2025 Certified Installer Training Day 2 - Refresher

Division of Water Engineering Support and Plan Review Section

March 21, 2025

Introduction

- Course Instructor: Ryan Peterson, Environmental Program Specialist, DEC-ESPR
- Course Instructor 2: Tonya Bear, PE, Environmental Program Manager and Engineer, DEC-ESPR

- Training is for the 2025 Refresher Certified Installer course for the installation of conventional onsite wastewater disposal systems

DEC Staff Contacts

- Ryan Peterson
  - Lead for onsite wastewater system registrations
  - Grades Exams, issues certifications
  - Specializes in areas covered by the Soldotna and Juneau offices
- Tony Sonoda
  - Manages class registration
  - Specializes in areas covered by the Fairbanks office
- Martha Harrison
  - Specializes in areas covered by the Wasilla office
- Tonya Bear, PE
  - ESPR Section Manager
  - Specializes in all areas in the State of Alaska

- Engineers in the Engineering Support and Plan Review section may also be contacted with questions and will provide any approvals needed for installations that do not meet the prescriptive requirements
  - https://dec.alaska.gov/water/wastewater/engineering/area-offices

Agenda

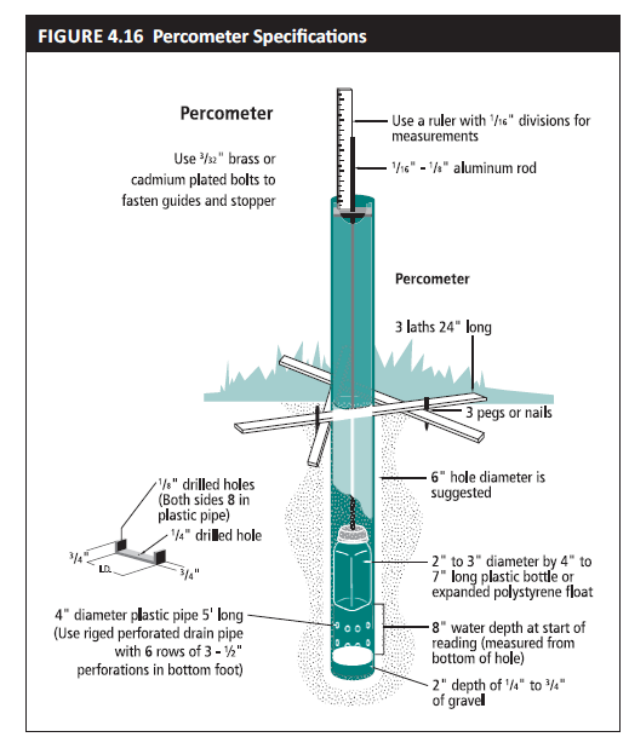
- Introduction and General Admin
- Pressure Distribution Presentation – Dave Wilfong (Q&A)
- OWSIM & 18 AAC 72 Changes
- Soils Refresher, Soils Class, & Percolation Tests
- Common Themes
- DOC Reminders
- Open Discussion and Questions and Answers

Course Completion

- Tests and course attendance forms will be emailed out after the conclusion of this class
- Test and attendance forms **must be submitted by March 31st**
- **If you are exempt but not submitted the exempt letter you must submit that ASAP or take the test.**
- Those installers who have submitted the exempt form will be emailed a course attendance verification form
- Forms received after the due date will not be graded unless a specific exception has been asked for and granted

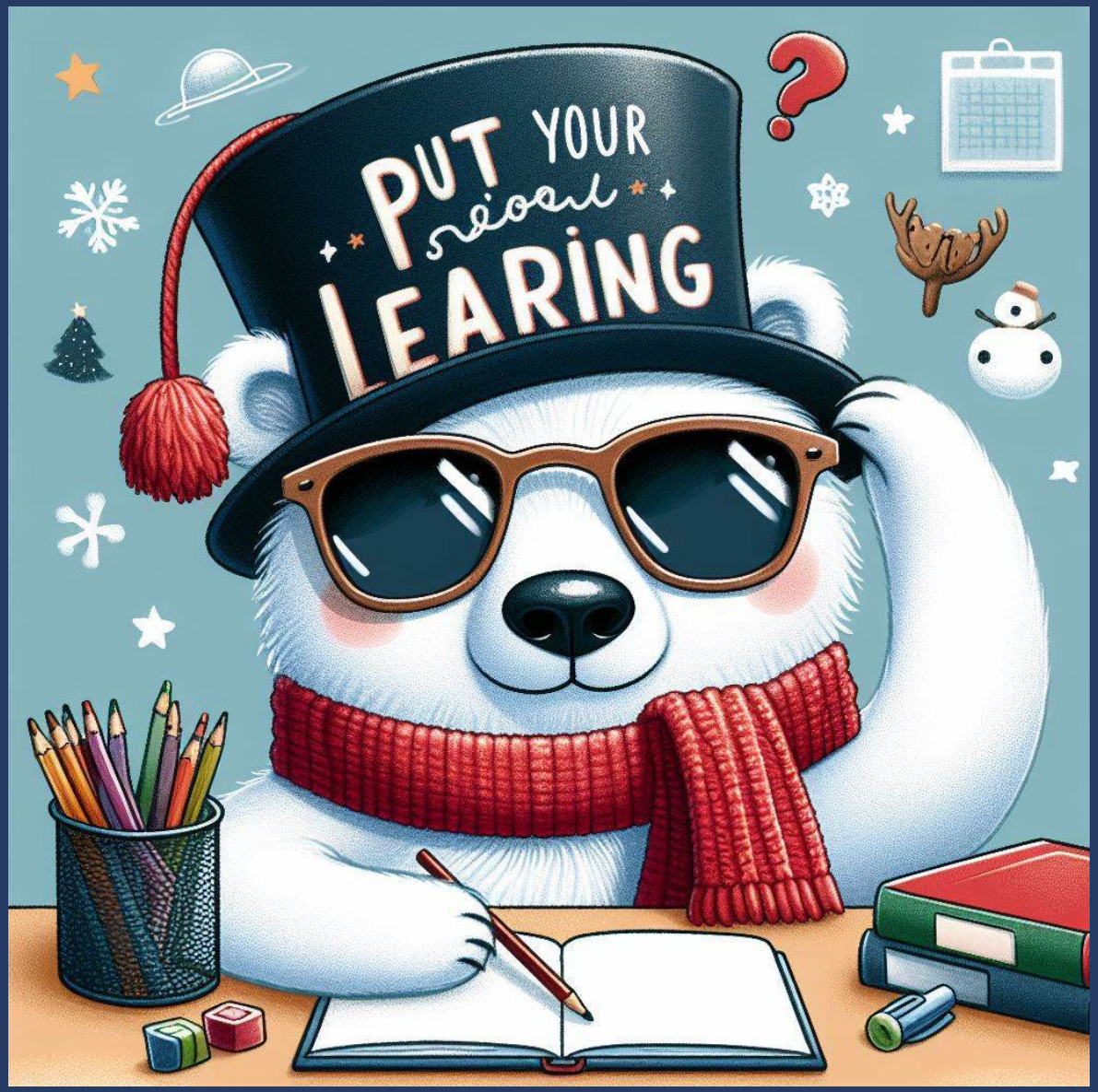
Percolation Tests & In person Soil Class

OWSIM 2.8.2



Onsite Sewage Treatment Program, University of Minnesota. 2020. Manual for Septic System Professionals in Minnesota, 4th Ed. St. Paul, MN.

- *NEW: percolation tests may be performed by a CI for systems that are installed under your certification (previously required by DEC regulations to be performed by a registered professional engineer)
- The in-person soils course will teach certified installers how to perform a percolation tests
- The in-person field course is tentatively scheduled for May/June of this year.
- If you are doing a percolation test prior to taking the soils course, you must contact DEC staff to go over the procedures.


PUT YOUR
LEARING

Pressure Distribution

- Pressure distribution presentation by Dave Wilfong, DEC Wastewater Engineer

OWSIM Changes

- From April 1, 2024 through present, no changes have occurred to the OWSIM.
- As noted, the OWSIM changes to the OWSIM Technical Guidance and Approved Best Management Practices
- The intent of this change was to provide a one stop manual for the installation of onsite wastewater disposal systems for the State of Alaska
  - Important reminder, when installing an onsite system under the direction of an engineer under the ABR process, you must install that system per their specifications. The engineer must submit the 24-hour notification and photos are now required for these systems to be submitted by the engineer!
  - Second important reminder, when a system is being installed where multiple qualified parties may be utilized, it must be determined who will be the qualified person.

OWSIM Changes

- More often and frequent changes in the OWSIM. Important to know where we were and where we are today!
- Change takes time to and learning to grow. It is understood and have an open conversations to facilitate this growth

18 AAC 72 and OWSIM Changes

- **To the point, the changes in the regulatory requirements and the OWSIM are covered in this training briefly and cover the "high points". As a Certified Installer you must familiarize yourself with the new changes by reading and understanding the new OWSIM.** If you need a new copy of the manual to read and review please stop by your local area office. Recommended to call in advance as sometimes staff need to print copies of the manual!

OWSIM Technical Review Committee

- The OWSIM is now managed and developed by a technical review committee. If you have interest in joining the technical review committee (strongly encouraged, counts for test exemption credit for Certified Installers) please contact Tonya Bear the ESPR section manager
- Would you like any specific topic added to the OWSIM? Email suggestions!

OWSIM Updates 1.5

- Existing Systems, Non-conforming systems, and change of use

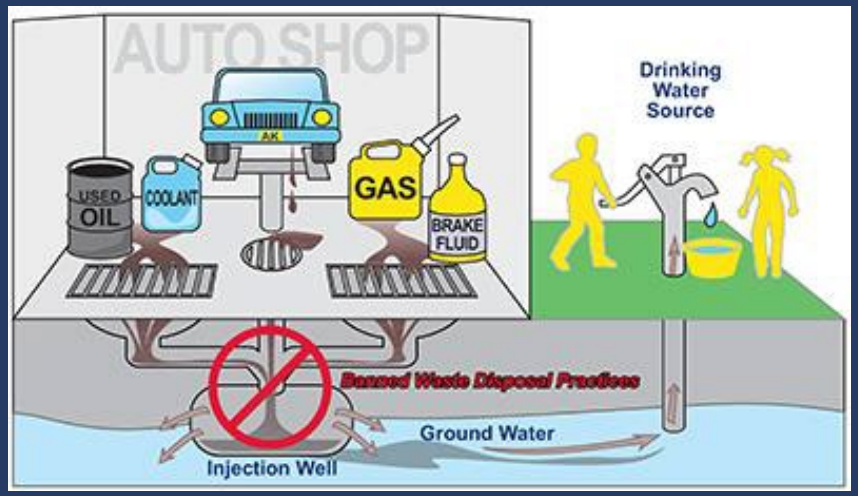
This section expanded and clarified many of the existing onsite system requirements. If doing an installation in these scenarios (such as a real estate transaction), this is the go to section for the OWSIM Best Management Practices requirements. **Includes updated decommissioning procedures.**

Installation Reminders

- Decommissioning procedures listed in the **OWSIM 1.5.2** are required by the OWSIM and the UPC.

OWSIM Updated 1.7

- Underground Injection Control (UIC) Wells
- EPA considers everything a motor vehicle injection well besides a single residential dwelling. For that reason, floor drains are inquired about on every multi-family dwelling, commercial facility, etc. In addition to, this is the reason DEC strongly discourages floor drains in all situations
- Important note: this may impact your own shops system. Please carefully read and understand this section.



Systems that can be done by a CI

OWSIM 2.2.2

- Private Residence Definition
- Multi-Family-Dwellings
  - Single multi-family dwelling with no more than four residential units.
- Small Commercial Facilities (**single building** daily flows less than 500 gpd) On lot wastewater must be less than 1500 gpd

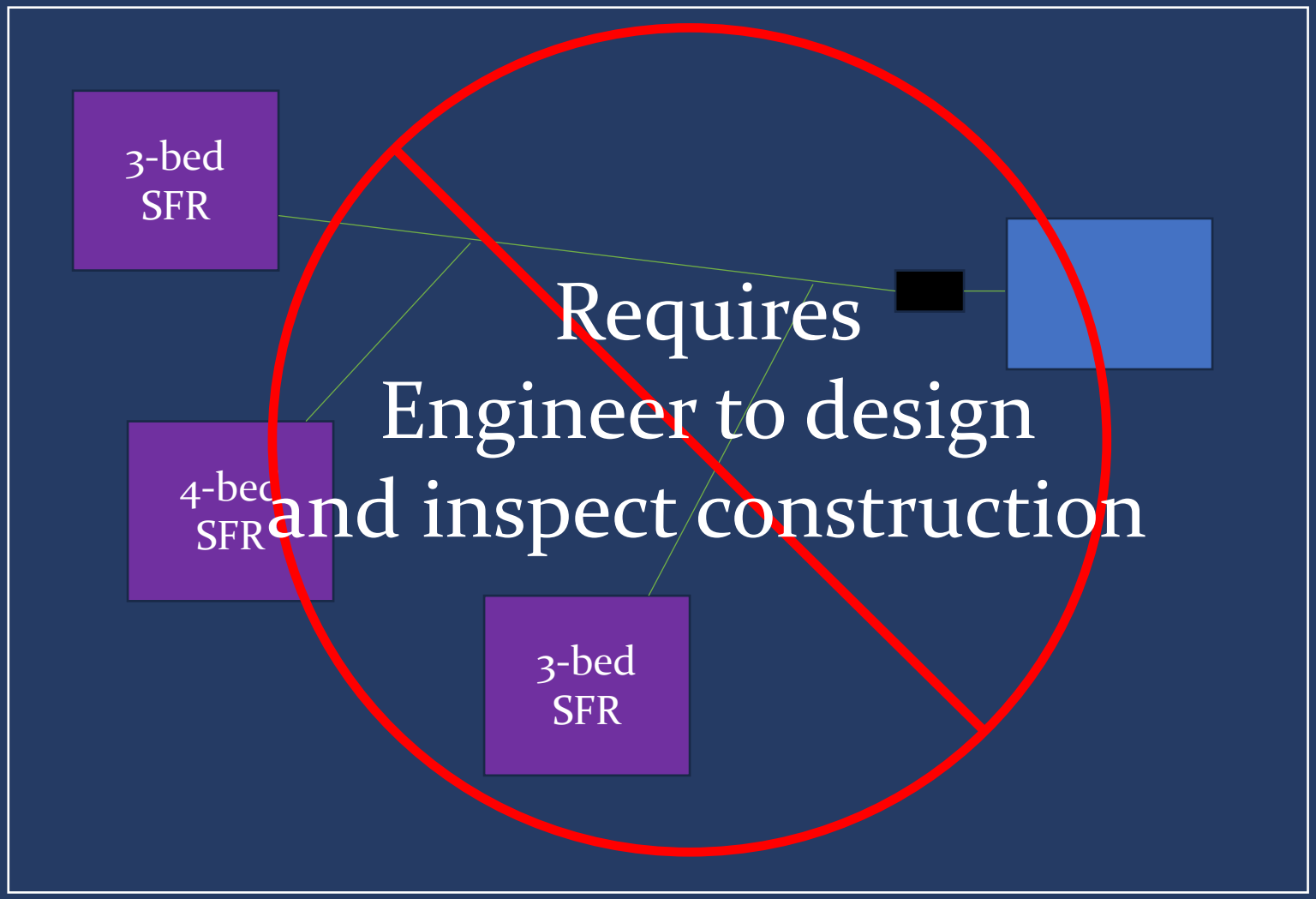
Certified Installer Scenarios

Next slides will go over some of the scenarios encountered in the field. There are always unique property specific considerations, and if you would like to discuss a specific property, please contact the DEC as soon as possible to go over that situation.

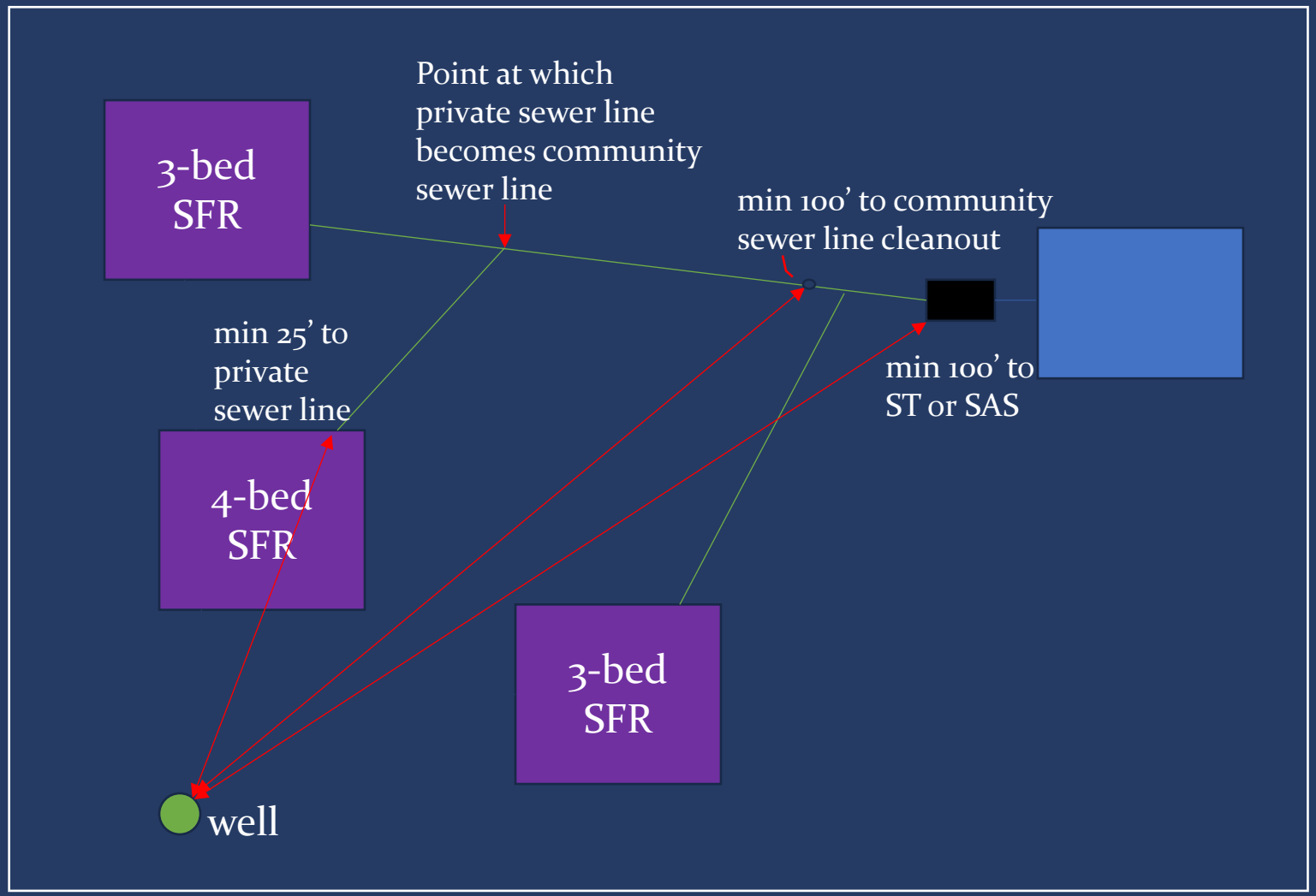
A simple conversation/email in advance can save a lot of trouble and misunderstanding later!

- Summary key points:
  - community sewer lines must be installed with a registered engineer
  - Total on lot peak daily flow must be less than 1,500 gallons per day
  - Commercial facilities must be:
    - single-service connection and
    - The structure must be less than 500 gallons per day! E.g., a **small** commercial facility!

10-beds total = 1500 gpd
more than two families so is NOT a private residence nor a single service multi-family dwelling



10-beds total = 1500 gpd
But more than two families so is not a private residence nor single building connected to the system. Note the community sewer lines!

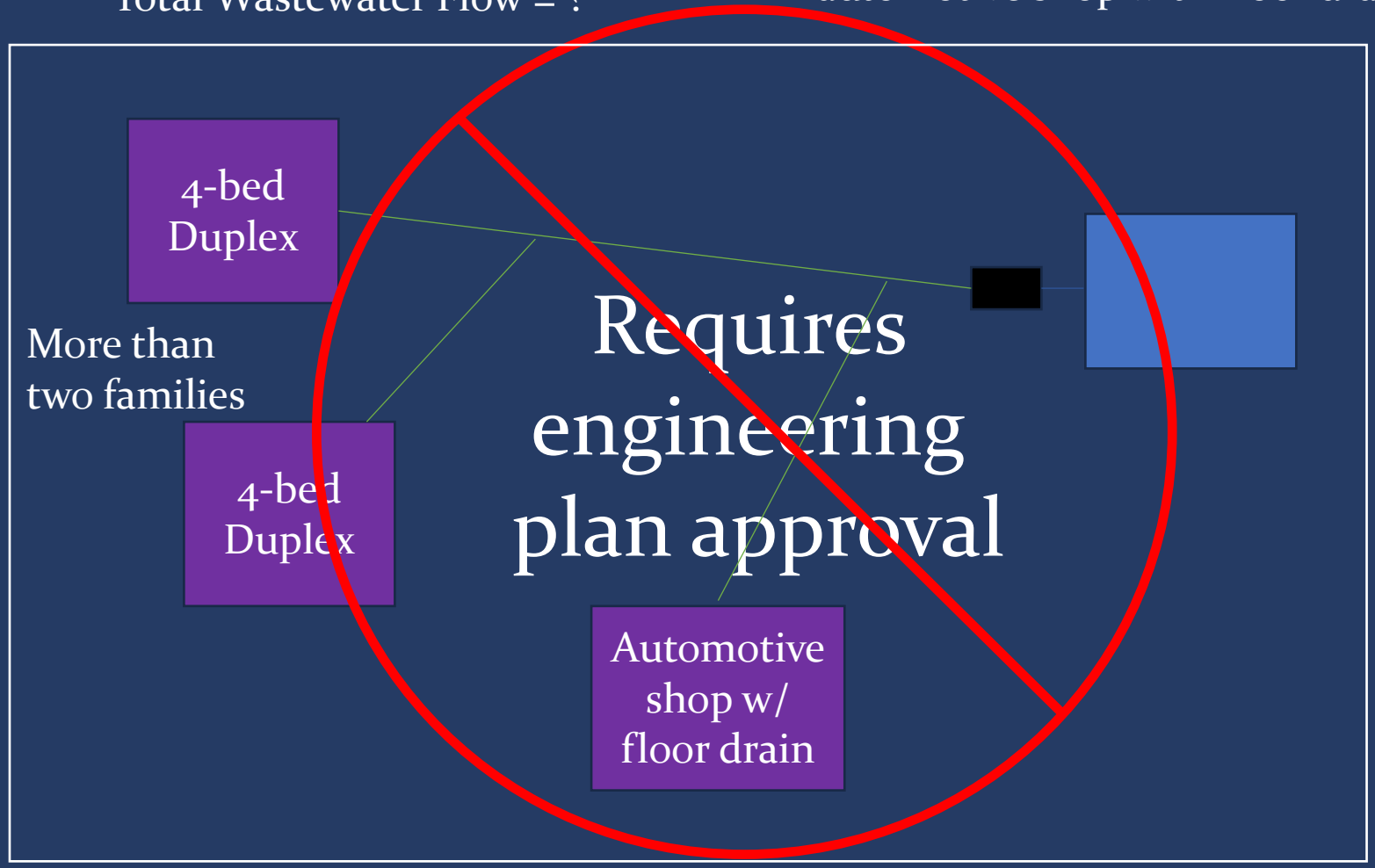


8-beds total = 1200 gpd

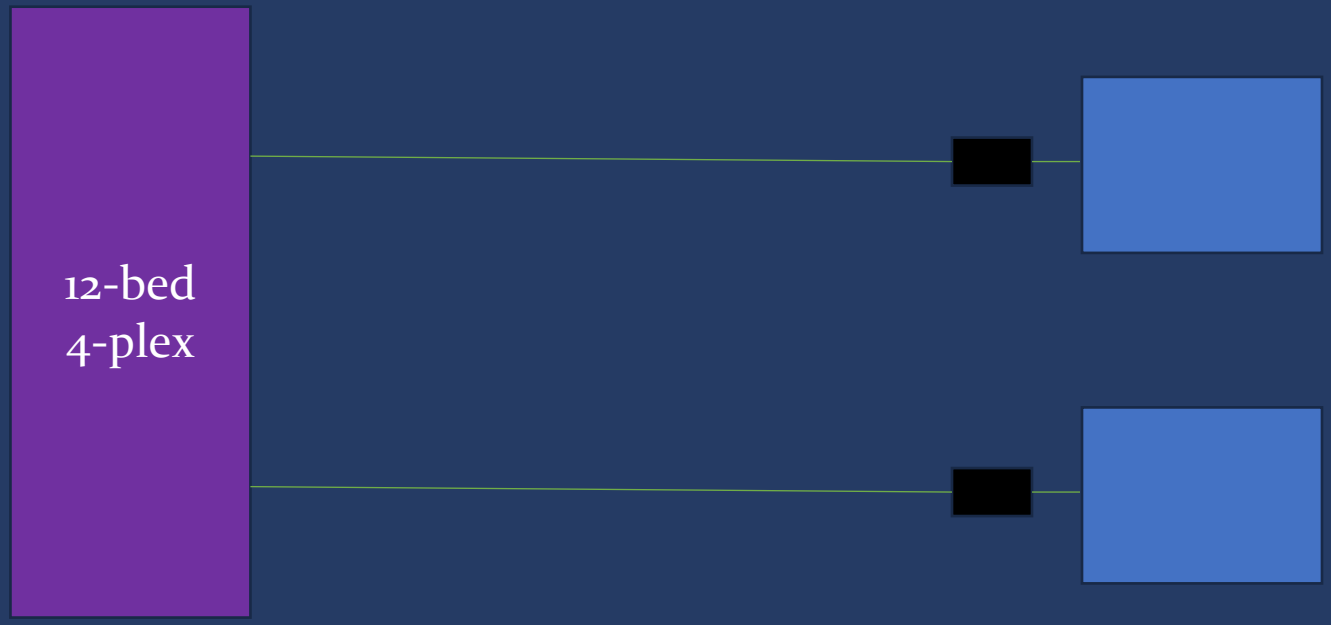
Auto Shop = ?

Total Wastewater Flow = ?

Engineer and plan approval required for systems with non-domestic wastewater source. In this case, the automotive shop with floor drains.



Each system serves half of the building:
Each system serves 6 beds = 900 gpd each
Total wastewater flow = 1800 gpd
Can you do this as a CI?

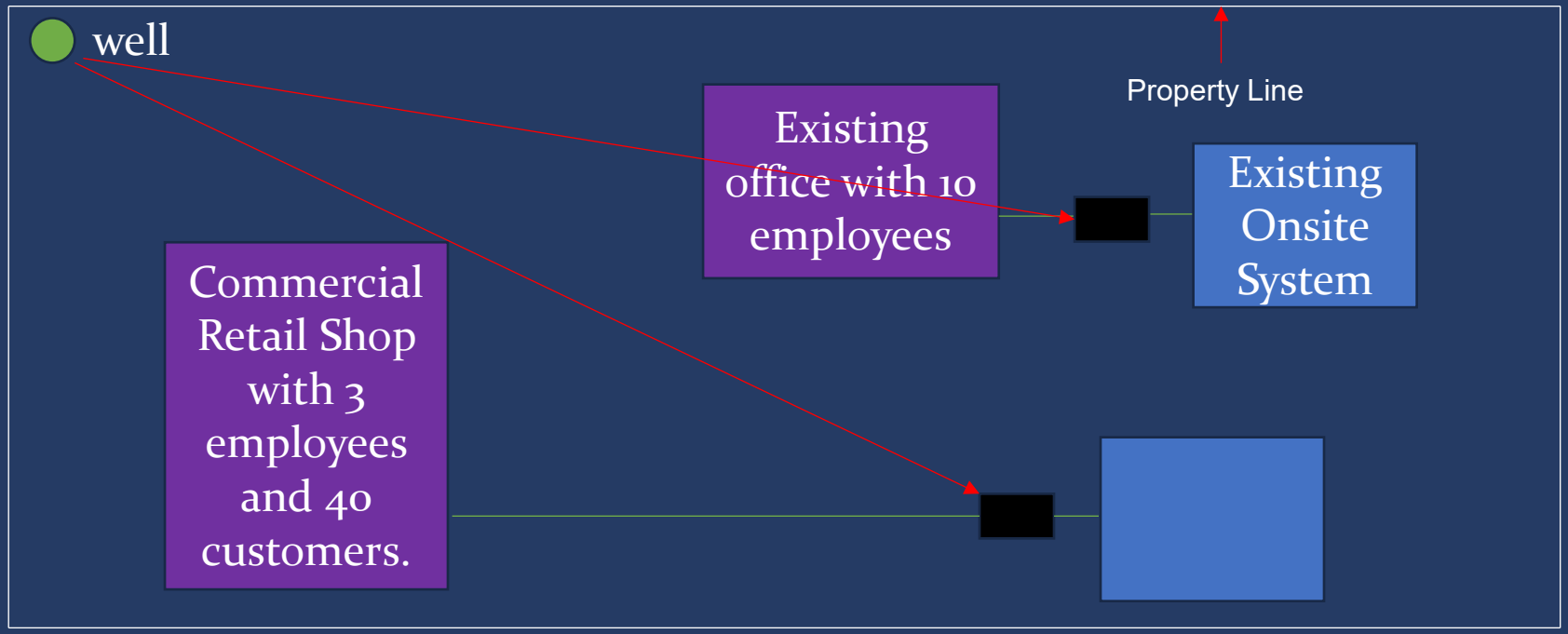


No! Even though a single multi-family dwelling with no more than
4 units, the total wastewater flow for the lot exceeds 1500 gpd

Each system serves half of the building:
Each system serves 4 beds = 600 gpd each
Total wastewater flow = 1200 gpd
Can you do this as a CI?

Yes, because it meets description of a single multi-family dwelling with no more than four residential units with total calculated daily flow less than 1500 gpd

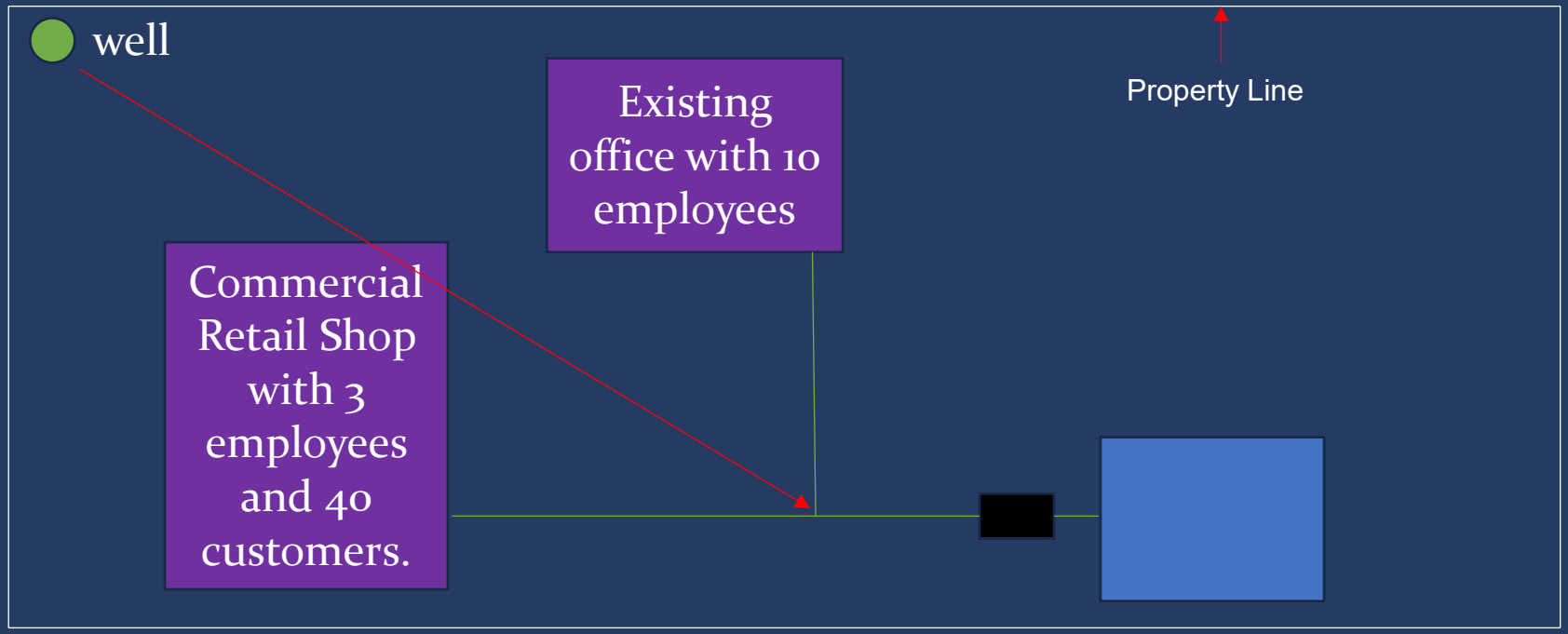
3 employees @ 10 gpd/employee OWSIM 2.4.2
40 customers @ 3 gpd/customer
Total wastewater flow = 150 gpd
Can you do this as a CI?



Yes, because it meets the definition of a small commercial facility with on lot wastewater flows less than 1,500 gpd

Note: the number of people, the well serving this property may be a public water well! Obtain a current drinking water system classification!
Note: You must verify some of the information on the existing system to do this system. This must be clarified on the DOC submission

3 employees @ 10 gpd/employee OWSIM 2.4.2
40 customers @ 3 gpd/customer
Total wastewater flow = 150 gpd
Can you do this as a CI?



No, because it includes multiple service connections.

Note the number of people, the well serving this property may be a public water well! Obtain a current drinking water system classification!

Systems that can be installed by an engineer that do not need prior construction approval

OWSIM Section 5

- Historically all alternative onsite systems required a plan approval, which included a application to the Department and a 30 day review timeframe. Now in accordance with this section, the authorization by rule process was expanded to include certain engineered alternative systems.
- This section is included the OWSIM; however, this section is for engineered systems only. When installing a system under the design of a registered engineer, installers must follow that design and work with the engineers per OWSIM 2.2.3.
- In that matter, it is always good to form good working relations with multiple local engineers in situations where an alternative onsite system may be required and/or a plan approval is needed

Commercial Facility Calculations

OWSIM 2.4.2

- Calculations were added back into the OWSIM and updated.

- Provide a couple commercial facility calculation examples
- Restaurant [meals (short order take out for example), customers, and employees
- Coffee Cart [this is just a coffee cart with no food prep]
- Office Building [20 employees and 30 visitors]

Evaluating Site Conditions

OWSIM 2.7

- Flooding sites an updated clarifications were added
- A section on evaluation of changing site conditions was added to clarify evaluation of systems and resiliently installed systems.
- In 2019 the Kenai Peninsula was in drought. In 2022/2023 Southcentral Alaska has had extremely wet years.

Percolation Tests

OWSIM 2.8.2

- Percolation tests, requirements, and percolation tests done by Certified Installers under their certification

2.4.2 Commercial Facilities

Commercial facilities include any building or services open to the public. Examples of commercial facilities include RV parks, restaurants, office buildings, nightly lodging, residential care facilities, and daycares. The daily flow for commercial facilities must be calculated by using published typical flows from the EPA wastewater system manual, the UPC, or this guidance. Typical flows published by other states may also be used when the use is more specific than the sources provided in the Wastewater Minimum Daily Flows table.

Wastewater Minimum Daily Flows		
Commercial Sources		
Source	**Unit**	**Flow in gpd/unit**
Airport	Passenger	3
Assisted Living Homes	Resident	100
	Employee	15
Automobile Service Station	Vehicle Served	12
	Employee	15
Bar	Employee	15
	Guest	3
Day Care Facilities	Each Child and Employee	15
w/ food service		20
Department Store	Employee	10
	Toilet Room	500

Regional exceptions

OWSIM 2.8.2

- Regional exceptions were added to the OWSIM clarifying what they are and how they are administered. Ultimately exceptions must be coordinated still with that local area office staff

Regional exceptions

OWSIM 2.8.2 & 2.11.1

- The only soil types that do not require a percolation test are SP/SW, unless there is a specific exception provided for an area
  - Nikiski Sands
  - Greater Fairbanks Area

- OR, you do not need a percolation test in GP/GW soils *IF* you install a 2 foot thick sand liner
  - Tok (area-wide sand liner waiver for GP/GW)

Separation distance tables

OWSIM 2.9

- Updated to include now separation distances from sewer components to water lines and private water lines. This was previously in the UPC; however, it was added into the OWSIM and 18 AAC 72 to clarify these separation distances instead of “refer to the UPC”.
- **Crossings for private water system lines are addressed in 2.9.2**
- Foundation is now a “recommendation”; however, the UPC Appendix H requires 5’ from the tank to the foundation and 8’ from the SAS to the foundation.
  - Foundation per UPC does include decks, covered walks. Think about how the system can ever be replaced and/or tank pumped.

MINIMUM HORIZONTAL SEPARATION DISTANCES TO DRINKING WATER SYSTEMS

all horizontal separation distances must be measured from nearest edge to nearest edge

	Private Sewer Line[a] and Cleanouts, Basement Sump	Sewer Line[b] and Cleanouts, Manholes, Lift Station	Septic Tank, Wastewater Holding Tank, Lift Station, Manholes	Pit Privy, Soil Absorption System	Fuel Tank[c] and Lines	Drinking Water Treatment Waste disposal system	Other Sources of Contamination[d]
Public Water System	100 feet	200 feet	200 feet	200 feet	100 feet	100 feet	200 feet
Private Water System	25 feet	100 feet	100 feet	100 feet	25 feet	25 feet	100 feet
Water line	10 feet	10 feet	10 feet	10 feet	10 feet	10 feet	Contact DWP
Private Water Line	1 foot	5 feet	5 feet	5 feet	10 feet	5 feet	--

Additional separation distance requirements may apply for public water systems; 18 AAC 80 must be referenced for all public water system requirements.
a. A drain pipe buried in the ground below a building is required to meet the same separation distance as a private sewer line to a public water system.
b. Sewer line includes sewer main, community sewer line, and stormwater sewer lines.
c. The separation distance to fuel tanks applies to below-ground fuel tanks and fuel lines, and to above-ground tanks greater than 500 gallons.
d. Other sources of contamination include, but are not limited to, animal byproducts, manure, and agricultural waste. The separation distance to landfills is covered under 18 AAC 60. DWP = Drinking Water Program.

MINIMUM VERTICAL SEPARATION DISTANCES TO DRINKING WATER COMPONENTS

	Private Sewer Line, Building Sewer	Community Sewer Line or Cleanout, Sewer Main	Septic Tank, Wastewater Holding Tank	Soil Absorption System	Fuel Tank** and Lines	Drinking Water Treatment Waste disposal system	Other Sources of Contamination*
Water line	18 inches recommended	18 inches	cannot cross	cannot cross	no crossing recommended	10 feet	Contact DWP
Private Water Line	12-inches	12-inches	cannot cross	cannot cross	no crossing recommended	5 feet	--

Well Classification and Select Abbreviated Definitions (See 18 AAC 80.1990 or 18 AAC 72.990 for complete definitions)

Public Water System: a potable water system serving 25 or more people at least 60 days per year or a system that has at least 15 service connections.

Water Line: is a pipe or conduit used to carry water as part of a public water system but does not include a water service line or private water line.

Private Water System: a potable water system that is not a public water system

Private Water Line: is a line, pipe, or conduit used to carry water as part of a private water system. The department interprets regulations to not include a water service line that is connected to a public water system in the definition of private water line.

Disclaimer: This separation distance table was developed for convenience but may not contain all separation distances required to be met.

MINIMUM HORIZONTAL SEPARATION DISTANCES FROM SEWER COMPONENTS					
	River, Lake, Stream, Spring, Slough[c]	**Slopes >25%**	**Soil Absorption System**	**Lot Line[a]**	**Foundation[a]**
Septic Tank, Holding Tank, Lift Station	100 feet	need to be stable	5 feet	10 feet	10 feet
Soil Absorption System	100 feet	50 feet[d]	see b. below	10 feet	10 feet
Pit Privy	100 feet	50 feet recommended	see b. below	10 feet	10 feet

a. Recommended minimum horizontal separation distance. All parts, including ground cover for freeze protection must be wholly located on the property with the facility being served. Locating a septic tank or soil absorption system too close to a building foundation may have negative impacts. The septic tank cleanouts or manhole riser must be accessible for maintenance purposes.
b. 6 feet or 2 times the distribution media depth, whichever is greater.
c. Setbacks is from the mean annual high water level of surface water or the mean higher high water level of tidally influenced water.
d. Separation distance applies to the downhill slope; does not apply to mound type soil absorption systems

MINIMUM VERTICAL SEPARATION DISTANCES FROM SEWER COMPONENTS		
	Seasonal High Water Table	**Impermeable Soil, Permafrost, Bedrock**
Septic Tank, Wastewater Holding Tank	need buoyancy protection	--
Subsurface Soil Absorption System	4 feet	6 feet
Pit Privy	4 feet	--

Disclaimer: This separation distance table was developed for convenience but may not contain all separation distances required to be met.

Freeze Protection

OWSIM 2.10

- Updated standard to allow 25 PSI for the installation of onsite systems.

Pipe Joints

OWSIM 3.1

- Solid pipe with no joints shall span 5 feet from the inlet and outlet of septic tanks onto undisturbed earth, or the soil may be backfilled and compacted in six-inch lifts before laying the pipe

OWSIM 2.9

- The separation distance between the septic tank and soil absorption field is now 5 feet

OWSIM 3.2

- The slope of the building sewer 10 feet immediately before the septic tank **is still** required to be 1/8” to ¼” per foot (not to exceed 2% slope)

Septic Tanks

OWSIM 4.2.1

- If a lift station / sump is located prior to the septic tank, the minimum septic tank size must be increased by 250 gallons for residential dwellings ~~with more than 18 bedrooms or commercial facilities with an estimated daily flow greater than 1250 gallons.~~
  - This is a bit wordy, you may cross out the rest and remember to increase the size of the septic tank!
  - Please be aware, this wording **does apply** for systems for which you work under an engineer!

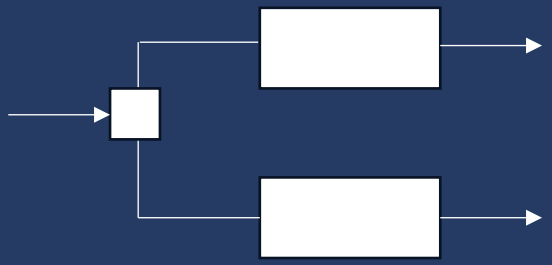
Septic Tanks in Series/Parallel

OWSIM 4.2.2 & 4.2.3

- Clarified that tanks in series or in parallel may be used to meet the required tank size.

In series

In parallel



Tank in series example

- 2250 gallon tank is required.
  - 2/3 of volume is required
  - 2250 x .666667 or **1500 gallon** tank required upstream. Upstream tank may be dual compartment if the first compartment is sized to meet 2/3 of the total volume required.
  - Downstream tank must be placed is the remainder or 2250 x .3333 or 750 gallons (say 1000 gallons). It may be single or 2 compartment.

Minimum Application Rates

OWSIM 4.3.1

- The most conservative wastewater application rate from the table below, based on either percolation rate or soil texture (USCS), must be used.

Cut and Fill Systems

OWSIM 4.4

- Clarified a practice that was done for many years by producing a drawing

Quick Formulas and Updated Examples

Appendix A

- Updated the examples from Appendix A and provided a summary sheet of formulas
  - The five-wide sizing factors have yet to be added to the Appendix, feel free to pen them in on your copy!

Test holes & Soils

Groundwater Levels and Soils

- GP/GW/SP/SW (gravel and sands) – water level stabilizes quickly
  - Be very careful near rivers, and account for seasonal fluctuations in the water level
- SM/ML (sandy silts and silts) – water level in test hole may take hours to stabilize
- Remember to research local groundwater information. In areas known for groundwater fluctuations, adjust the depth of the system accordingly

Test holes & Soils

Groundwater Seeps

Seeps may or may not indicate the groundwater table

Seeps may be seasonal or based on recent precipitation events

Look at test hole side walls for reason for seep (soil layers, different color, etc.)

Let test hole remain open for several hours if possible to see if groundwater collets in hole

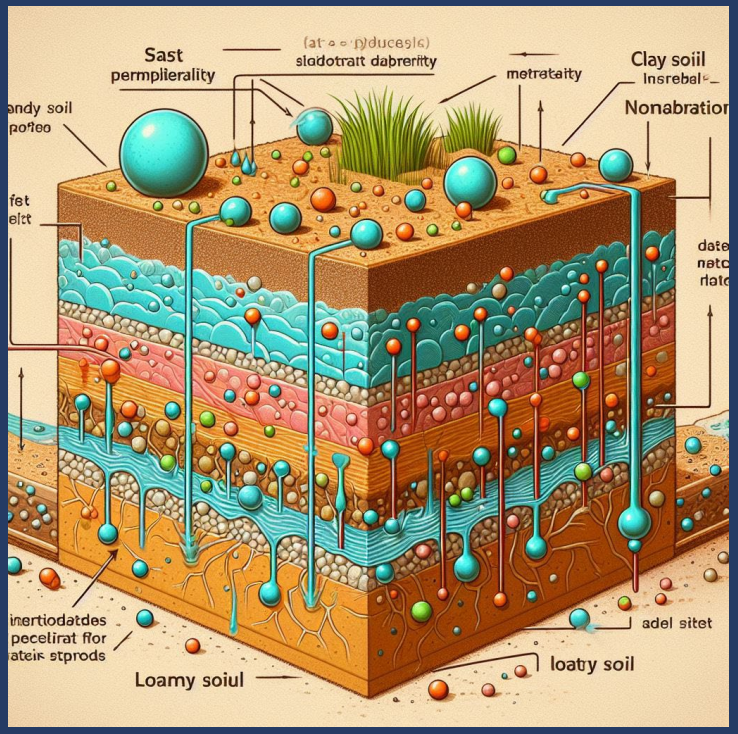
The more fine-grained the soil is, the higher the concern

Soils

Soil Permeability

Permeability is the ease with which water will flow through a porous material

- Water flow is **generally** proportional to particle size
  - Gravel → excellent
  - Sand → good
  - Silt → moderate/poor
  - Clay → poor



Soils

The evaluation of site specific soil conditions is one of the most important aspects of septic system construction

- **Gravel** – Best draining, may be too fast and may require a sand liner. Usually only suitable for bed or shallow trench systems.
- **Sand** – Best for treatment and general drainage. Commonly requires a bed, 5-wide, or shallow trench system.
- **Silt** – Common in hills and along river and stream channels in upper layers – slower draining but usually still acceptable. Suitable for 5-wide, leach pits, and deep trench systems
- **Clay** – Very slow draining, likely requires an engineered system.

Soils are not always homogenous. Get to know the local soils well, ask an engineer or a soils lab if you are unsure.

Test holes

Keep a sample!

Soils Part 1

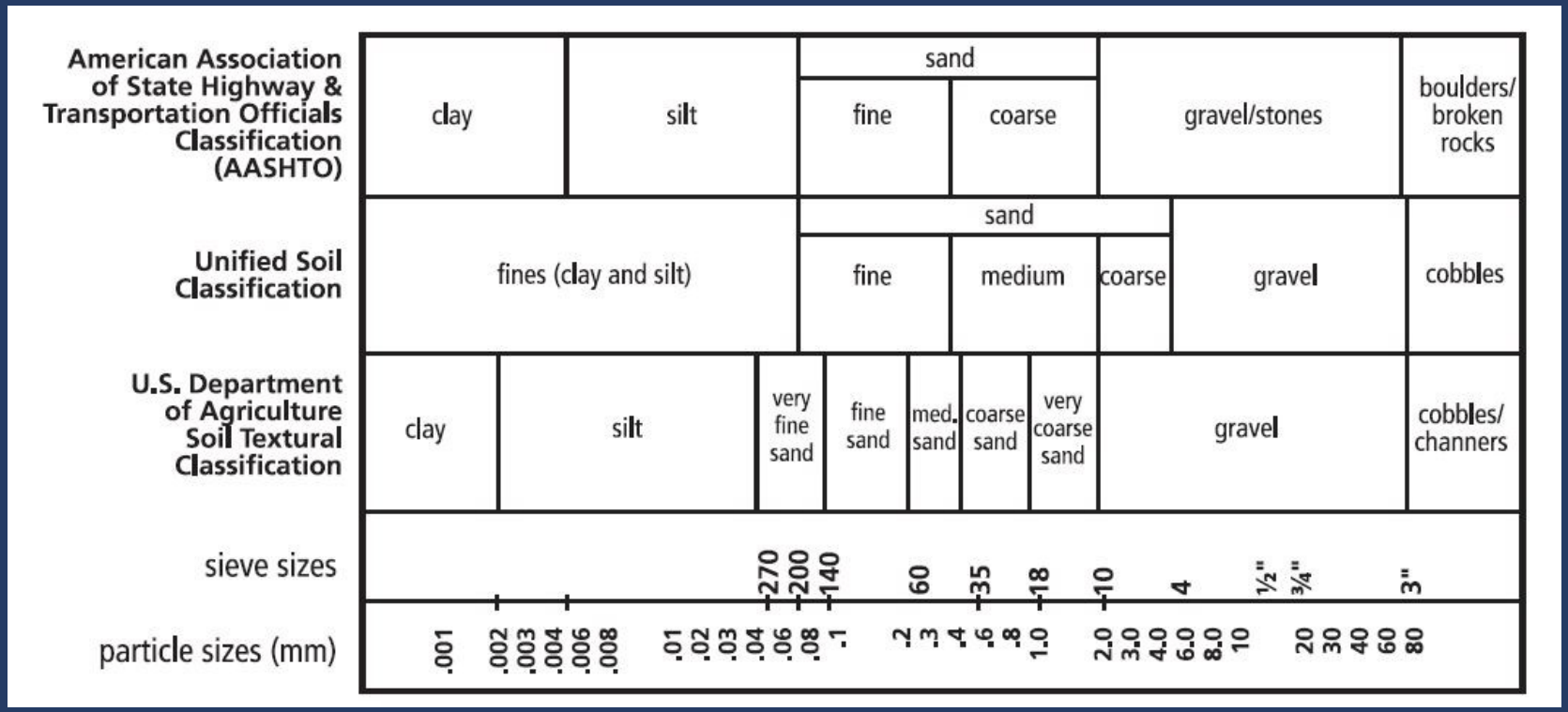
But why classify?

- Soils can be broken down into classifications; however, why?

- All of the classification systems are made to provide a method to describe soils in a way that they are predictable. Sandy soils behave in this matter. Gravel in that matter. And so on and so forth.

- Wastewater application wise:
- Gravel does not provide adequate treatment of effluent however disposes of wastewater effectively
- Sand provides adequate treatment and disposes of wastewater effectively
- Silty soils provides treatment however requires knowledge of the soil whether it is an appropriately receiving soil
- Clay soils often are not suitable for wastewater disposal

Soil Classification Methods

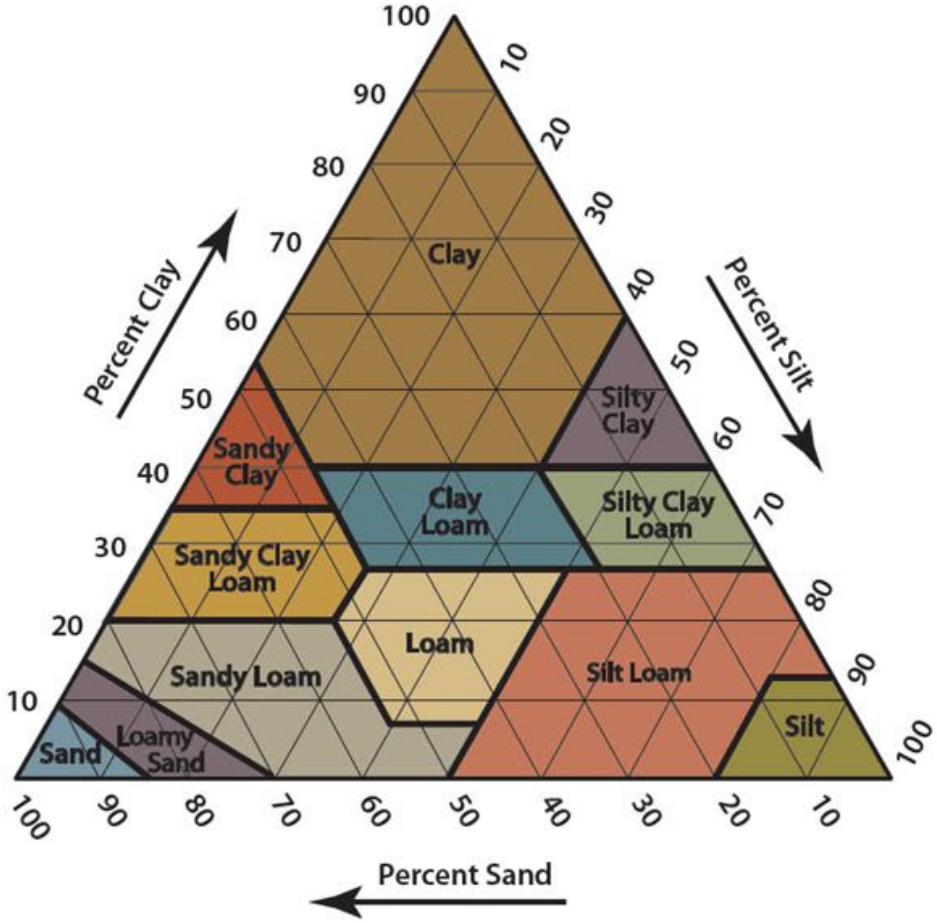


USCS describes soils with a 2-letter symbol based on the gradation of a soil.

- % retained or % passing
- #4 sieve – gravel/sand
- #200 – sand/silt

Primary Divisions			Group Symbol	Descriptions
COARSE GRAINED SOILS Sands/Gravels Over 50% retained on #200 sieve	GRAVELS Over 50% of coarse material retained on #4 sieve	CLEAN GRAVEL Less than 5% passing #200 sieve	GW	Well graded gravel, many different particle sized, little or no fines
			GP	Poorly graded, few different particle sizes, little or no fines
		GRAVEL WITH FINES	GM	Silty gravels, gravel-sand-silt mixtures, fractured schist
			GC	Clay-like gravels, gravel-sand-clay mixtures
	SAND Over 50% of coarse material passed #4 sieve	CLEAN SANDS Less than 5% passing #200 sieve	SW	Well graded sands, many different particle sizes, little or no fines
			SP	Poorly graded, few different particle sizes, little or no fines
		SAND WITH FINES	SM	Silty sands, sand-silt-gravel mixtures, Fairbanks Silt Loam
			SC	Clay-like gravels, gravel-sand-clay mixtures
FINE GRAINED SOILS Silts/Clays Over 50% passing the #200 sieve	SILTS AND CLAYS Liquid limit is less than 50%		ML	Inorganic silts, slight to no plasticity
			CL	Inorganic clays, low to moderate plasticity
			OL	Organic silts and clays of low plasticity
	SILTS AND CLAYS Liquid limit is more than 50%		MH	Inorganic silts, moderate to high plasticity
			CH	Inorganic clays, high plasticity, fat clays
			OH	Organic silts and clays of high plasticity

SOIL TEXTURE TRIANGLE



USDA classification system describes soil texture as the relative amount of sand, clay, silt and combinations thereof

Soil Texture

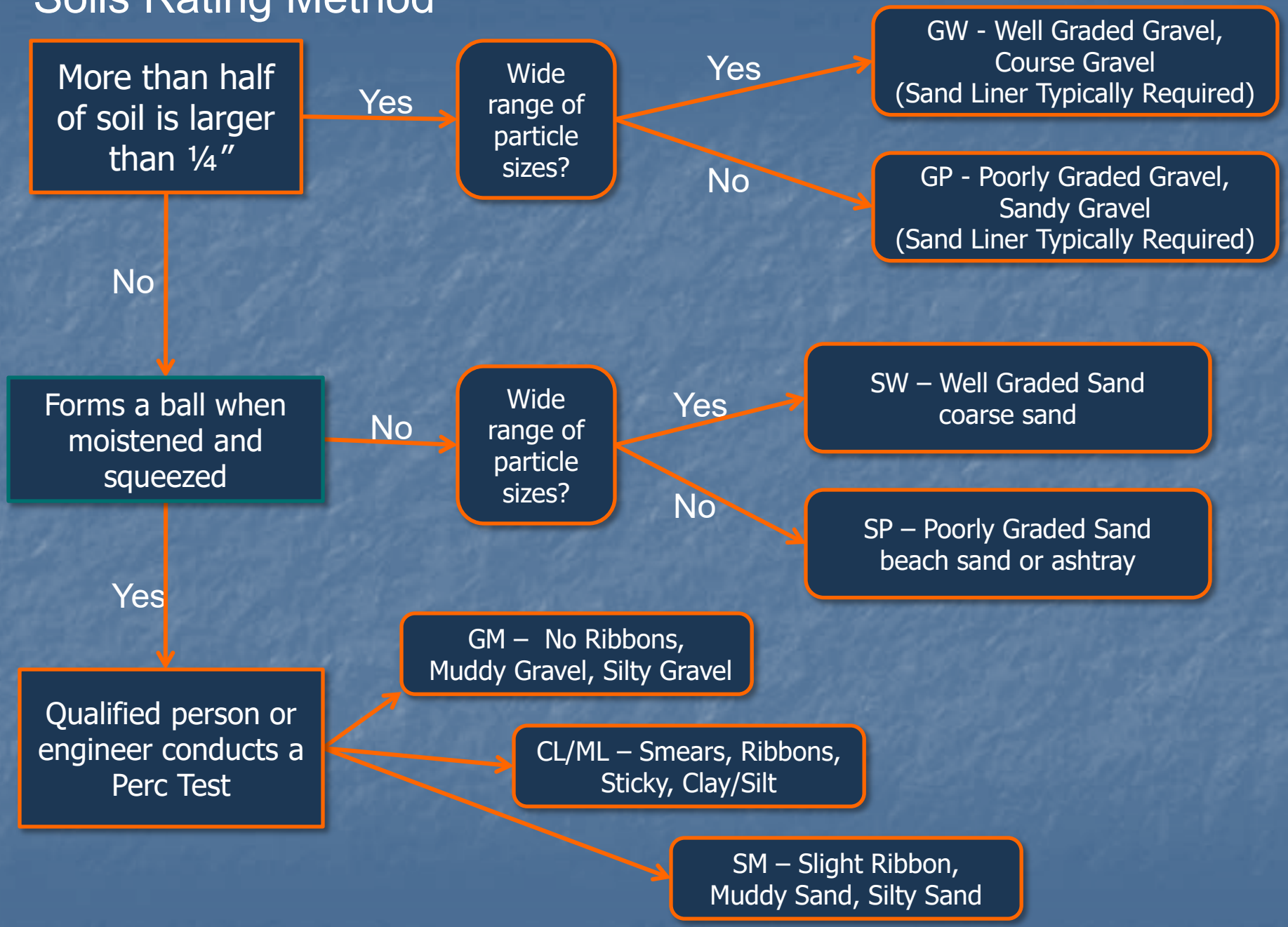
The “feel” of the soil, when moist how it may be manipulated.

- Sands are gritty like salt or sugar
- Soil with a lot of silt will feel silky, similar to flour
- Clay tends to be greasy and sticky, easily forms a ball

Most soils have a varying amount of these particles and will have a combination of properties

Picture from Quick Reference Guide: Assessing soil texture | VRO | Agriculture Victoria

Soils Rating Method



Field Soil Method (in photos)

Grab a soil sample.

Separate the gravel out. Note the amount.

Moisten the sample (if necessary). If over moistened, get more soil.

Does the soil form a ball when moistened and squeezed?

STOP! If you answer yes here, you'll need to perform a percolation test. Continue forward though!

Form ribbons. Depending on the size of ribbons, texture, and feel, select USCS classification.

Soil Application Rates Flow Chart

Classify the soils → Percolation test* (if necessary)

The percolation test for soils that require it confirm the minimum application rate used.

Compare selected percolation rate and soil classification on the chart → Select the most conservative of the two application rates

WASTEWATER APPLICATION RATE or PERC TEST REQUIRED? - DRAFT		
Soil Texture (Unified Soil Classification)	Application Rate	Application Rate in gpd/sf for design flows ≤ 2,500 gpd
Gravel (GW/GP)	Perc test or sand liner	Perc test or sand liner
Medium to coarse sand (SW/SP)	150	1.0
Fine sand or loamy sand	190	0.8
Sandy loam, silty gravel (GM), silty sand (SM)	Perc Test	Perc Test
Loam, silt loam, silt (ML)	Perc Test	Perc Test
Silty clay loam, clay loam	Not Suitable	Not Suitable

Draft Table

WASTEWATER APPLICATION RATES FOR SM, GM, ML BASED ON PERC TEST AND SOIL CLASSIFICATION - DRAFT

Soil Texture (Unified Soil Classification)	Percolation Rate Faster than 1	Percolation Rate 1-5 minutes/inch	Percolation Rate 6-30 minutes/inch	Percolation Rate 31-60 minutes/inch	Percolation Rate >60 minutes/inch
Gravel (GW/GP)	Sand Liner	125 sf/bedroom	Verify soil classification	Verify soil classification	Not suitable, engineered system, or plan approval required
Sandy loam, silty gravel (GM), silty sand (SM)	250 sf/bedroom	250 sf/bedroom	250 sf/bedroom	335 sf/bedroom	Not suitable, engineered system, or plan approval required
Loam, silt loam, silt (ML)	335 sf/bedroom	335 sf/bedroom	335 sf/bedroom	335 sf/bedroom	Not suitable, engineered system, or plan approval required

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DEPARTMENT OF ENVIRONMENTAL CONSERVATION
STATE OF ALASKA

DOC Reminders

- Reminder to all installers, standard drawings are listed in the OWSIM for plan view, profile view, and cross-section drawings. Tailoring those standard drawings to site specific installations is what you must do on your drawings!
- Photo requirements: Taking photos is an artform. Remember to zoom out and capture the system component but also where the system is on the lot.

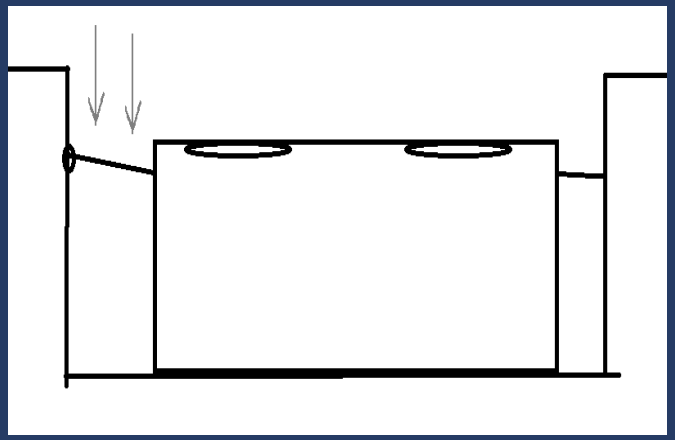
Photo Documentation

VS

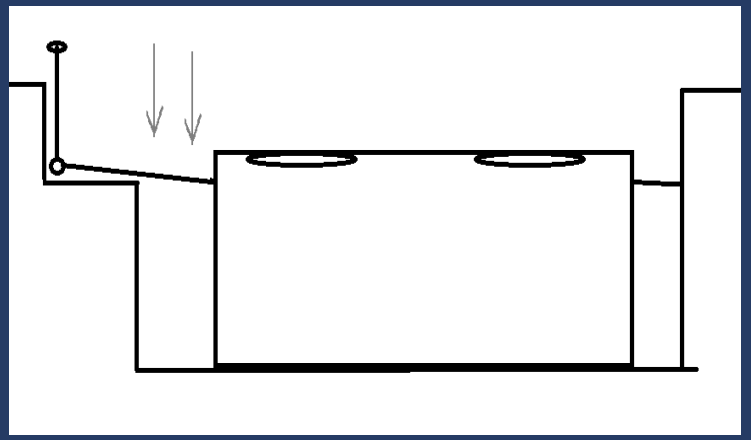
Additional Items

- Measuring distance with an object in-between – A procedure will be emailed out shortly!
- Dry Cabins on lot and wastewater flow
- Use of banded rubber couplers are limited to connecting building/disposal or cleanout/vent pipes to the septic tank
- Replacement of an existing septic tank and pipe joints

Septic tank replacement



Pipe joint is glued right over the open excavation and connected into the tank. Soils underneath this joint **must be compacted** in this layout



Pipe joint is on unexcavated soil and is stabilized. Add a two-way sweep cleanout if no foundation cleanout is discovered.

Sloping sites and beds

- Maximum slope a bed can be installed on is 10%

- A 20 foot wide bed on a 10 percent slope will lose 2 feet. If installing a system on slopes at 10 percent start from the lower bottom to ensure you keep grade control otherwise you may inadvertently install a mound SAS or change soil strata's

Questions/Open Discussion