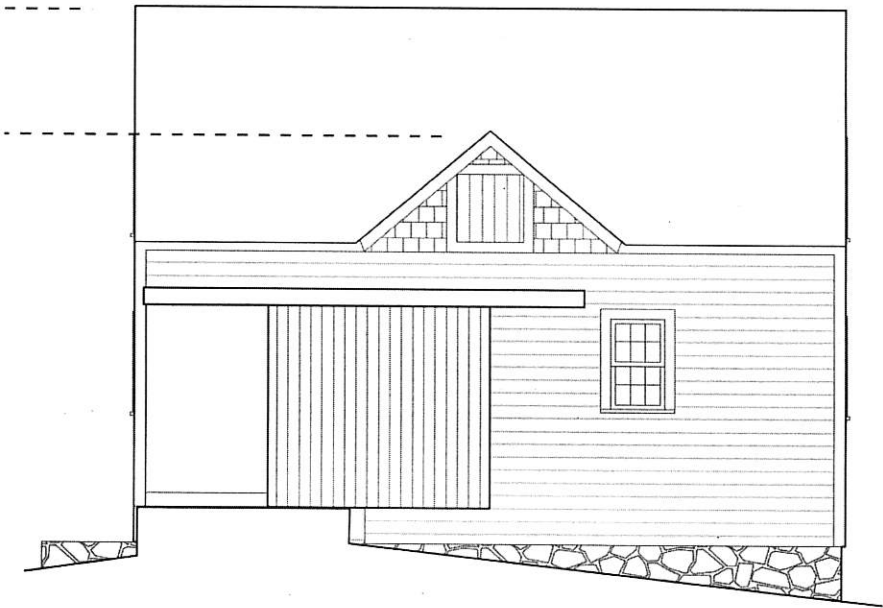
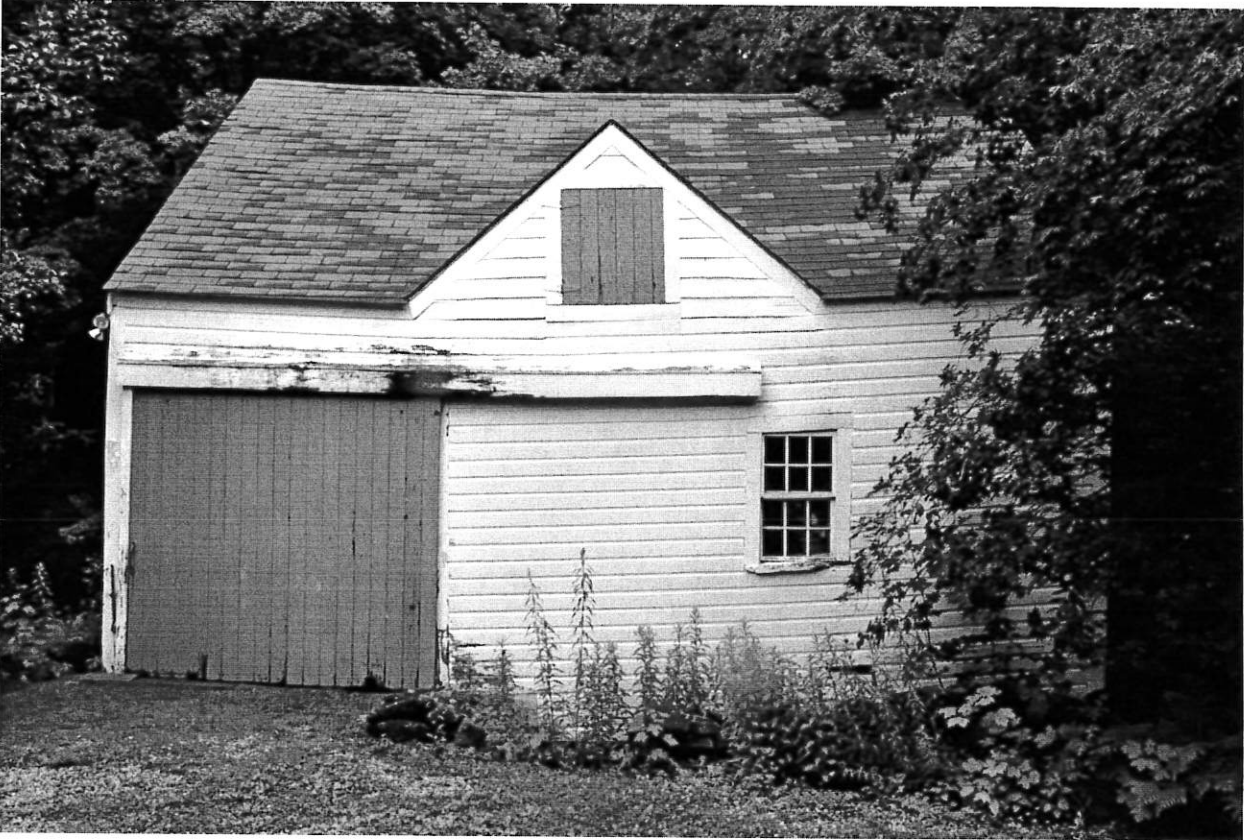
## Floorplan



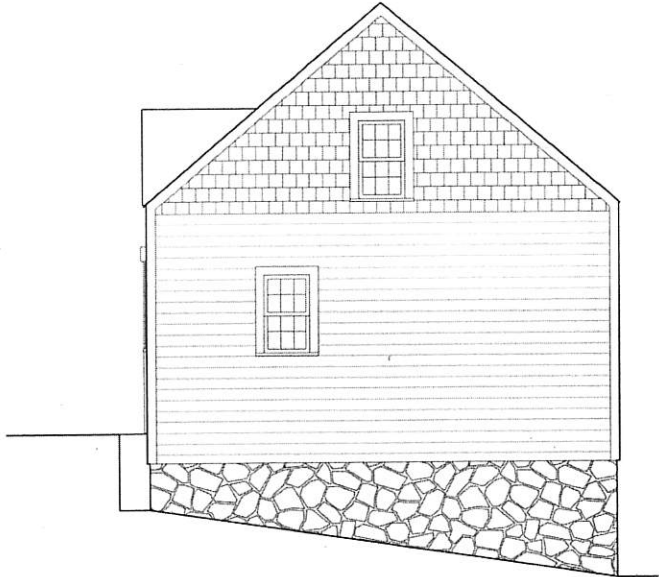
Elevation – Northwest (facing away from Mill Road)



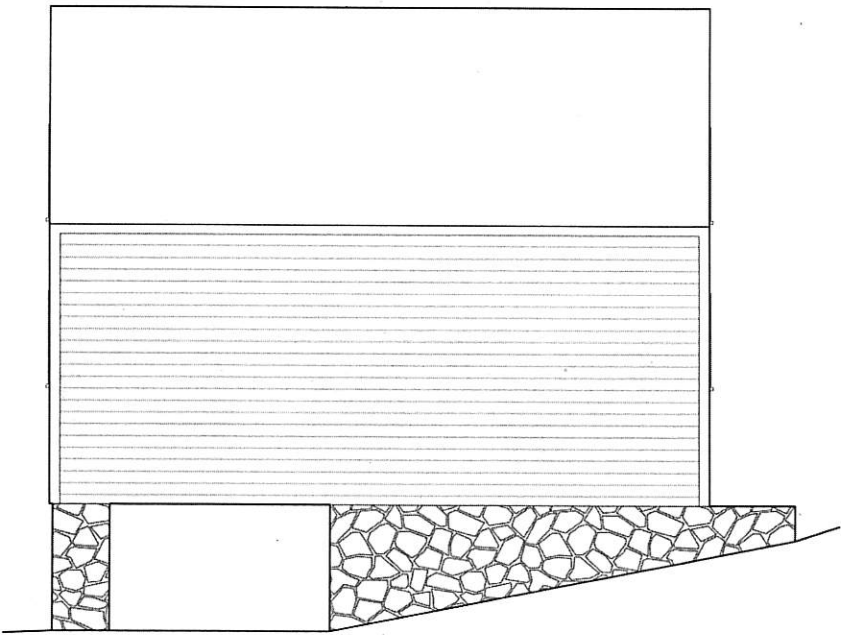
Elevation – Southwest (Front)



Elevation – Southeast (facing Mill Road)



Elevation – Northeast (Rear)

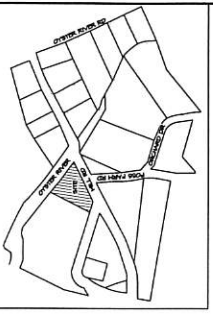




Erosion of the southwest foundation wall by stormwater runoff from Mill Road  
(photo taken from under the structure)



**Appendix B – Existing Conditions Site Plan – Ross Engineering, LLC**



**LOCUS PLAN  
N.T.S.**

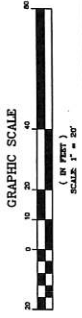
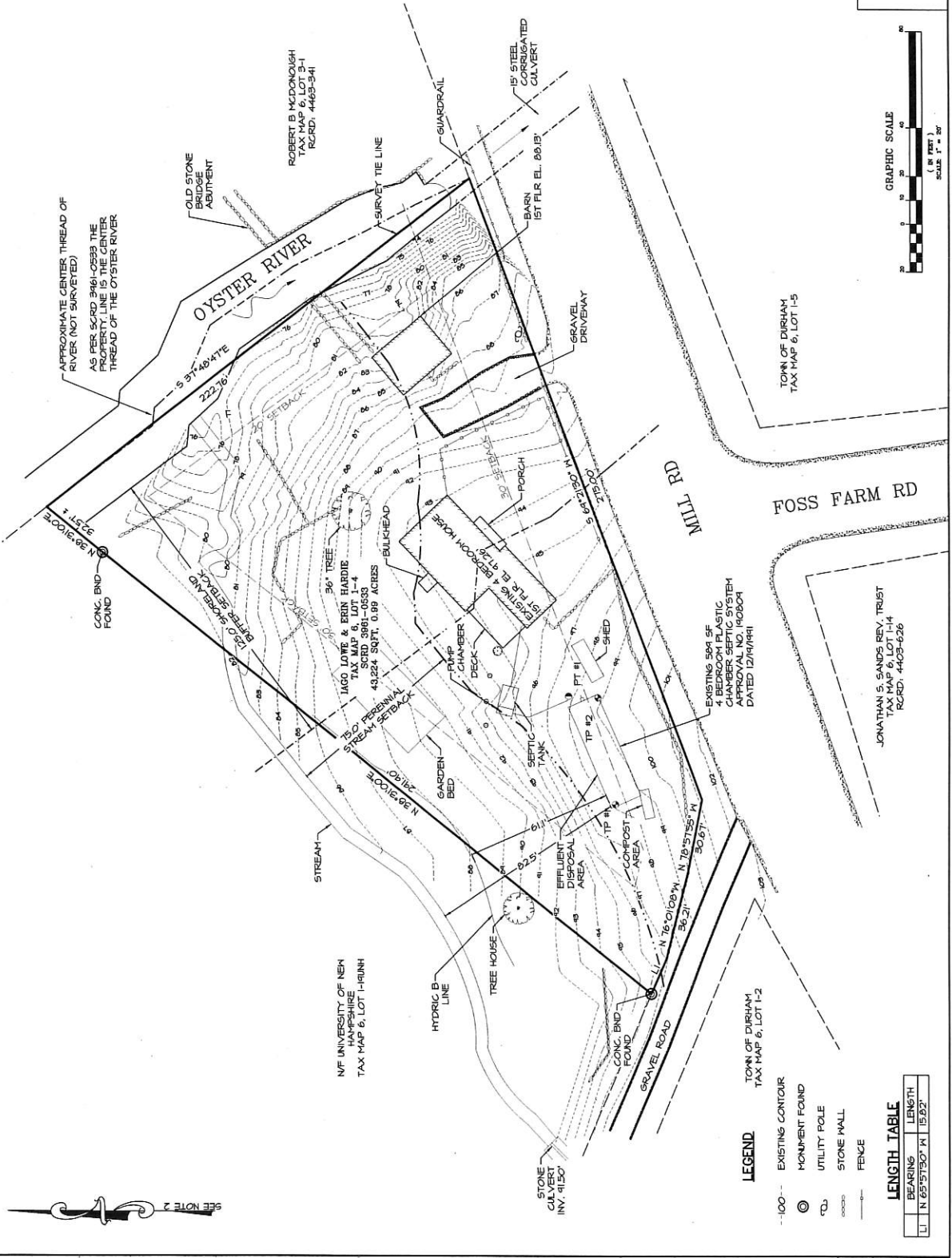
**NOTES**

- 1) OWNER OF RECORD:  
LAGO LONE & ERIN HARDIE  
TAX MAP 6, LOT 1-4  
31 WILSON WAY  
DUNSMITH, NH 03824  
SCRD: 3961-0293  
AREA: 49,224 SF, 0.91 ACRES
- 2) BASIS OF BEARINGS HELD FROM PLAN REFERENCE #1.
- 3) PARCEL IS IN RESIDENCE B (RB) AND SHORELAND PROTECTION OVERLY DISTRICT ZONES.  
MINIMUM LOT AREA.....40000 SF  
MINIMUM LOT WIDTH.....100 FT  
MINIMUM FRONTAGE.....150 FT  
SETBACKS:  
FRONT.....30 FT  
SIDE.....30 FT  
REAR.....30 FT  
SHORELAND BUFFER.....125 FT  
MAXIMUM BUILDING HEIGHT.....30 FT  
MAXIMUM IMPERVIOUS COVERAGE.....30%
- 4) THE PARCEL IS PARTIALLY WITHIN FEMA FLOOD ZONE AE, AS PER FLOOD INSURANCE RATE MAP #800TC0301E PANEL 318 OF 681, DATED SEPTEMBER 30, 2015.

**REFERENCE PLANS**

- 1) "SKETCH OF DANIELS LOT" BY F.E. DREM R.L.S. 375, DATED AUGUST 1980; SCRD 1055-0036

|                                                      |           |                      |
|------------------------------------------------------|-----------|----------------------|
| DATE                                                 | 1/27/2020 | PRELIMINARY          |
| SCALE                                                | 1" = 20'  | DESCRIPTION OF SHEET |
| PROJECT                                              | LOCUS     |                      |
| DRAWN                                                | A.R.S.S.  |                      |
| CHECKED                                              | D.O.D.    |                      |
| DESIGNED                                             |           |                      |
| PROJECT NO.                                          |           |                      |
| <b>ROSS ENGINEERING, LLC</b>                         |           |                      |
| CONSULTING ENGINEERS AND ARCHITECTS                  |           |                      |
| Professional Seal                                    |           |                      |
| 74 MILL ROAD<br>DURHAM, NH 03824                     |           |                      |
| TITLE                                                |           |                      |
| <b>EXISTING CONDITIONS PLAN</b>                      |           |                      |
| 74 MILL RD<br>DURHAM, NH 03824<br>TAX MAP 6, LOT 1-4 |           |                      |
| DATE                                                 | 20-034    | SHEET NO.            |
|                                                      |           | 1 OF 2               |



**LEGEND**

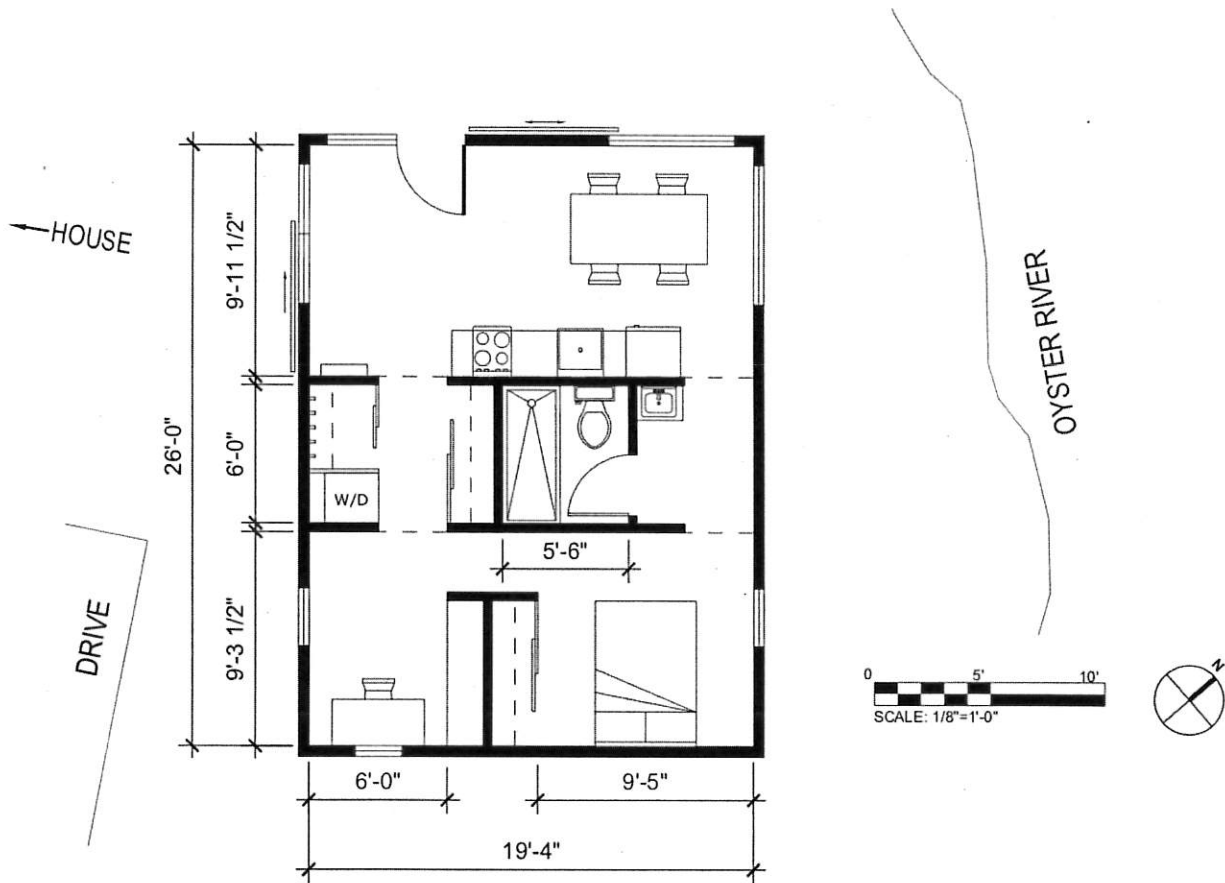
- 100--- EXISTING CONTOUR
- ⊙ MONUMENT FOUND
- ⊙ UTILITY POLE
- STONE MALL
- FENCE

**LENGTH TABLE**

| BEARINGS           | LENGTH |
|--------------------|--------|
| U1 N 65° 51' 30" W | 15.82' |

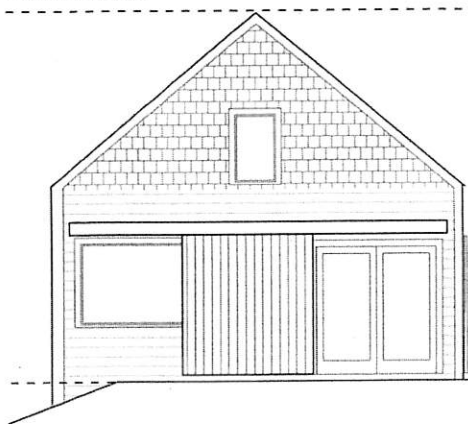
Appendix C – Proposed Floorplan and Elevations – Placework Architects

Proposed Floorplan

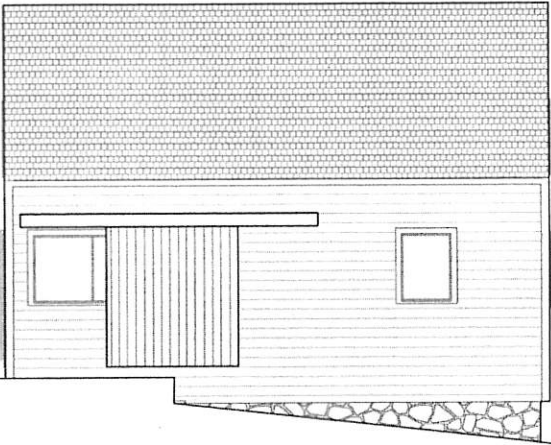


**Proposed Elevations**

Northwest



Southwest

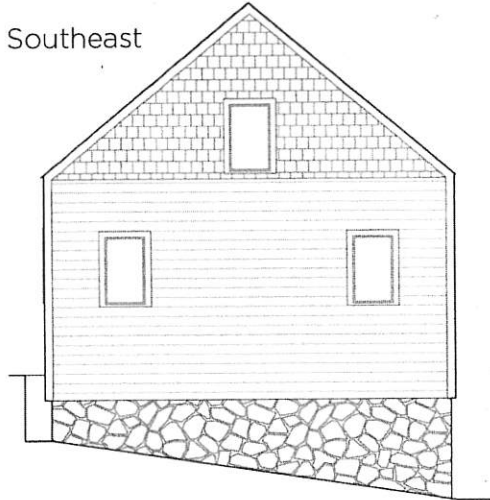


18'-05"±4"

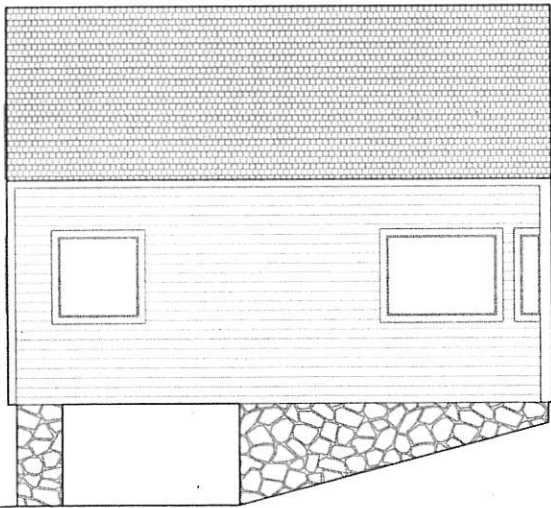
13'-03"±4"

00'-00"

Southeast



Northeast



**Appendix D** – *Septic Plan – Ross Engineering, LLC*

**NOTES**

- 1) OWNER OF RECORD, IAGO LOWE & ERIN HARDIE  
TAX MAP 6, LOT 1-4  
DURHAM, NH 03824  
SCRD. 3461-0293  
AREA. 43,224 SF, 0.99 ACRES
- 2) BASIS OF BEARINGS HELD FROM PLAN REFERENCE #1
- 3) PARCEL IS IN RESIDENCE B (RB) AND SHORELAND PROTECTION OVERLY DISTRICT ZONES.
- 4) MINIMUM SETBACKS:  
MINIMUM FRONT SETBACK.....40,000 SF  
MINIMUM REAR SETBACK.....150 FT  
MINIMUM SIDE SETBACKS:  
FRONT.....30 FT  
REAR.....30 FT  
SHORELAND BUFFER.....125 FT  
MAXIMUM BUILDING HEIGHT.....30 FT  
MAXIMUM IMPERVIOUS COVERAGE.....50%
- 5) COVERAGES:  
LOT COVERAGE.....1.98  
EXISTING LOT COVERAGE.....1.98  
PROPOSED LOT COVERAGE.....1.98  
HOUSE.....1,593 SF  
DECK.....206 SF  
PORCH.....64 SF  
SHED.....102 SF  
ADU.....594 SF  
GRAVEL.....848 SF  
TOTAL LOT COVERAGE.....3,407 SF  
EXISTING LOT COVERAGE.....1.98  
PROPOSED LOT COVERAGE.....1.98
- 6) THE PARCEL IS PARTIALLY WITHIN FEMA FLOOD ZONE AE, AS PER FLOOD INSURANCE RATE MAP (FIRM) NUMBER 19050-0101B, DATED SEPTEMBER 24, 2015.

**REFERENCE PLANS**

- 1) SKETCH OF DANIELS LOT BY E.E. DREHM R.L.S. 975 DATED AUGUST 1860. SCRD. 1055-0293

THE PURPOSE OF THIS PLAN IS TO DEPICT THE CONVERSION OF AN EXISTING BARN INTO AN ADU AND CONNECTING IT TO A NEW SEPTIC SYSTEM. SITE IMPROVEMENTS INCLUDE:

- 1) REMOVING A 30 YEAR OLD TRADITIONAL SEPTIC SYSTEM AND REPLACING IT WITH AN ON SITE SOLUTIONS SYSTEM WITH SECONDARY TREATMENT WHICH WILL RESULT IN SIGNIFICANTLY CLEANER EFFLUENT.
- 2) A SMALLER EFFLUENT DISPOSAL AREA MINIMIZING THE IMPACT TO THE SITE.
- 3) MOVING THE EFFLUENT DISPOSAL AREA 117' FURTHER AWAY FROM THE STREAM AND 71' FURTHER AWAY FROM THE HYDRIC B SOILS.

| NO. | DESCRIPTION           | AMOUNT |
|-----|-----------------------|--------|
| 1   | EXISTING LOT COVERAGE | 1.98   |
| 2   | PROPOSED LOT COVERAGE | 1.98   |

| NO. | DESCRIPTION           | AMOUNT   |
|-----|-----------------------|----------|
| 1   | HOUSE                 | 1,593 SF |
| 2   | DECK                  | 206 SF   |
| 3   | PORCH                 | 64 SF    |
| 4   | SHED                  | 102 SF   |
| 5   | ADU                   | 594 SF   |
| 6   | GRAVEL                | 848 SF   |
| 7   | TOTAL LOT COVERAGE    | 3,407 SF |
| 8   | EXISTING LOT COVERAGE | 1.98     |
| 9   | PROPOSED LOT COVERAGE | 1.98     |

**SOIL DATA**

Performed on 11-27-1991 by JAMES E. SHEPARD  
Witnessed by BOB STEFAN  
ELEV. 105.00 Date: 11-27-1991  
Observed Ground Water @ NONE  
Roots @ NONE  
Seasonal High Ground Water @ NONE  
Moisture @ 30% Date: 11-27-1991  
Performed by JAMES E. SHEPARD  
Depth: 30" Rate: 8 MIN/INCH  
TEST BIT # 2 Date: 11-27-91  
ELEV. 87.50  
Observed Ground Water @ NONE  
Roots @ NONE  
Seasonal High Ground Water @ NONE (Moisture) @ 50%

| NO. | DESCRIPTION | AMOUNT                             |
|-----|-------------|------------------------------------|
| 1   | 0-3"        | TO THE SANDY LOAM GRANULAR FRIABLE |
| 2   | 3-20"       | TO THE SANDY LOAM GRANULAR FRIABLE |
| 3   | 20-30"      | TO THE SANDY LOAM GRANULAR FRIABLE |

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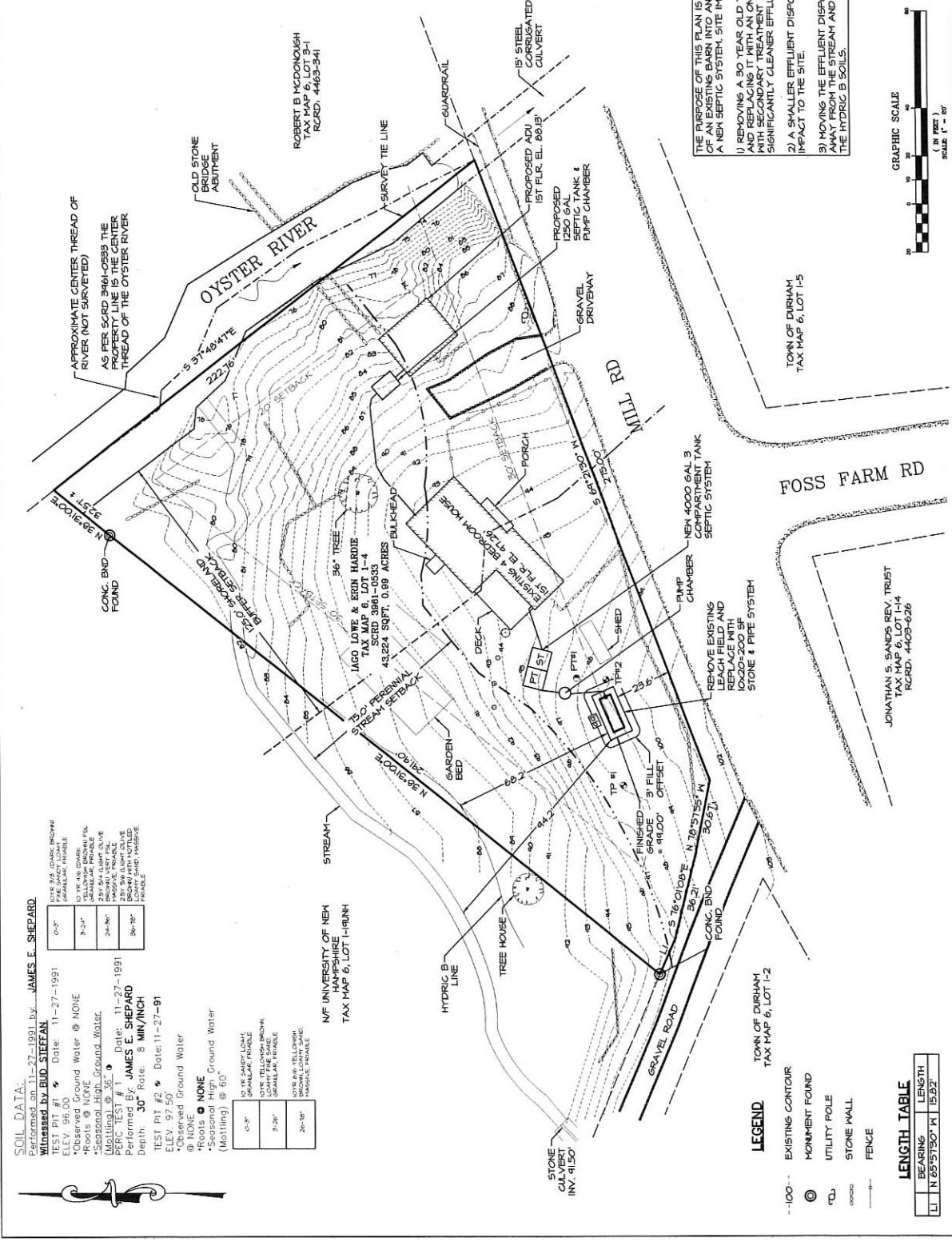
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**LEGEND**

- 100-- EXISTING CONTOUR
- MONUMENT FOUND
- UTILITY POLE
- STONE WALL
- FENCE

**LENGTH TABLE**

| LI | BEARING       | LENGTH |
|----|---------------|--------|
| 1  | N 65°57'30" W | 15.92' |

**SITE PLAN**

74 MILL RD  
DURHAM NH 03824  
TAX MAP 6, LOT 1-4  
20-034 2 OF 2

| NO. | DESCRIPTION           | AMOUNT |
|-----|-----------------------|--------|
| 1   | EXISTING LOT COVERAGE | 1.98   |
| 2   | PROPOSED LOT COVERAGE | 1.98   |

| NO. | DESCRIPTION           | AMOUNT   |
|-----|-----------------------|----------|
| 1   | HOUSE                 | 1,593 SF |
| 2   | DECK                  | 206 SF   |
| 3   | PORCH                 | 64 SF    |
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**Appendix E** – *Information about Advanced Onsite Solutions septic systems*





## ADVANCED ONSITE SOLUTIONS LLC

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

### 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.



## ADVANCED ONSITE SOLUTIONS LLC

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### 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.

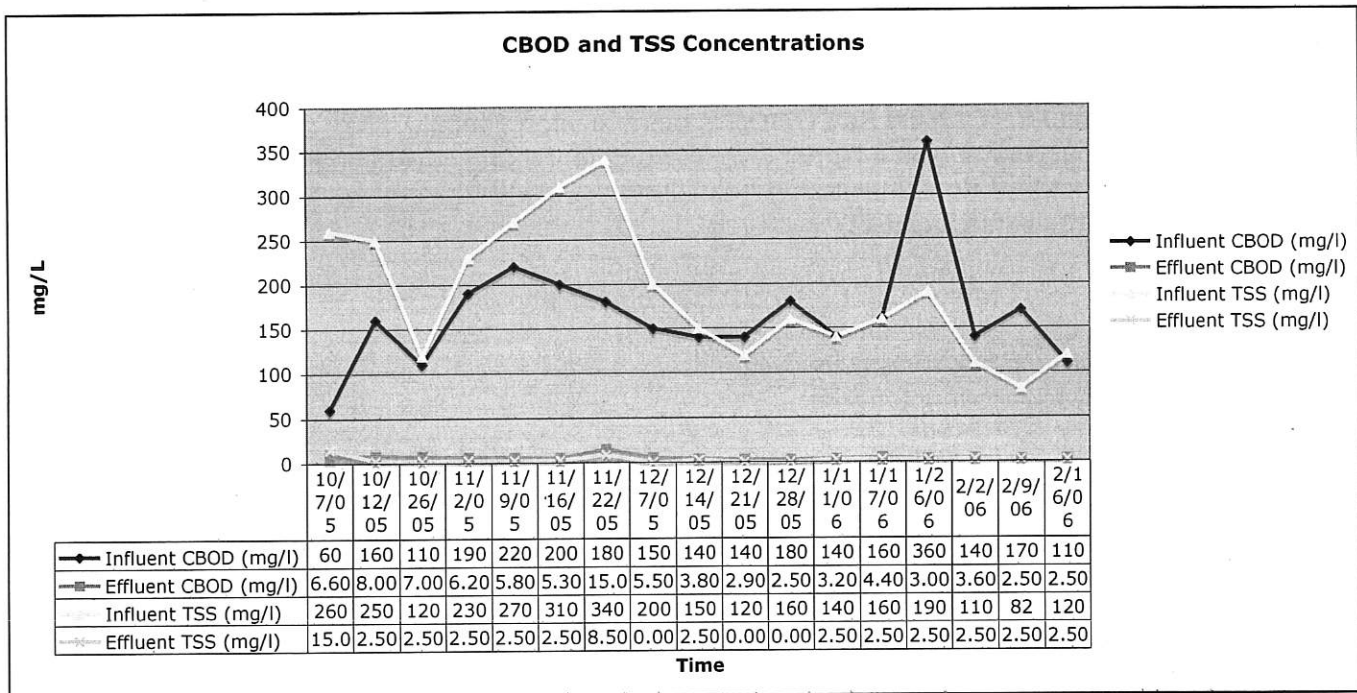
#### Restaurants

- **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.



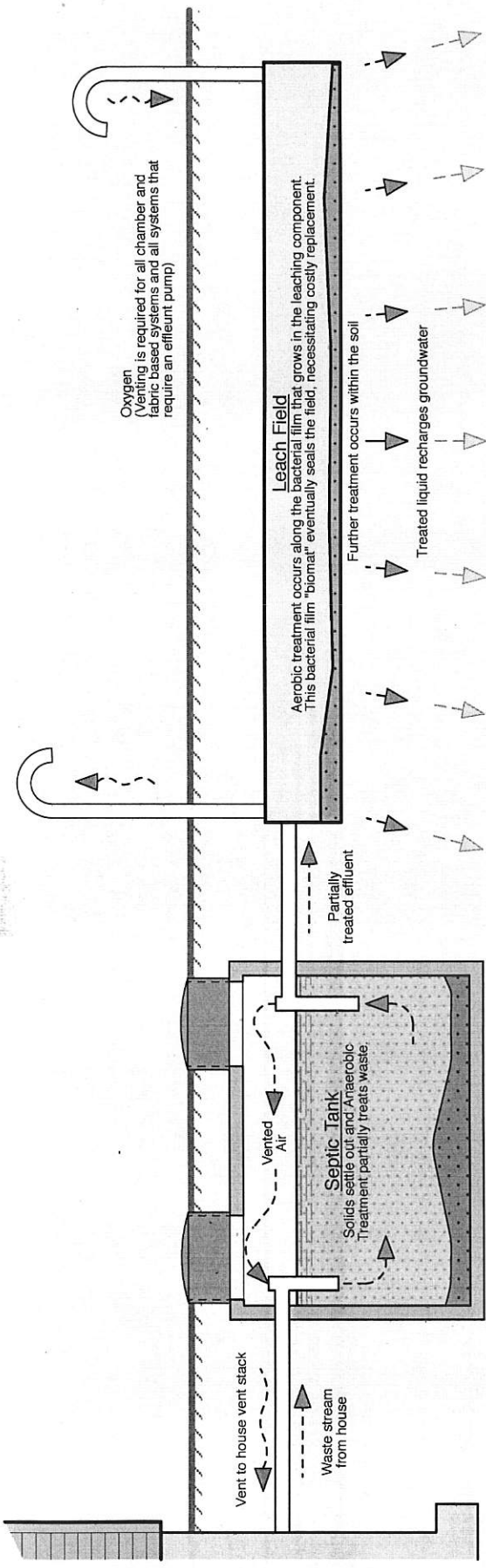
## INDEPENDENT TEST RESULTS

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.



Oxygen  
(Venting is required for all chamber and fabric based systems and all systems that require an effluent pump)

**Leach Field**

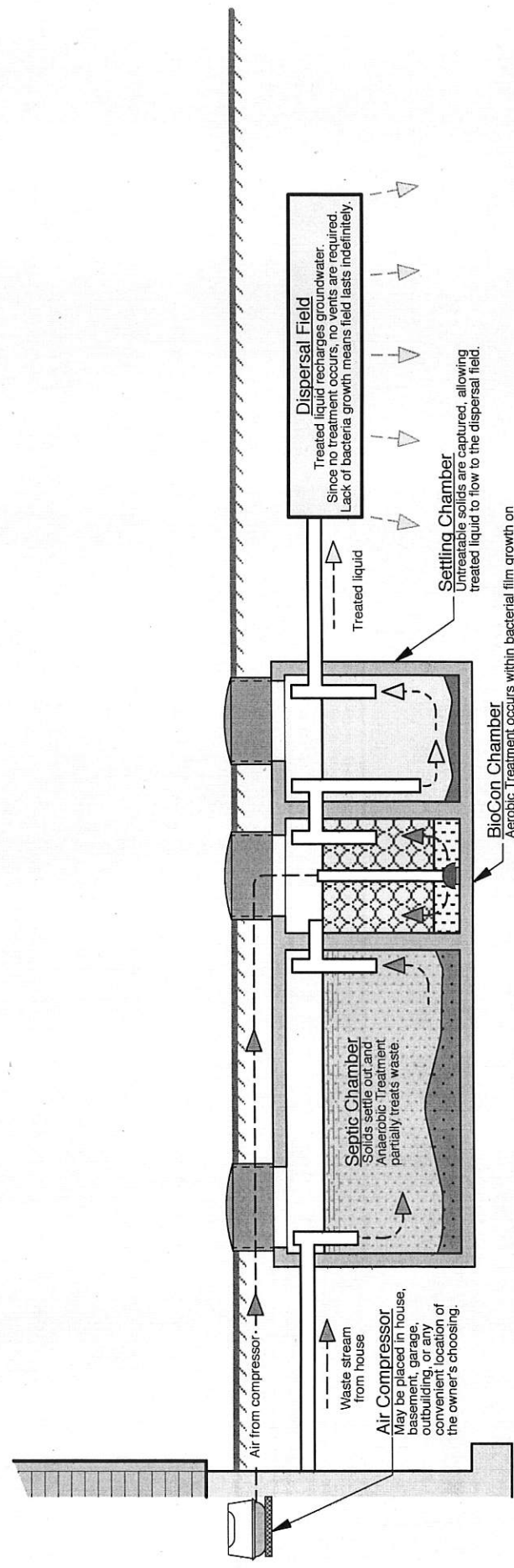
Aerobic treatment occurs along the bacterial film that grows in the leaching component. This bacterial film "biomat" eventually seals the field, necessitating costly replacement.

Further treatment occurs within the soil

Treated liquid recharges groundwater

**CONVENTIONAL LEACH FIELD SEPTIC SYSTEM**

Treatment occurs within the leach field components, whether fabric wrapped pipes or mats, concrete or plastic chambers or traditional pipe & stone.



**Dispersal Field**

Treated liquid recharges groundwater. Since no treatment occurs, no vents are required. Lack of bacteria growth means field lasts indefinitely.

**Settling Chamber**

Untreatable solids are captured, allowing treated liquid to flow to the dispersal field.

**BioCon Chamber**

Aerobic Treatment occurs within bacterial film growth on the plastic media. Air is pumped in by the compressor, providing dissolved oxygen for the bacteria.

**Air Compressor**

May be placed in house, basement, garage, outbuilding, or any convenient location of the owner's choosing.

**THE CLEAN SOLUTION™ ALTERNATIVE SEPTIC SYSTEM**

Treatment occurs within the BioCon™ Aerobic treatment chamber, allowing for a dispersal area smaller than a leach field.



**Advanced Onsite Solutions LLC**  
*innovative wastewater solutions with sustainable results*  
 P.O. Box 248  
 Canterbury, NH 03224  
 Phone 603.783-8042  
 www.thecleansolution.com