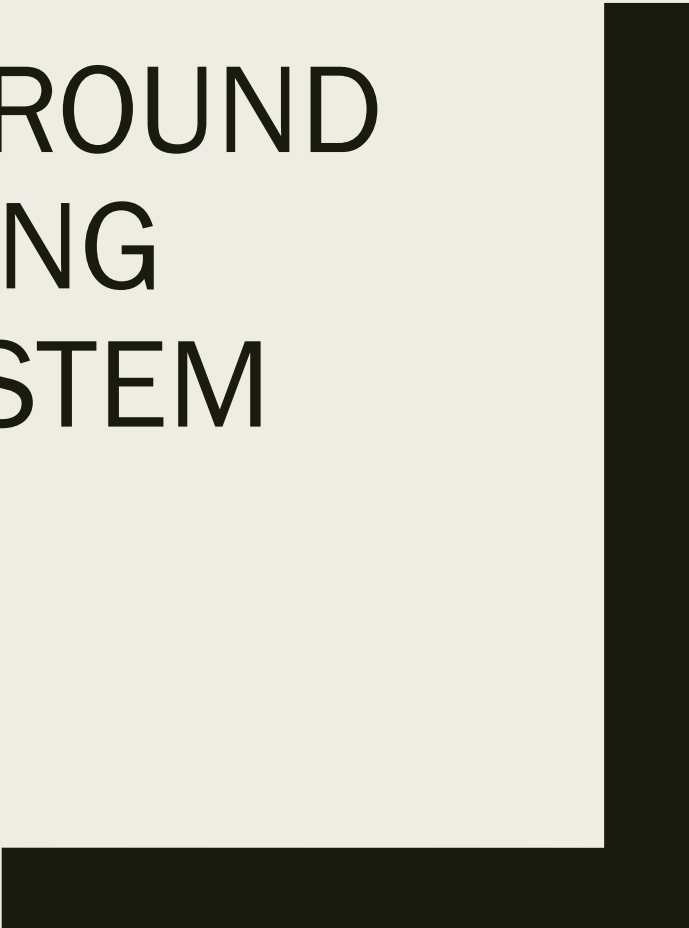
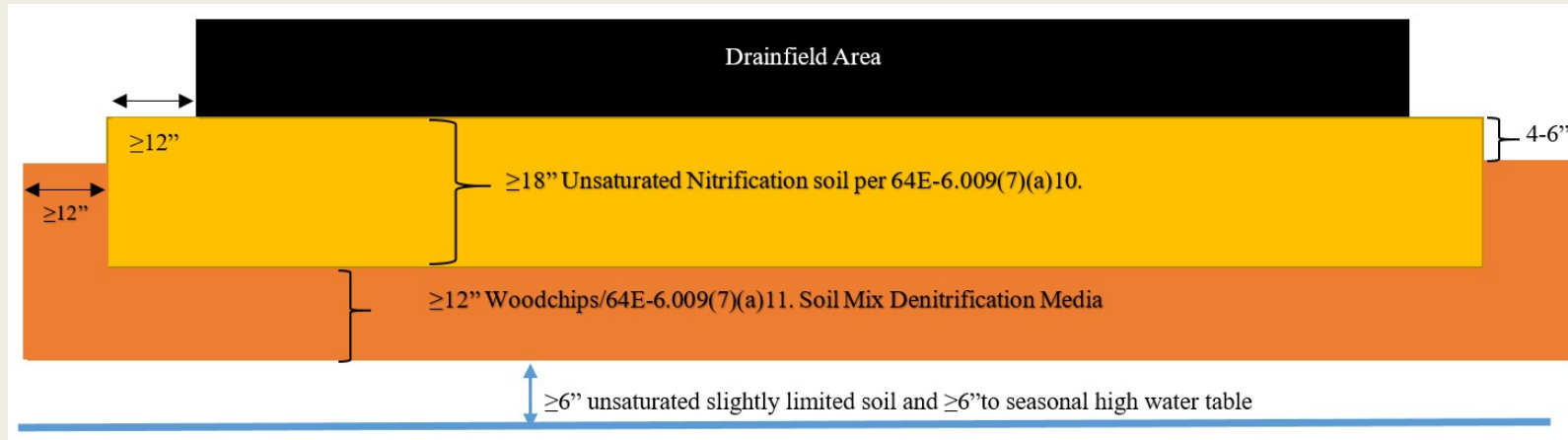




OVERVIEW OF THE INGROUND NITROGEN REDUCING BIOFILTER (INRB) SYSTEM

Roxanne Groover
September 2021





PROCEDURES FOR THE IN-GROUND NITROGEN-REDUCING BIOFILTERS (INRB)

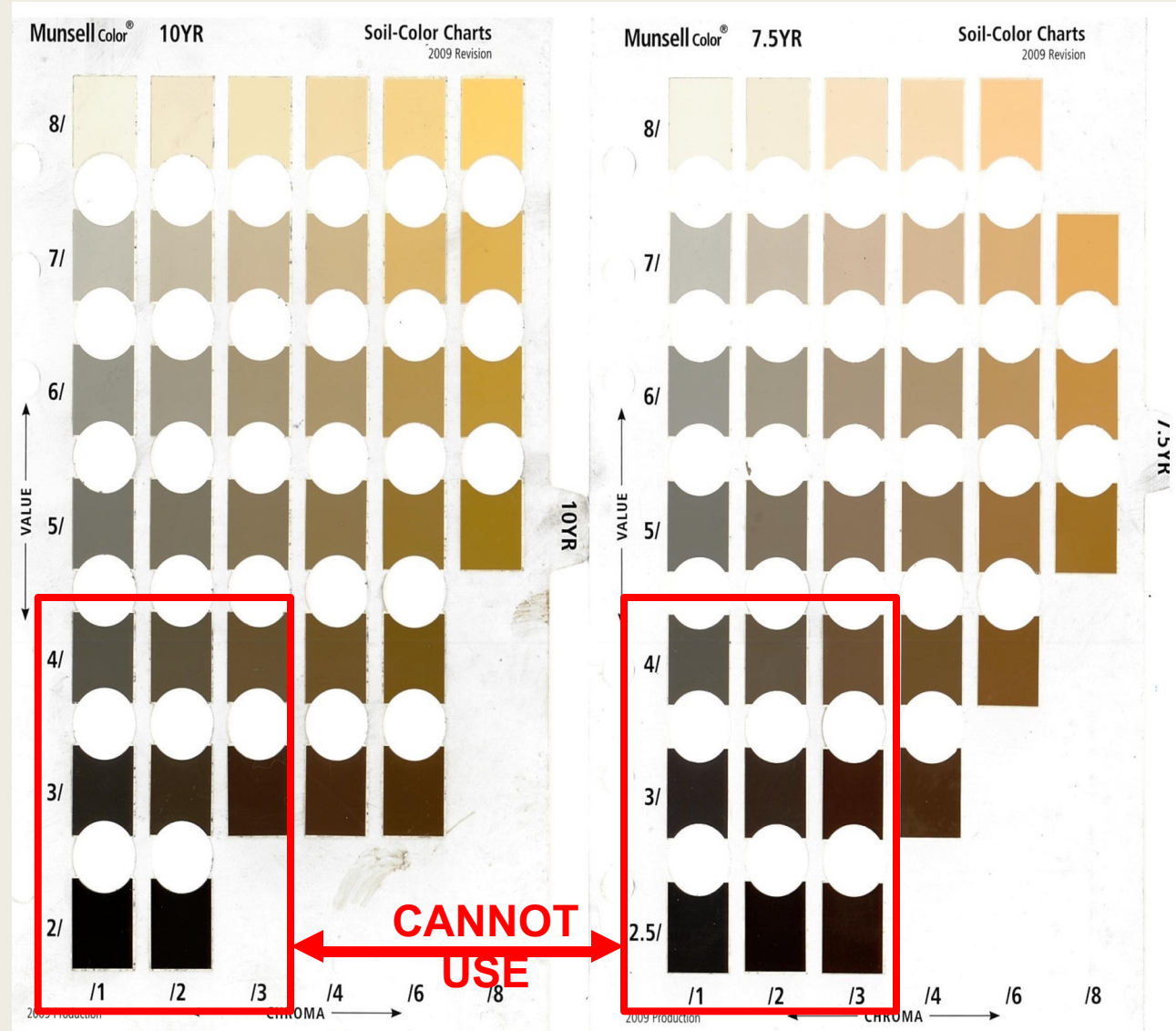
Drainfield Requirements

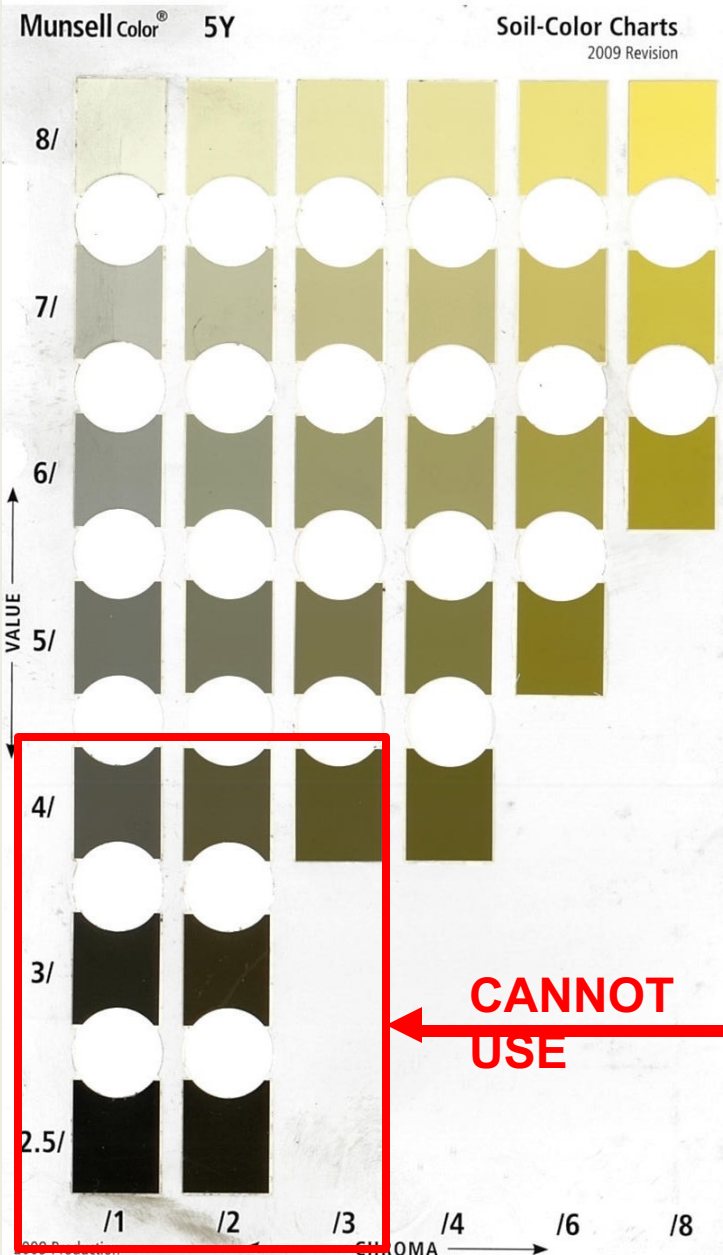
- Only drainfield materials approved per Rule 62-6.014 or Rule 62-6.009, F.A.C. shall be used.
 - Any Department-approved drainfield effluent distribution method may be used.
 - Media longevity and nutrient reduction may be enhanced by the use of low-pressure distribution,
- The natural and existing soil profile throughout the area of the drainfield shall indicate slightly limited soils extending from the ground surface to at least 6 inches below the bottom of the nitrogen-reducing media layer.
- The drainfield shall be centered above the sand fill area
 - ≥ 36 " separation from water table to drainfield bottom

Unsaturated Nitrification Soil Layer Requirements

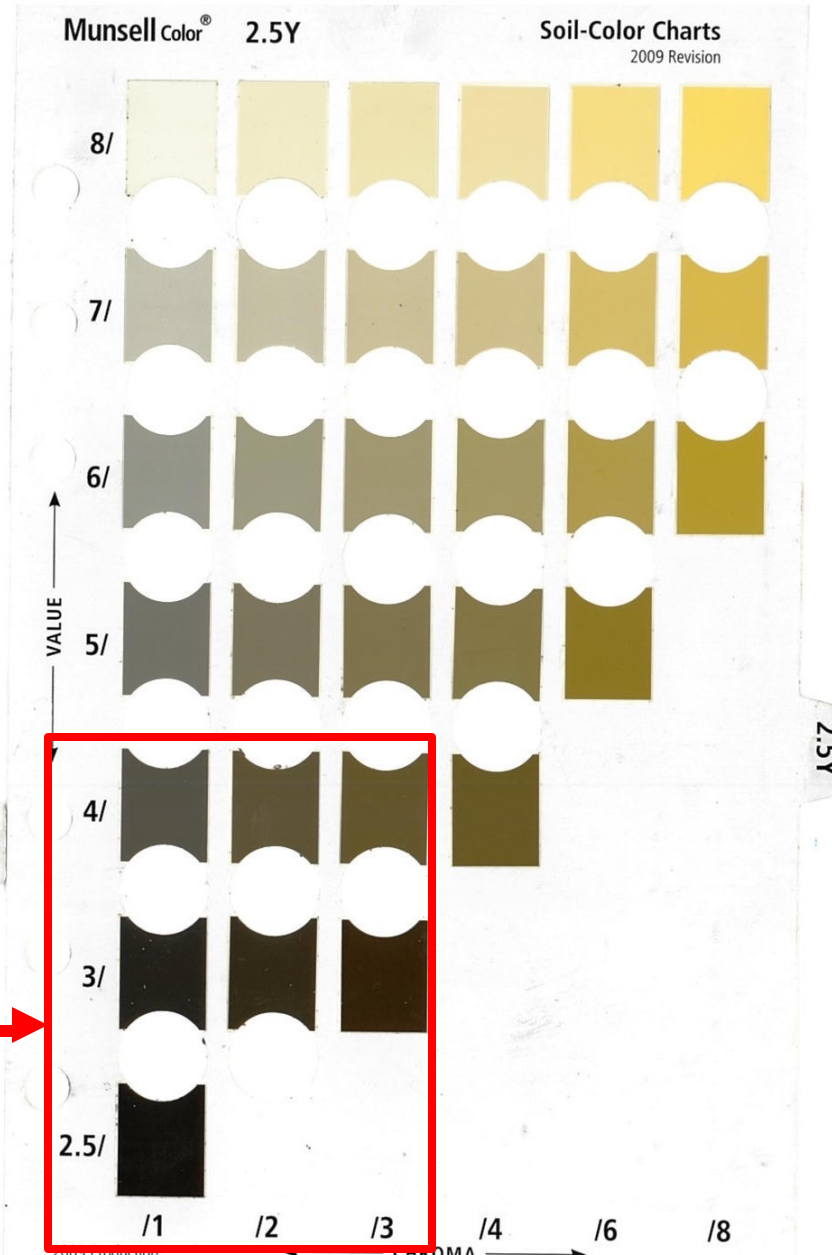
- A sand fill material that is at least 18 inches thick
 - Fine aggregate having a texture of sand or fine sand but excluding:
 - Those having color values less than or equal to 4 with chromas less than or equal to 3; or
 - Those with colors on the gley charts.
- Shall extend at least one foot beyond the perimeter of the drainfield.

CANNOT USE
SOILS
having
Value ≤ 4
with
CHROMA ≤ 3





**CANNOT
USE**



No soils
with
colors
found on
Gley
charts



Calculations for the nitrification layer

- A sand fill material that is at least 18 inches thick
 - Fine aggregate having a texture of sand or fine sand but excluding:
 - Those having color values less than or equal to 4 with chromas less than or equal to 3; or
 - Those with colors on the gley charts.
- Shall extend at least one foot beyond the perimeter of the drainfield.

Denitrification Soil Mix Layer Requirements

- Media layer (mixture) of at least 12 inches
 - The media layer shall be a combination of nitrogen-reducing media and fine aggregate, which shall be composed of 40-60% nitrogen-reducing media by volume, with the remainder to be fine aggregate.
- The media layer shall be thoroughly mixed while the soil is in a non-plastic state, with the constituents uniformly distributed when installed.



60/40 mix

(with sand)



Lignocellulosic Material



Blended Urban Waste Wood

Lignocellulosic Material



- Wood Shavings

Lignocellulosic Material

- Wood Chips



Hardwood Mulch



Denitrification Soil Mix Layer Requirements

- Media

- Examples of lignocellulosic nitrogen-reducing media:
 - Chips or shavings of untreated lumber
 - Blended urban waste wood mulch
 - yellow pine sawdust
 - 2-inch to 3-inch wood chips

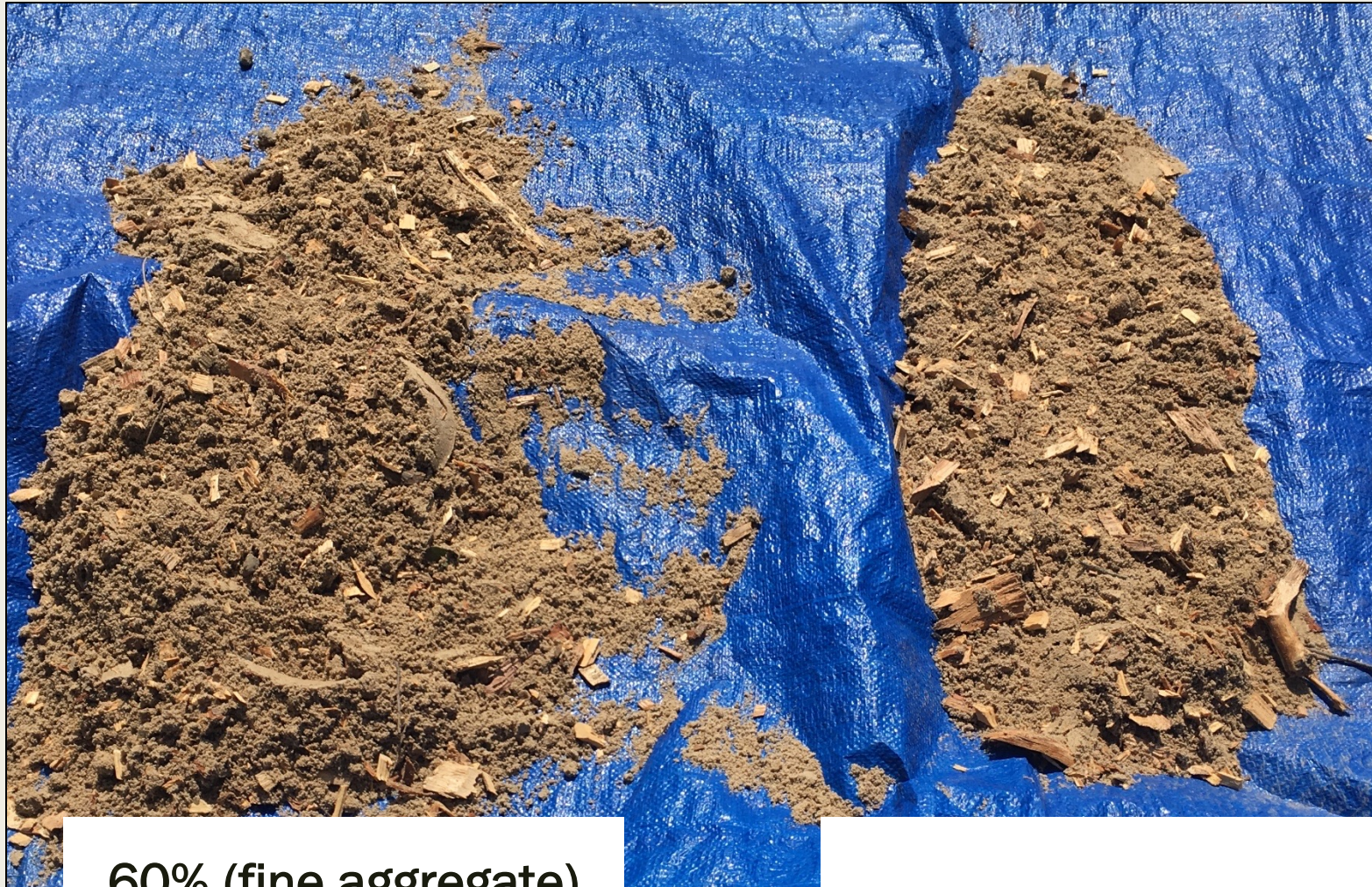
The nitrogen-reducing media shall be demonstrated in Florida-based studies to be effective at providing a substrate for denitrification.





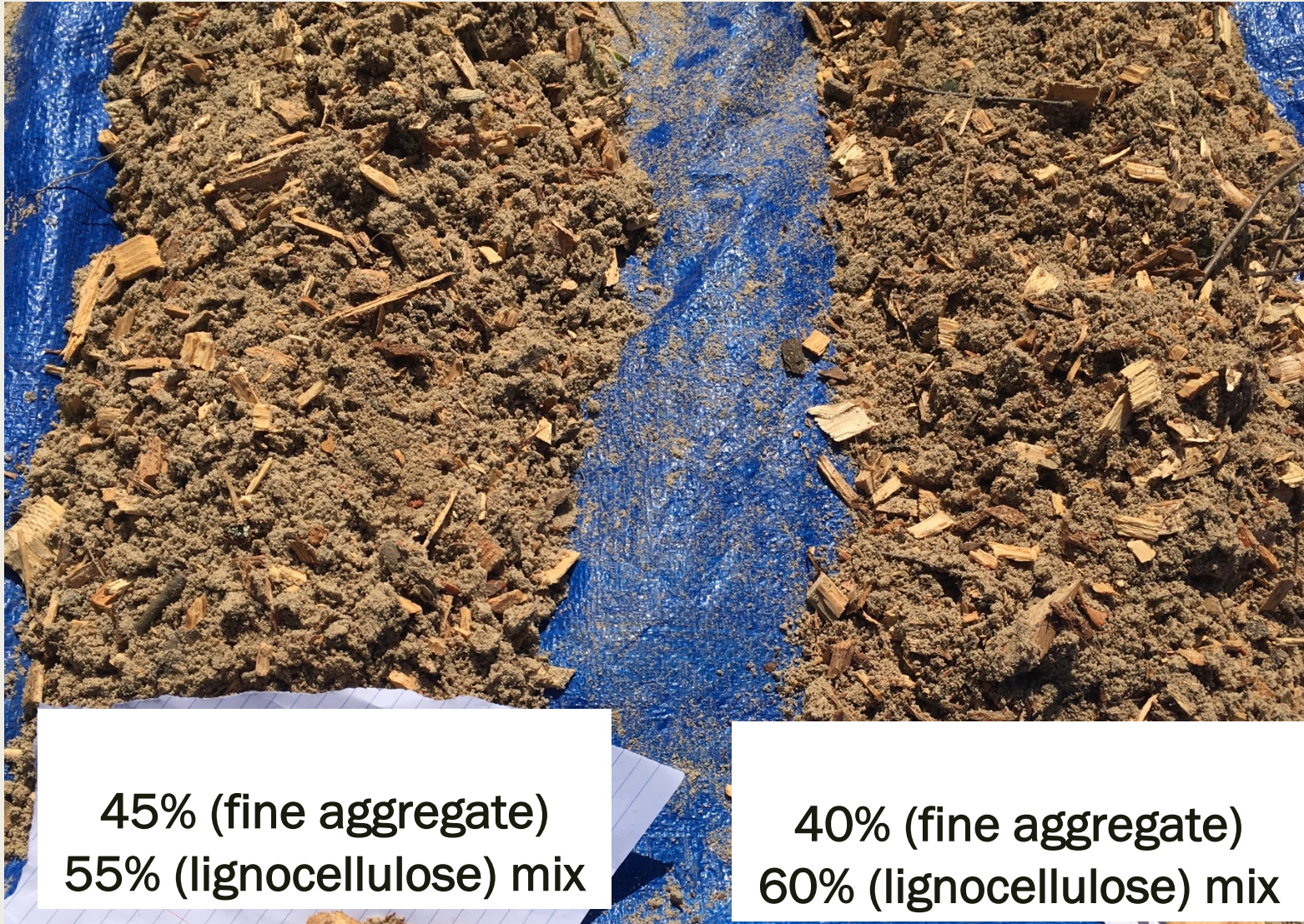


50% (fine aggregate)
50% (lignocellulose) mix



60% (fine aggregate)
40% (lignocellulose)
mix

50% (fine aggregate)
50% (lignocellulose) mix



45% (fine aggregate)
55% (lignocellulose) mix

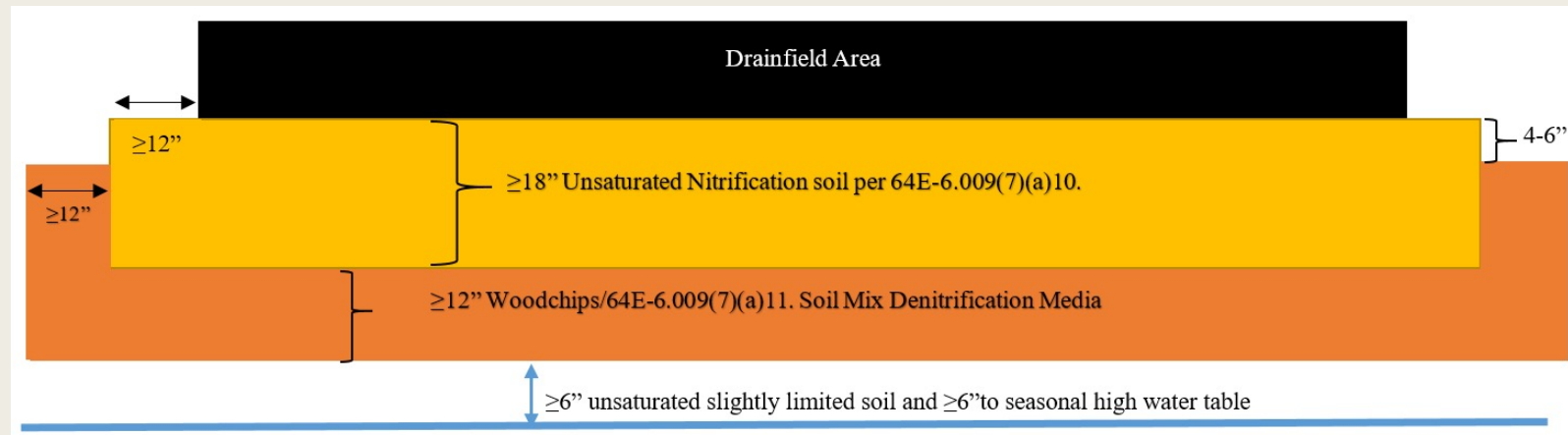
40% (fine aggregate)
60% (lignocellulose) mix

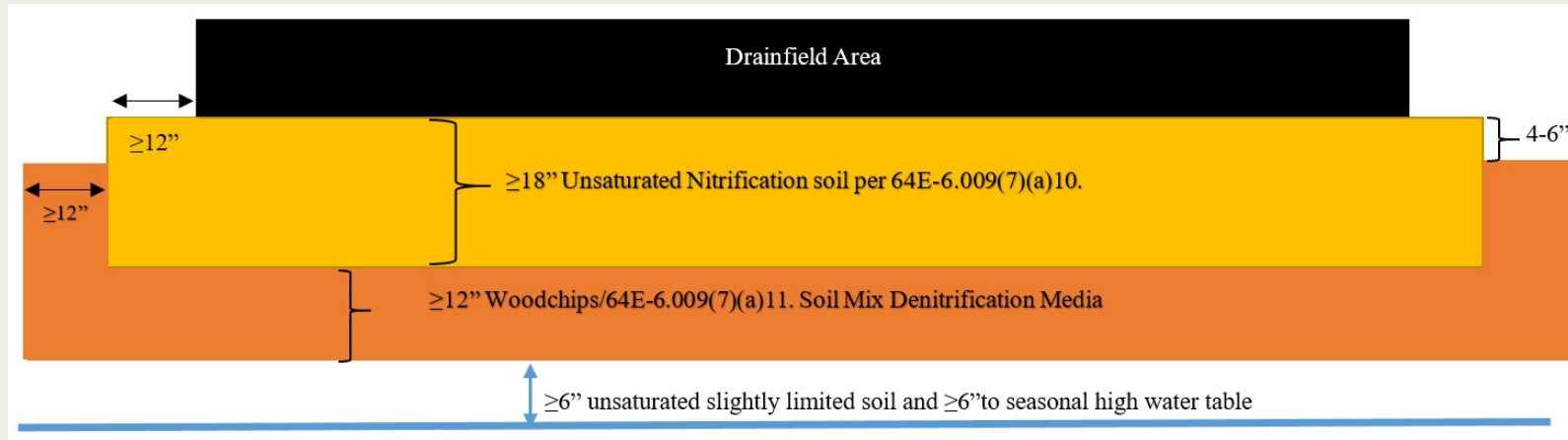
Denitrification Soil Mix Layer Requirements (cont.)

- Extends beneath the entire drainfield absorption surface
 - And extends at least 24 inches beyond the perimeter of any portion of the drainfield absorption surface and any other effluent release point.
- The drainfield shall be centered above the media layer.
- The media layer shall also extend upward along the boundary of the sand fill material to a point four to six inches below the bottom of the drainfield.

Denitrification Soil Mix Layer Requirements (cont.)

- As measured vertically, no portion of the media layer shall be within 18 inches of the infiltrative surface of the drainfield.
- The bottom of the media layer shall be at least 6 inches above the wet season water table.
 - The media layer shall not be installed when the observed water table is at or above the lowest depth of the media layer.





DESIGN OF THE IN-GROUND NITROGEN-REDUCING BIOFILTERS (INRB)

Setbacks for the INRB

- Different from a conventional system design
 - Setback distances to the denitrification media or soil material directly above denitrification media extending to the infiltrative surface of the drainfield shall be reduced by the following:
 - Except for building foundations, vertical obstructions and pilings for elevated structures, where the required setback is ≤ 5 feet, the setback shall be reduced to one foot.
 - Where the required setback is ≥ 10 feet, the setback shall be reduced by five feet.
 - Setbacks to all other parts of the system shall be in compliance with the requirements in this Chapter and section 381.0065, Florida Statutes.

Other Requirements

Inspection of media layer is required in addition to regular construction inspection and final inspections

Setbacks from media are reduced so that tank and drainfield remain as the main setback determinants

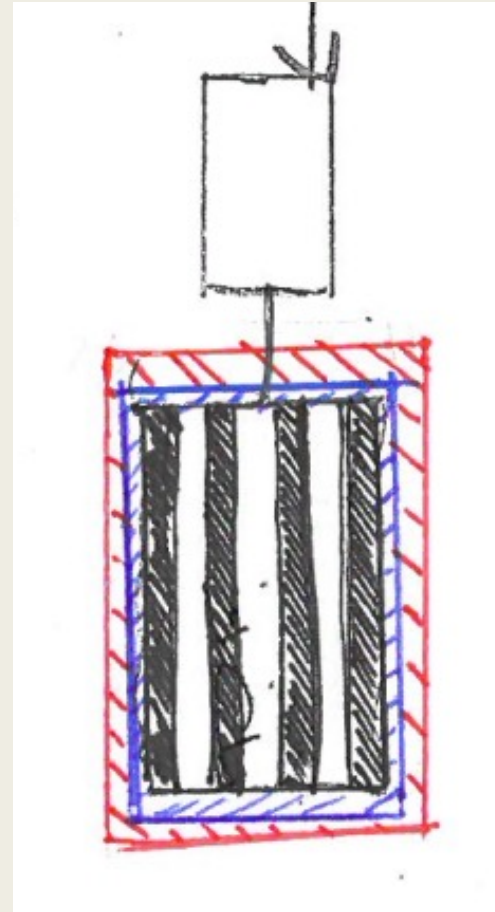
Requires filing a public records notice regarding the nitrogen-reducing media requiring special repair or maintenance procedures

Unobstructed Area (INRB)

- No change to calculation
- Media layer is not considered an obstruction

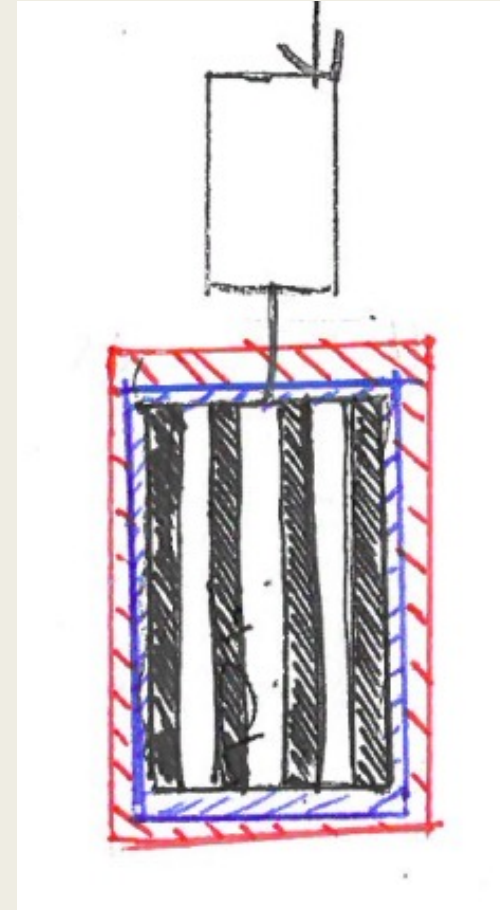
Application requirements

- Site plan must meet all current rule requirements (see HSES 09-010)
 - footprint of the INRB must be shown
- No change in site evaluation requirements
- Large (>1500 SF) systems, engineer must address and monitor mounding (accumulation of water above the less permeable denitrification layer) by use of an observation port.



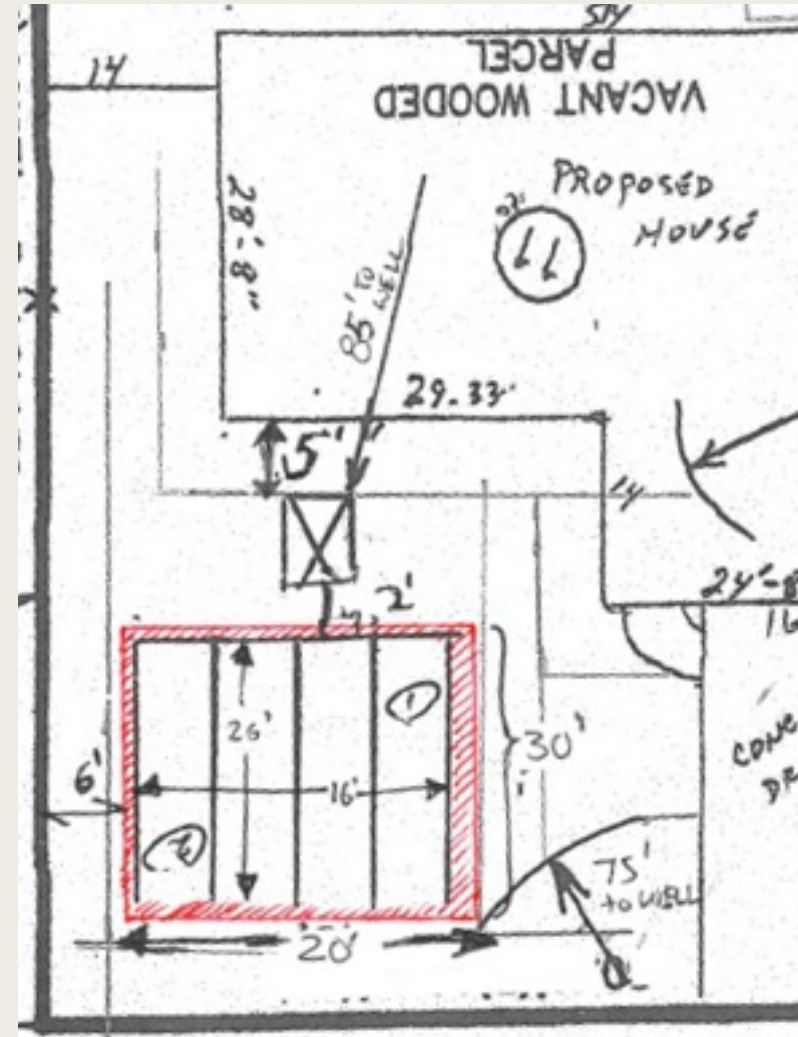
Site Plan - New

- Site plan must include scale drawing of the INRB footprint including the denitrification media layer
- Verify there is enough room for the drainfield, nitrification soil layer, and denitrification media layer



Site Plan - Repair

- Site plan must show:
 - actual setbacks
 - length and width of denitrification layer and drainfield
- Verify there is enough room for the drainfield, nitrification soil layer, and denitrification media layer



Calculations for the drainfield layer

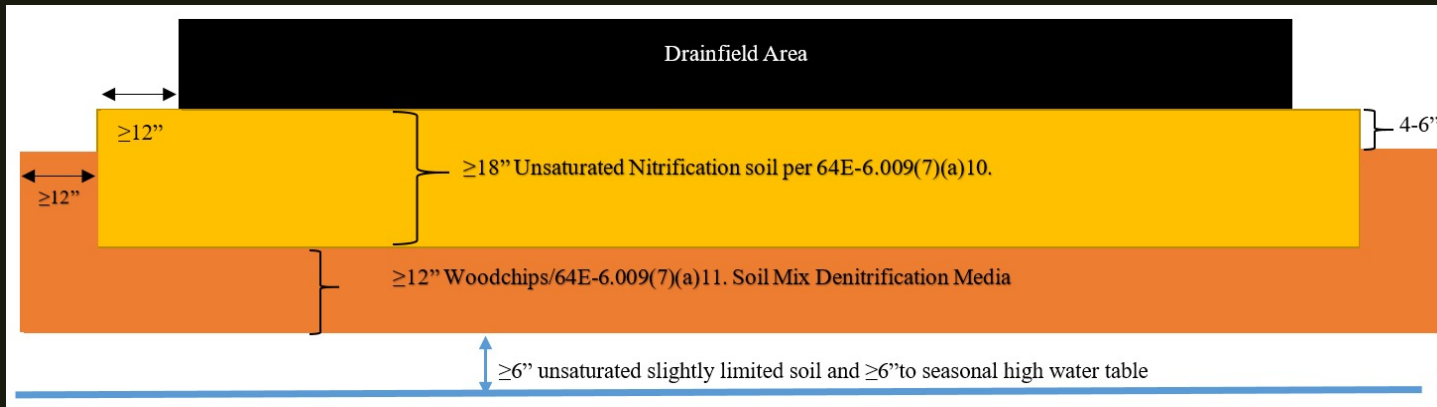
- Effective soil must extend at least 42” below bottom of drainfield
- Slightly limited soil must exist from ground surface to 6 inches below media layer
 - No excavation or soil replacement
 - Size drainfield on slightly limited material
- Can permit a mound using slightly limited fill
 - To meet SHWT separation ONLY

Calculations for the nitrification layer

- A sand fill material that is at least 18 inches thick
 - Fine aggregate having a texture of sand or fine sand but excluding:
 - Those having color values less than or equal to 4 with chromas less than or equal to 3; or
 - Those with colors on the gley charts.
- Shall extend at least one foot beyond the perimeter of the drainfield.

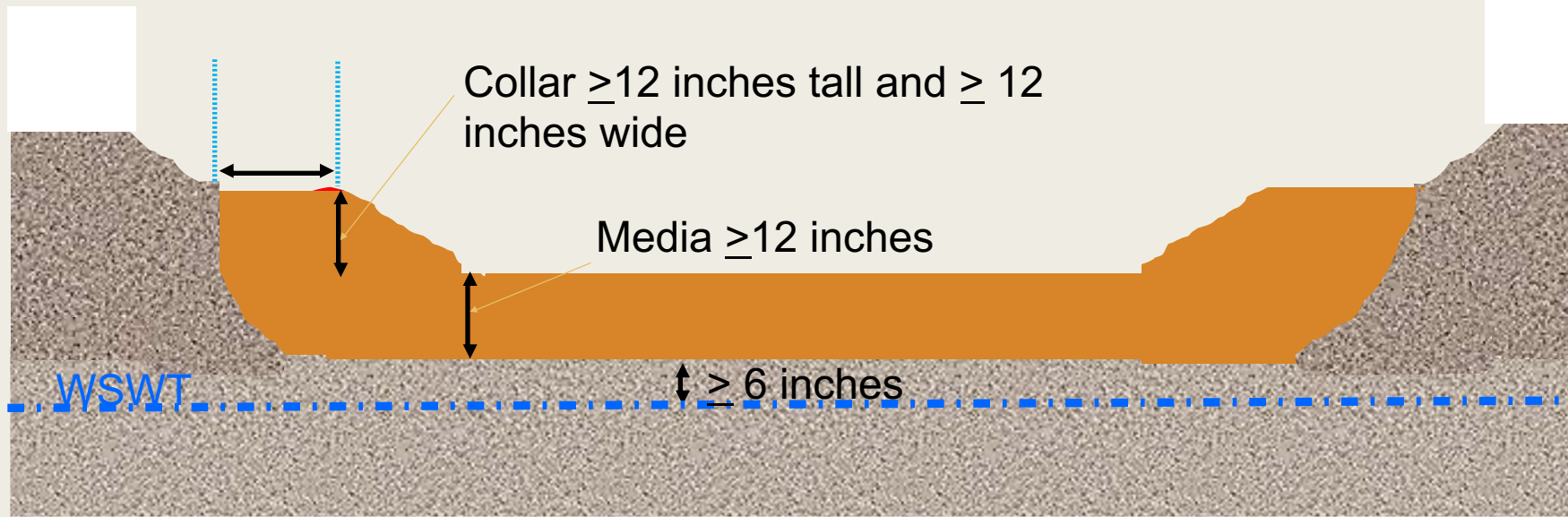
Calculations for the denitrification layer

- Media layer (mixture) of at least 12 inches
 - The media layer shall be a combination of nitrogen-reducing media and fine aggregate, which shall be composed of 40-60% nitrogen-reducing media by volume, with the remainder to be fine aggregate.
- Extends beneath the entire drainfield absorption surface
 - And extends at least 24 inches beyond the perimeter of any portion of the drainfield absorption surface and any other effluent release point.
- The drainfield shall be centered above the media layer.
- The media layer shall also extend upward along the boundary of the sand fill material to a point four to six inches below the bottom of the drainfield.



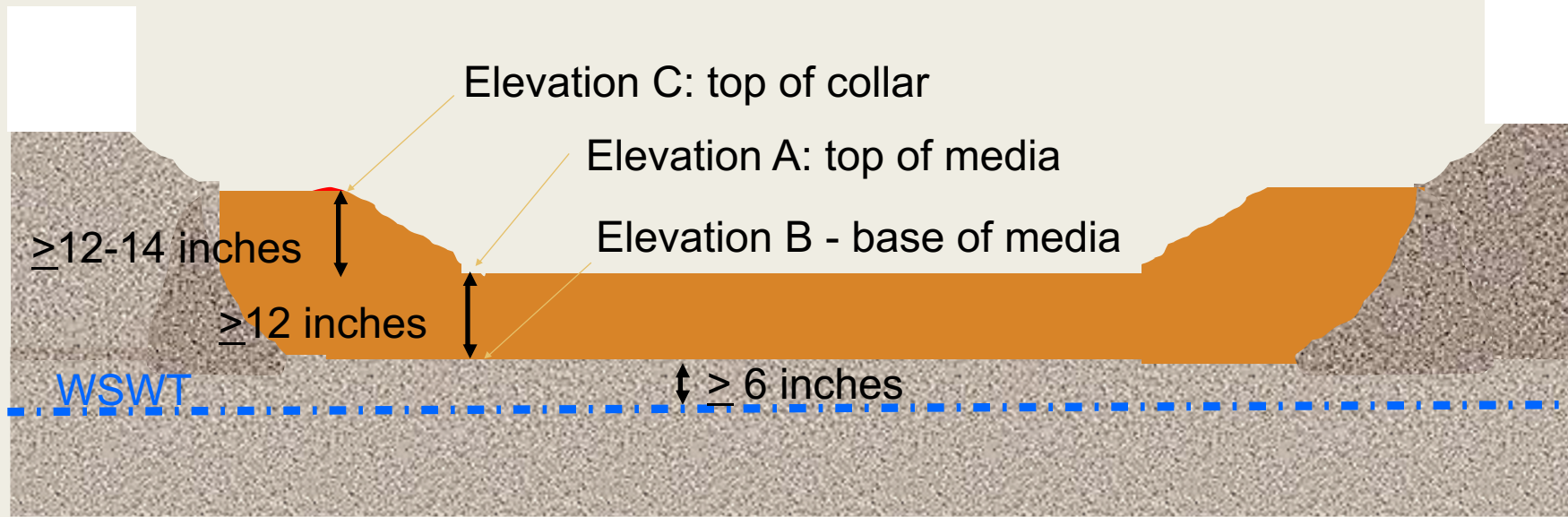
INSPECTION OF THE IN- GROUND NITROGEN- REDUCING BIOFILTERS (INRB)

Denitrification Media Layer: Elevations



- Media layer is at least 12 inches thick
- Extends beneath the entire drainfield absorption surface
- Extends at least 24 inches beyond the perimeter of the proposed drainfield
- Media layer collar extends ≥ 12 inches above top of media layer

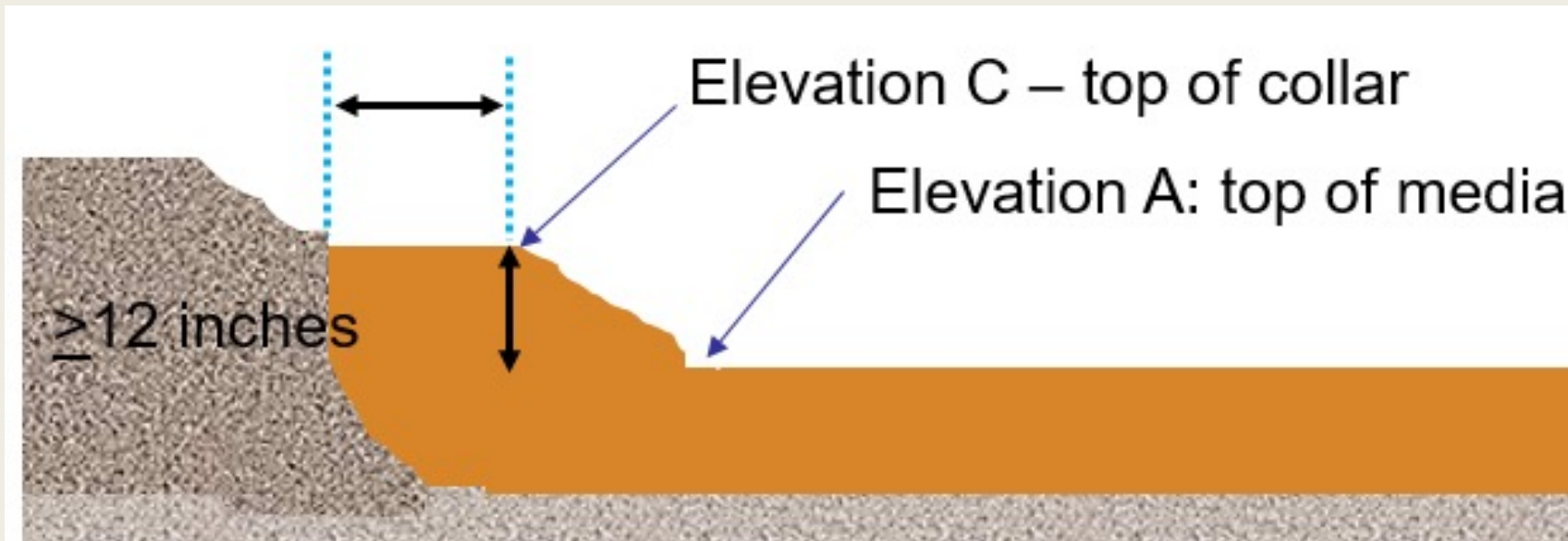
Denitrification Media Layer: Elevations



- Determine elevation of base of media layer “B,” in at least 3 locations
 - Can use probe or dig through layer if needed
 - Verify media layer is at least 12 inches thick at each location
 - Record lowest elevation in Remarks/Comments section of the form
- Determine elevation “A,” Top of Media
- Determine elevation “C,” Top of Collar
- Determine whether base of media is at least 6” above the WSWT

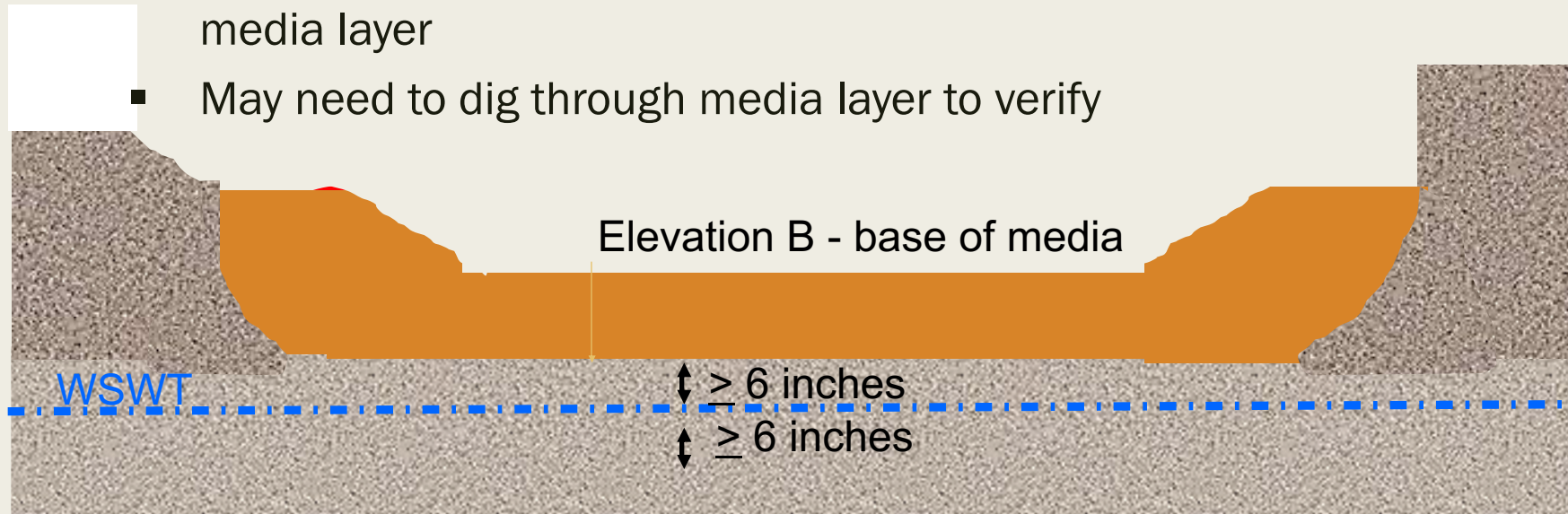
Denitrification Media Layer: Collar

- Elevation A: (measured previously)
- Elevation C: top of denitrification media layer (top of collar)
 - Difference C-A (collar) must be at least 12 inches
- Measure width of Collar, Determine if at least 12 inches wide

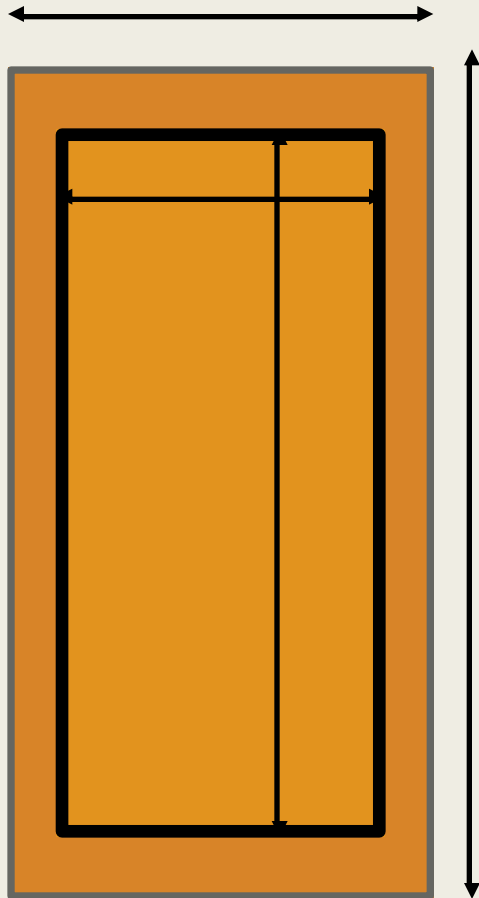


Soil Validation

- Validate soil profile if site evaluation was not performed by DOH
 - WSWT (minimum 6 inches separation to bottom of media layer)
 - Texture (slightly-limited for at least 6 inches below bottom of media layer)
 - Effective soil depth extending at least 12 inches below bottom of media layer
 - May need to dig through media layer to verify



Media Footprint and Setbacks



- Media should be somewhat compacted
- Measure width and length of INRB footprint (outside collar)
 - It should be at least 4 ft wider and longer than the proposed drainfield area (2 ft perimeter on all sides)
- Measure width and length of the area within the collar
- Use as-built to ensure next inspector can locate perimeter of media
- Measure setback distances from edge of nitrogen-reducing layer

Lignocellulosic Denitrification Material

- Validate that the lignocellulosic material meets the standards in Rule 62-6.009(7)(a)8, FAC “lignocellulosic material such as chips or shavings of untreated lumber, blended urban waste wood mulch, yellow pine sawdust, or 2-inch to 3-inch wood chips”

Fine Aggregate Denitrification Media

- Validate that the “sand” material meets the standards in Rule 62-6.009(7)(a)11., FAC:
“coarse sandy loam, sandy loam, loamy sand, fine sandy loam, very fine sand, loamy fine sand, and loamy very fine sand”, subject to color restrictions
 - Installer has raw material separately
 - Texture
 - Lab analysis (if necessary)

Inspection Form

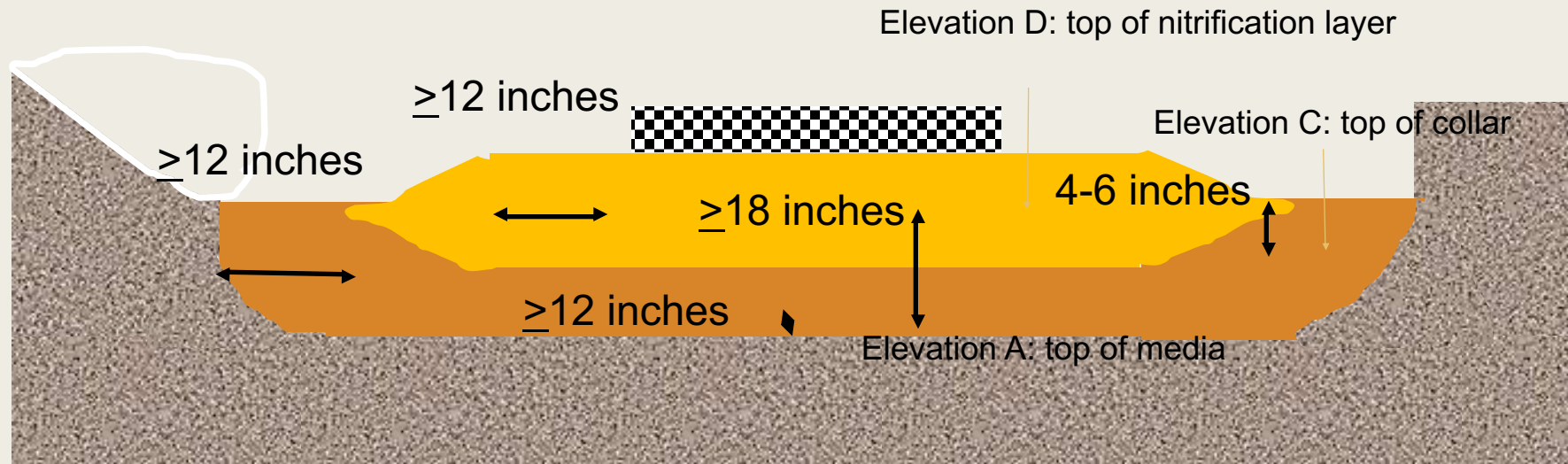
- Keep notes for next inspection and documentation
- Record bottom of media layer elevation in final inspection comments

Denitrification Media Layer

- Once the nitrogen-reducing media has been installed, inspected and given the approval to proceed, the installer will then complete the drainfield installation

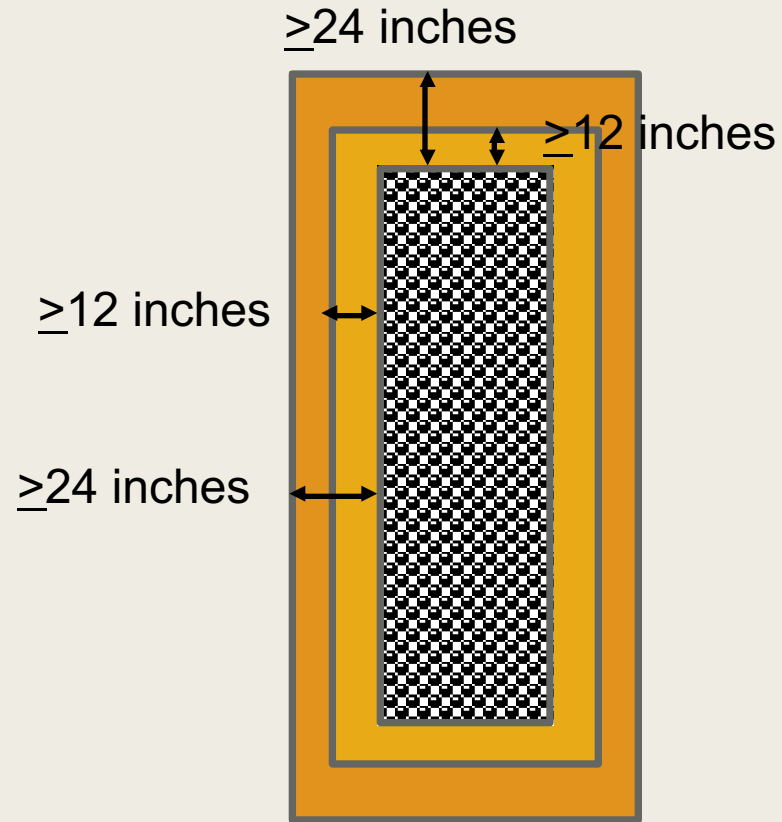


Nitrification Layer and above



- Top of nitrification layer = bottom of drainfield absorption surface
- Validate that nitrification material has correct texture (sand or fine sand) and color
- Measure elevation “D” of top of nitrification layer
 - validate that thickness is sufficient (minimum 18 inches throughout)
 - The difference between Elevation “A” and Elevation “D”
 - not less than 4 inches and not more than 6 inches above collar of the media layer
 - The difference between Elevation “D” and Elevation “C”

Nitrification Layer and above

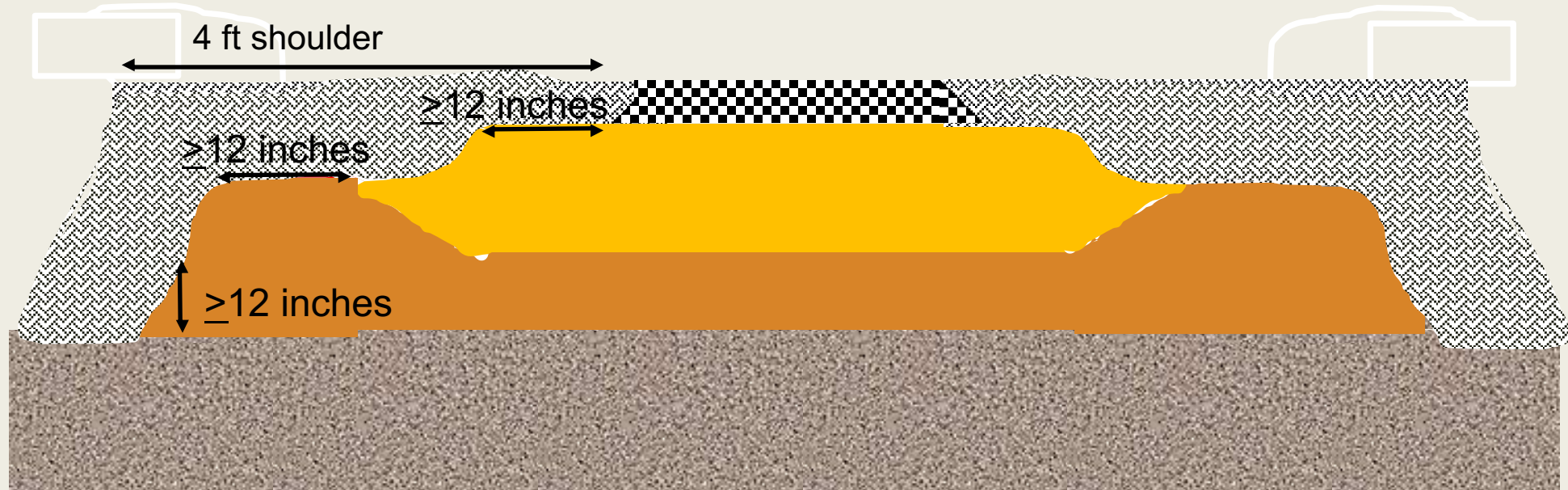


- Validate the drainfield is centered in the media layer (≥ 24 " perimeter)
- Measure and record setbacks from drainfield (system setback first, denitrification media layer setback second)
- Inspect drainfield
- Record in EHD

Inspection Form

- Document both setbacks:
 - System first, media layer second
- Document in “EXPLANATION OF VIOLATIONS / REMARKS” section:
 - Elevation of bottom of media layer (B)

Mounds



The 4-foot shoulder is measured from the outside edge of the drainfield product

FINAL APPROVAL OF THE IN-GROUND NITROGEN-REDUCING BIOFILTERS (INRB)

- Final installation approval shall not be granted until the county health department has confirmed that the property owner has executed and recorded in the public property records at the county courthouse,
 - a written notice that informs all subsequent property owners of the use of the nitrogen-reducing media onsite system that may require special repair or maintenance procedures.
 - The notice shall include the department's construction permit number for the system, and that additional information may be obtained by contacting the county health department.

REPAIR OF THE IN-GROUND NITROGEN-REDUCING BIOFILTERS (INRB)

- Drainfield repair shall not necessitate media replacement provided:
 - the media has been in use for less than 10 years
 - or if sampling within the previous 12 months shows denitrification at or above the target level for mean total nitrogen (TN) removal efficiency which shall be a minimum 65%.

Repairs

- Must be inspected by county health department
- No final inspections by master septic tank contractor (Rule 62-6.009(7)(c), FAC)
- No alternative repair methods (Rule 62-6.009(7)(c), FAC)
- If an INRB needs to be repaired and the drainfield expanded, media layers have to be extended, too

LARGE SYSTEMS (>1500 SQUARE FEET) IN-GROUND NITROGEN-REDUCING BIOFILTERS (INRB)

- The design engineer shall address the potential for mounding of the effluent between the drainfield and the bottom of the media layer at the estimated sewage flow
- Will increase the separation between the drainfield and the layer required in subparagraph 2 to ensure no less than 18 inches of unsaturated soil beneath the drainfield.
- A four-inch diameter observation port in the center of the drainfield shall be installed to monitor this parameter.
 - The observation port shall be capped and lockable and installed within a protective surface cover. A toilet flange shall be securely attached to the bottom of the observation port to prevent the port from being inadvertently raised from its installed position. The observation port, including the flange, shall be perforated at the lowest elevation possible to allow accurate measurements. If installed within three feet of the sidewall of a bed or trench, the port shall be grouted to prevent effluent from flowing down the outer surface of the port to the media.



QUESTIONS/COMMENTS