Pipe Cameras

Appropriate usage to assist with a Title 5 Inspection

Introduction

Andrew Curtis Inspector # 47

- President of MSSPA (MA Septic Service Providers Association)
- Working in the septic industry for over 40 years
- Licensed Title 5 inspector since 1995 (around 10,000 inspections personally, 30,000 by the company)
- Licensed to repair and maintain systems in about 80 towns in Massachusetts
- Grade 2 treatment plant operator
- Worked with 6 of the approved IA technology companies from sales to training

Objective

- To understand when using pipe cameras during a Title 5 inspection is appropriate and when it is not
- To Promote consistent techniques and results

Types of Cameras Used

RIDGID M40 SeeSnake

- Self-leveling 25mm camera
- Pipe capacity – 1.5” through 8”
- HDR image sensor and TiltSense inclinometer provides angle of the camera head inside the pipe
- Locator is **RIDGID NaviTrack Scout Locator** (512 HZ FLEXMITTER)

Mytana portable cameras (several different models)

iPad (9th Generation) for Monitor

Potential Uses of Pipe Camera

We will discuss the following uses of pipe cameras in Title 5 Inspections

- Inspecting the sewer pipe
  - House to tank
  - Tank to the distribution box
- Inspecting the distribution box
- Inspecting the SAS
  - Condition of SAS
  - Location & Depth of SAS
  - Measuring setbacks

Pipe Inspection:
House to Tank & Tank to D-Box

Pg 9 of Title 5 Official Inspection Form – Building Sewer

- Depth below grade
- Material of Construction
  - Cast Iron, SDR35, SCH40, Orangeburg, Clay, other _____
- Distance from private water supply well or suction line.
- Condition of joints, venting, evidence of leakage, etc.

DEPTH

Modern electronic locating equipment is very accurate when used properly

Types of Pipe commonly used in septic systems over the years

Inspectors should be familiar with the different types of pipes and the characteristics of each

Clay Sewer Pipe

- Typically 1960's and earlier
- Holds up pretty well
- When it fails, it usually cracks or splits
- Can have multiple low spots/ sags due to usually being installed in 3' sections

Orangeburg Sewer Pipe

- Layers of ground wood pulp fibers and asbestos fibers mixed with liquified coal and tar pitch
- Typically pre-1970
- When it fails, it tends to delaminate or flatten
- Sometimes appearing totally round on the outside, but very deformed on the inside
- Camera is very helpful with this type of pipe

Cast Iron Sewer Pipe & SCH40 PVC

- Homes pre-1970 that have been upgraded expect to see cast iron changing over to PVC
- Cast iron inside diameter tends to get smaller and smaller as it ages, often can only be seen by looking inside the pipe

SDR35 & SCH40 Solid & Perforated

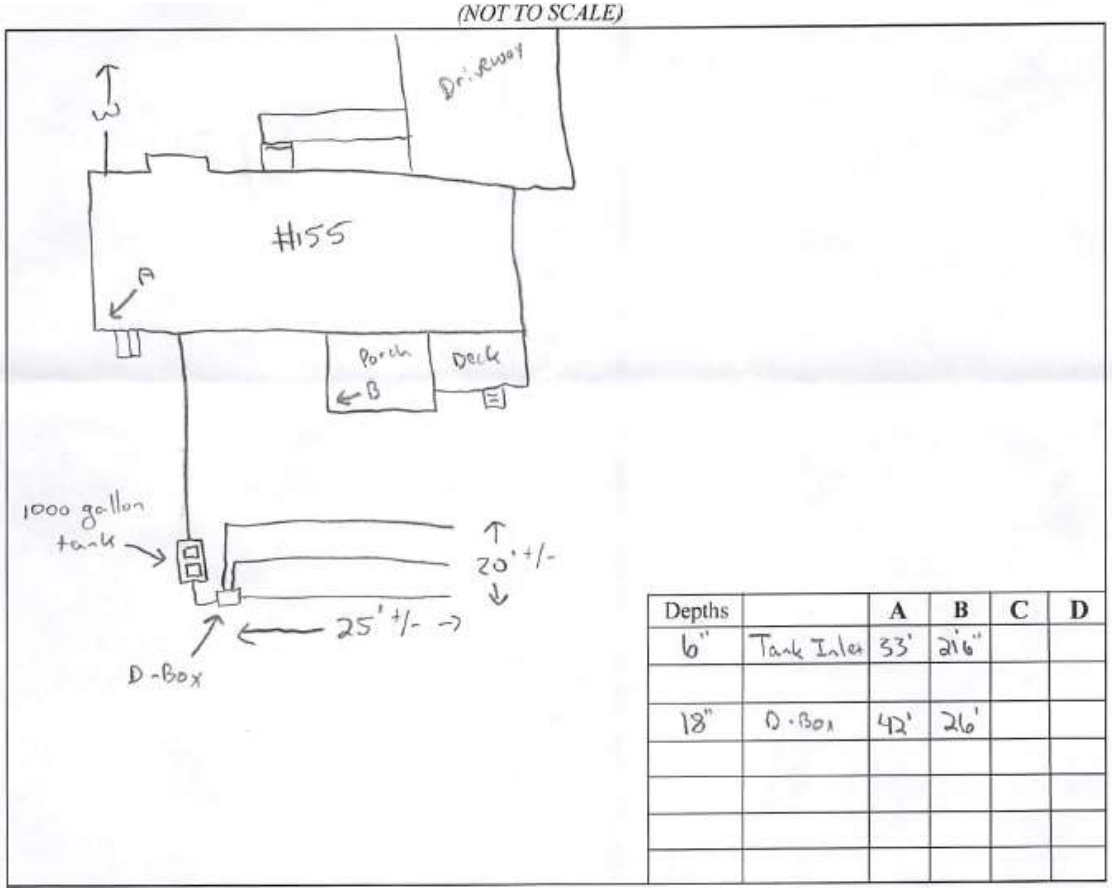
- Used on almost all septic systems since approximately 1970
- Corrosion resistant
- Lightweight, easy to work with
- Can have sags/ dips in pipes when not properly backfilled during an installation

Distance from private water supply well or suction line (Locate on site plan)

- No setback when doing a Title 5 Inspection
- 10’ minimum on new constuction

Site Plan Diagram

(NOT TO SCALE)

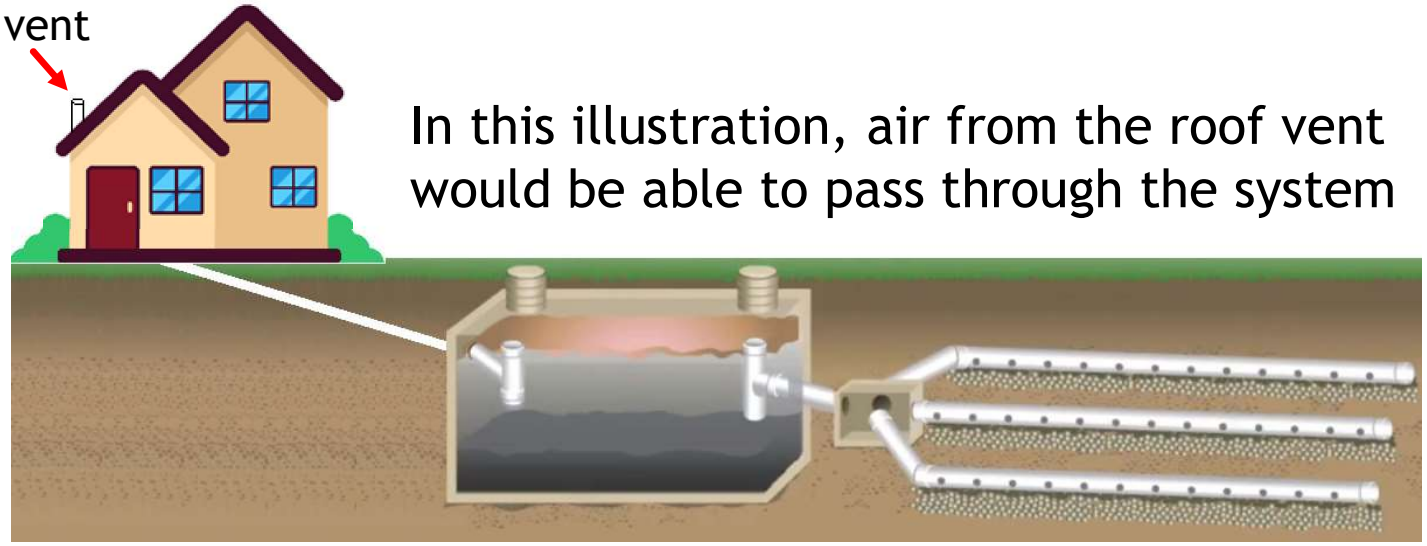


Depths		A	B	C	D
6"	Tank Inlet	33'	216"		
18"	D-Box	42'	216'		

Pipe Inspection:
House to Tank & Tank to D-Box

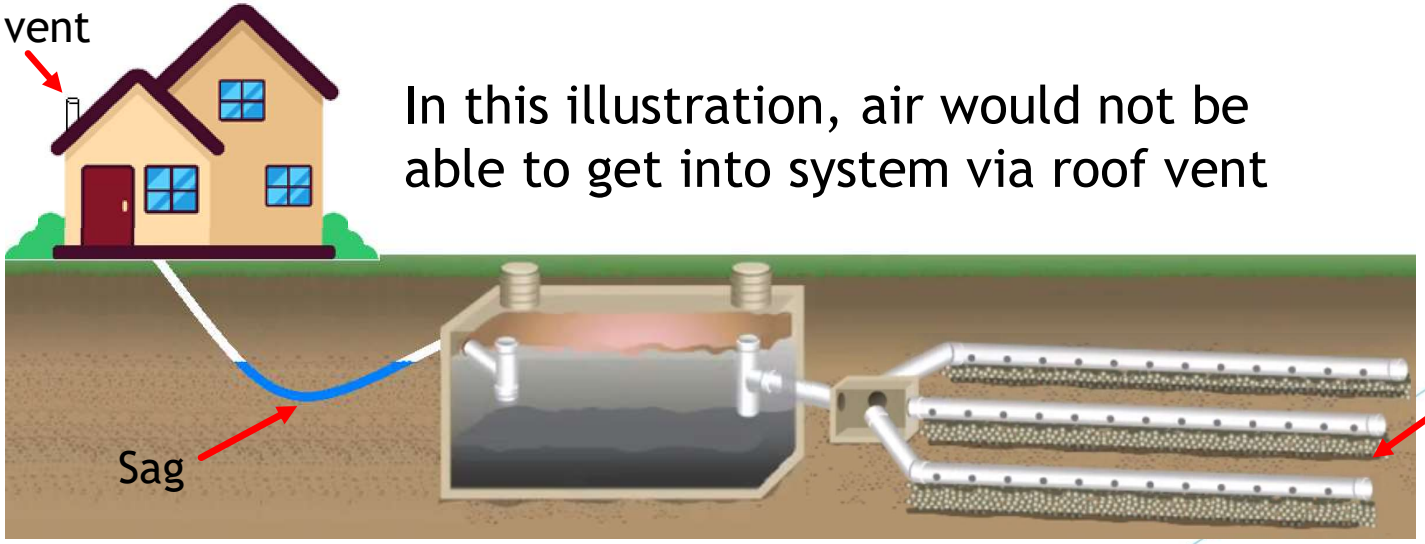
- Flat spot & sags in main line can cause solids to be left behind, leading to blockage.
- Can allow pipes to freeze
- Sags or low spots in the pipe can obstruct extremely important airflow into the system. Without atmospheric oxygen, systems will go anaerobic and develop biomat causing SAS to go into hydraulic failure. (NOTE: Biomat is the #1 cause of failure in septic systems)

Roof vent



In this illustration, air from the roof vent would be able to pass through the system

Roof vent



In this illustration, air would not be able to get into system via roof vent

Pipe Inspection: House to Tank

Pipe Inspection: House to Tank

Pipe Inspection: Tank to D-Box

Pipe Inspection:
House to Tank & Tank to D-Box

CONCLUSION:

APPROPRIATE USAGE OF CAMERA

Distribution Box Inspection

- Water level appears high
- Box structure appears OK

D-Box Inspection

Distribution Box Inspection

- Hydrosulfide rot is very common

Distribution Box Inspection

After flow regulator dials were removed

Distribution Box Inspection

- Distribution box is not water-tight, some off the effluent may not get secondary treatment

- Is it just surface rot? (possibly make note of condition.)
  Example – "D-box is brittle, but not leaking at the time of inspection"

OR

- Is the box structurally unsound or leaking? (conditional pass)
  Example "D-box rotted, needs to be replaced"
- Be sure to consult with Board of Health & get necessary permits before making any repairs

Distribution Box Inspection

Page 12 of Title 5 Report (revision 7/26/18)

- Distibution Box (If present must be opened) (locate on site plan -*pg 16 diagram*)
- Depth of liquid level above outlet invert _____
- Comments (note if box is level and distribution to outlets equal, any evidence of solids carryover, any evidence or leakage into or out of box, etc)

Distribution Box Inspection

- 310 CMR: 15.302 (1)
  - "**At a minimum, the septic tank and distribution box, if present, or cesspool, if present, shall be located, uncovered and inspected**, and reasonable professional efforts shall be made to locate and identify other components and features, as described in 310 CMR 15.302(2) and (3)"
- DEP document "Guidance for the Inspection of On-site Sewage Disposal Systems"
  - In the *Inspection Procedure: Distribution Box* section: **"Expose and remove cover."**

Distribution Box Inspection

CONCLUSION:

CAMERA INSPECTION NOT ADEQUATE FOR DISTRIBUTION BOX INSPECTION

Distribution Box Pictures

- Including a picture of the distribution box in your report works as great evidence of what the working level and the structure of the box was at the time of the inspection. This can prove to be helpful if anyone ever questions your findings.

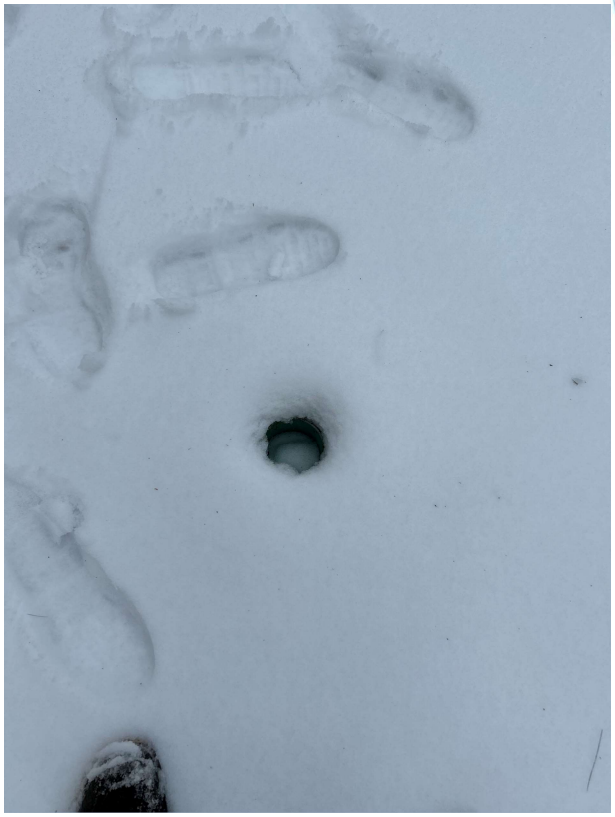
SAS Inspection: Condition

- From DEP document “Guidance for the Inspection of On-site Sewage Disposal Systems”
  - “It is extremely important that the inspector locate the leaching system. However, excavation of the soil absorption system, once it is located, is typically NOT required. It may be appropriate to expose a portion of the soil absorption system (especially if the leaching system is a pit) to determine its condition if other indications of failure, such as evidence of breakout, ponding; sewage backup, condition of the distribution box, etc., suggest that a failure of the soil absorption system may have occurred."
- Camera inspection of SAS can often avoid excavation

Leach Pit: Determining Liquid Level

Leaching Lines: Debris in Line

Vent Pipe Missing



- Leaves, acorns and other debris obstructing airflow will shorten the lifespan of the system
- Should be a conditional pass – be sure to consult with Board of Health and get necessary permits if necessary

Inspecting a Leaching Galley

Leach Pit with Root Infiltration

Light root problem, appears to be coming in from cover on top of pit

- Should nearby trees or bushes be removed to prevent problem from getting worse?
- This could be a note or if more severe could be a conditional pass allowing board of health to make a decision on a remedy.

Advanced Root Problem

Failure or Conditional Pass, depending on how extensive the root problem is.

Also depends on what pipe the roots are in (house to tank, tank to d-box, header pipes or is it throughout the entire SAS

Advanced Root Problem

- Establishing how severe the root problem is very important.
- Can roots be removed with drain cleaning equipment and/or replacing sections of pipe and making pipes **water-tight**.
- Often times, tree(s) or bush(es) will need to be removed to prevent re-occurrence.
- Always consult with Board of Health and obtain necessary permits before commencing any work.

Best Professional Judgement

Locating SAS

- “Excavation is not required” (or is it?)

“Excavation is not required” (or is it?)

- From 310 CMR: 15.302 (5)
  - “Location of Soil Absorption System. The location of any cesspool must be determined. For systems with a septic tank and distribution box, excavation is not required to determine the location of the soil absorption system. Reference may be made to as-built plans of the system (if any). All components of the soil absorption system shall be located where the failure criteria specified in 310 CMR 15.303(1) are triggered. Where the failure criteria specified in 310 CMR 15.303(1) are not triggered, the location may be approximated by considering design flow, location of the distribution box and direction of outlet pipes, and physical condition of the site. The location may also be determined by running a metal snake or similar device from the outlet of the distribution box and using a metal detector, or use of similar methods. Nothing in 310 CMR 15.302(5) shall prevent an owner from choosing to establish the location of the leaching system through more intrusive methods.”

Setbacks from SAS

From 310 CMR: 15.303 (1)

- (c) Evaluation of systems with septic tanks and soil absorption systems near drinking water supplies: If any portion of the soil absorption system is within any of the dimensional criteria listed in 310 CMR 15.303(1)(c), unless the Approving Authority in its professional judgment, with the concurrence of the public water supplier, if any, determines the system is functioning in a manner to protect the public health and safety, welfare and the environment.
  - 1. within 100 feet of a surface water supply or tributary to a surface water supply;
  - 2. within a Zone I of a public well;
  - 3. within 50 feet of a private water supply well;
  - 4. less than 100 feet but 50 feet or more from a private water supply well, unless a well water analysis, conducted at a laboratory that is certified by the Department for the parameters analyzed, indicates an absence of fecal coliform bacteria, and the presence of ammonia nitrogen and nitrate nitrogen is equal to or less than 5 ppm. The laboratory's sampling protocols shall be followed and its chain of custody forms shall be signed and completed. If water well analysis is conducted, the System Inspector shall attach a copy of the chain of custody forms and the laboratory results to the System Inspection Form.

These setbacks are pass & fail questions

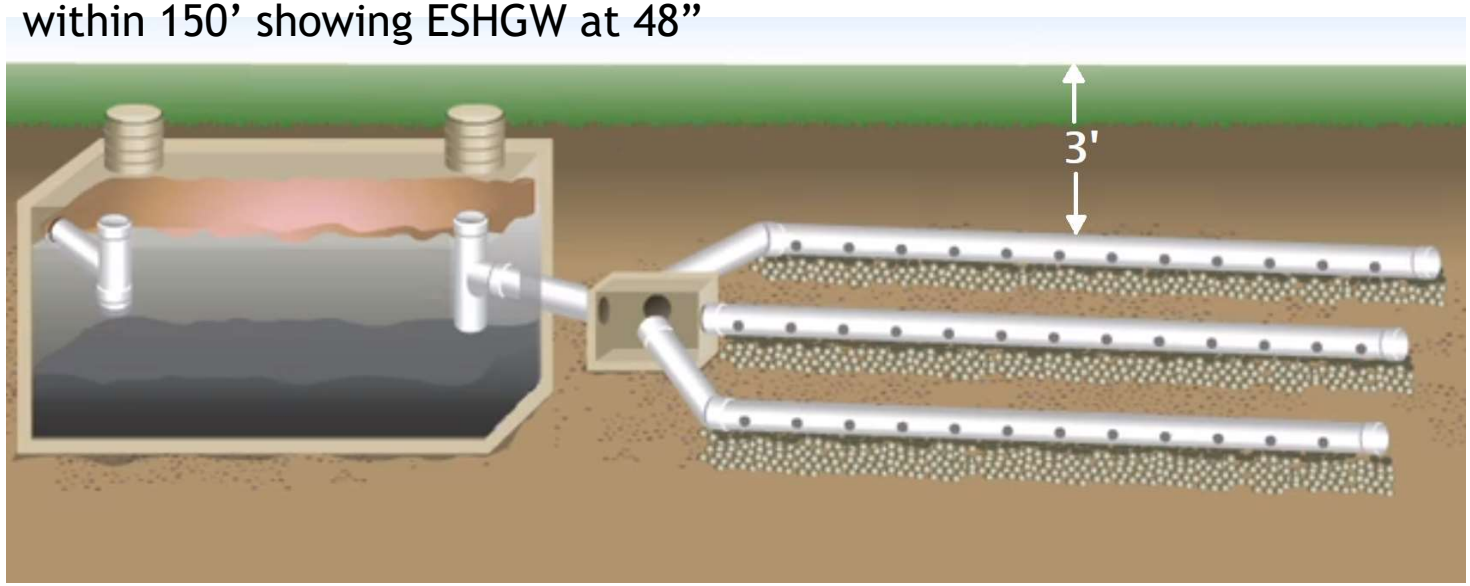
Using Camera & Locator to layout system to determine setbacks

When is excavation required?

- Excavation of part of the SAS may be required to determine the bottom of the system in relation to high groundwater. (when plans for subject property are not available)
- Excavation of edge of SAS may be required to determine horizontal setbacks such as; offset to well or surface water supply or tributary to such.

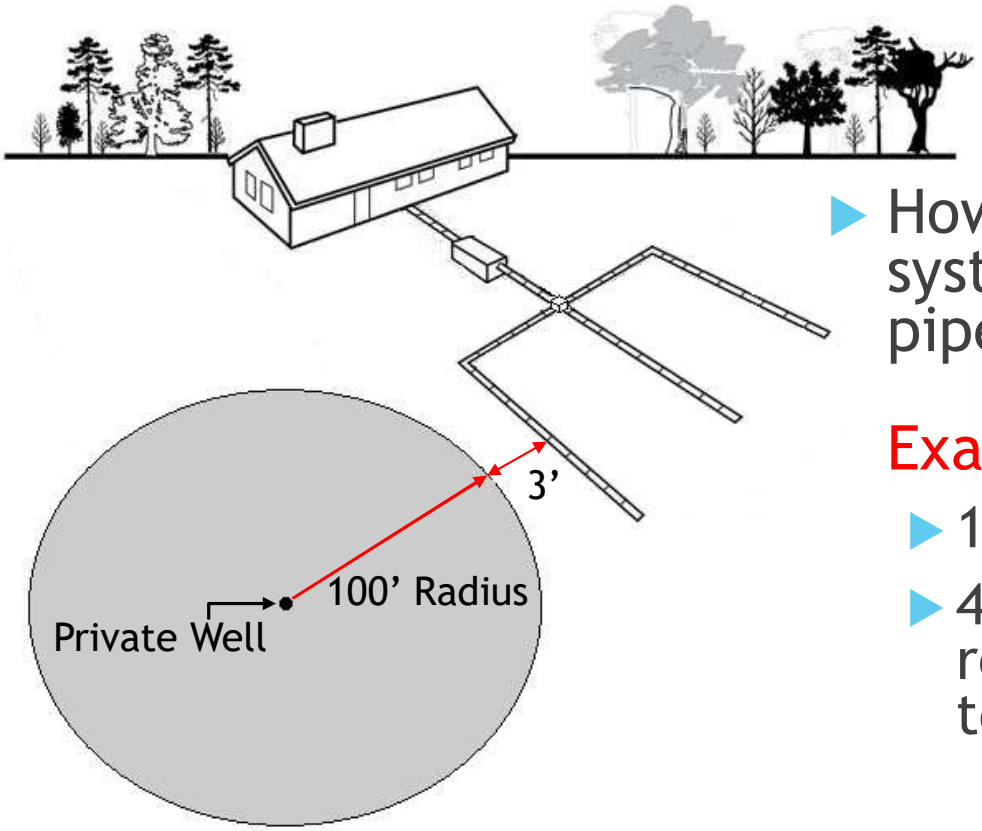
Example #1: When excavation of SAS will be required (if no plan is available)

*Assuming only document available is test hole data from an abutter within 150' showing ESHGW at 48"



- How much stone is under perforated pipe?
  - 6" = Pass 24" = Fail
- Note: If plan is pre-1995, estimated seasonal high groundwater is most likely not accurate
- If ESHGW from abutters or any other estimation technique causes the system to fail, a qualified soil evaluator should be brought in to confirm findings.

Example #2: When excavation of SAS will be required (if no plan is available)



- How much stone or system sand is around pipe?

Example

- 1’ of stone = Pass
- 4’ of stone = Would require well to be tested

SAS Inspection: Condition, Depth & Location

CONCLUSION:

EXCAVATION MAY BE REQUIRED