



# OSS Commercial Designer Workshop

## Soil Absorption Fields Components and Design Elements



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November 7, 2017



Indiana State  
Department of Health

# Soil Absorption Field

- Conventional Technologies
  - Subsurface Trenches
    - Gravity
    - Flood Dosed
    - Pressure Distribution
    - Stone/Pipe
    - Chambers
    - Tire chips/Pipe
  - Elevated Sand Mound
- Technologies New to Indiana
  - Chambers with reduced size soil absorption 
  - Max 25% may be allowed
  - Sand lined systems 
    - Certification required

# Soil Absorption Field

## General parameters

- Properly sized
- Adequately described with soil evaluation
- Contour
- Above the regulated flood plain elevation

	<input type="checkbox"/>	<i>Check here if no "Subsurface Trench Soil Absorption Fields" in this project and skip to the next section.</i>	
YES	N/A	Subsurface Trench Soil Absorption Fields <a href="#">(410)AC.6-10.1-83</a>	<a href="#">Example Drawing</a>
		All trench bottoms above the 100 year floodplain elevation?	
		Beginning, middle and end ground and invert elevations provided for each lateral on plans and a note is placed on the plans stating: "Existing grade shots obtained on-site are provided for the soil absorption field. The affixed stamp of the engineer or architect certifies that this has been done and that the grade shots provided for the soil absorption field were not extrapolated from computer generated topography for the purposes of establishing contour lines."	
		Designed minimum and maximum trench depths adhere to Tech Data Sheet requirements?	

Meets or Exceeds	Does Not Meet	Additional Informatio	N/A	
				742
				744
				746

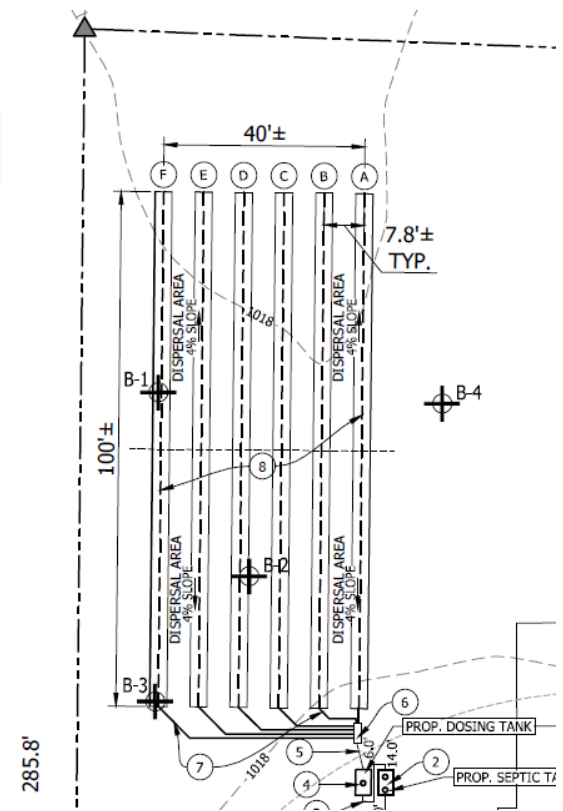
# Soil Absorption Field

## Proper Size

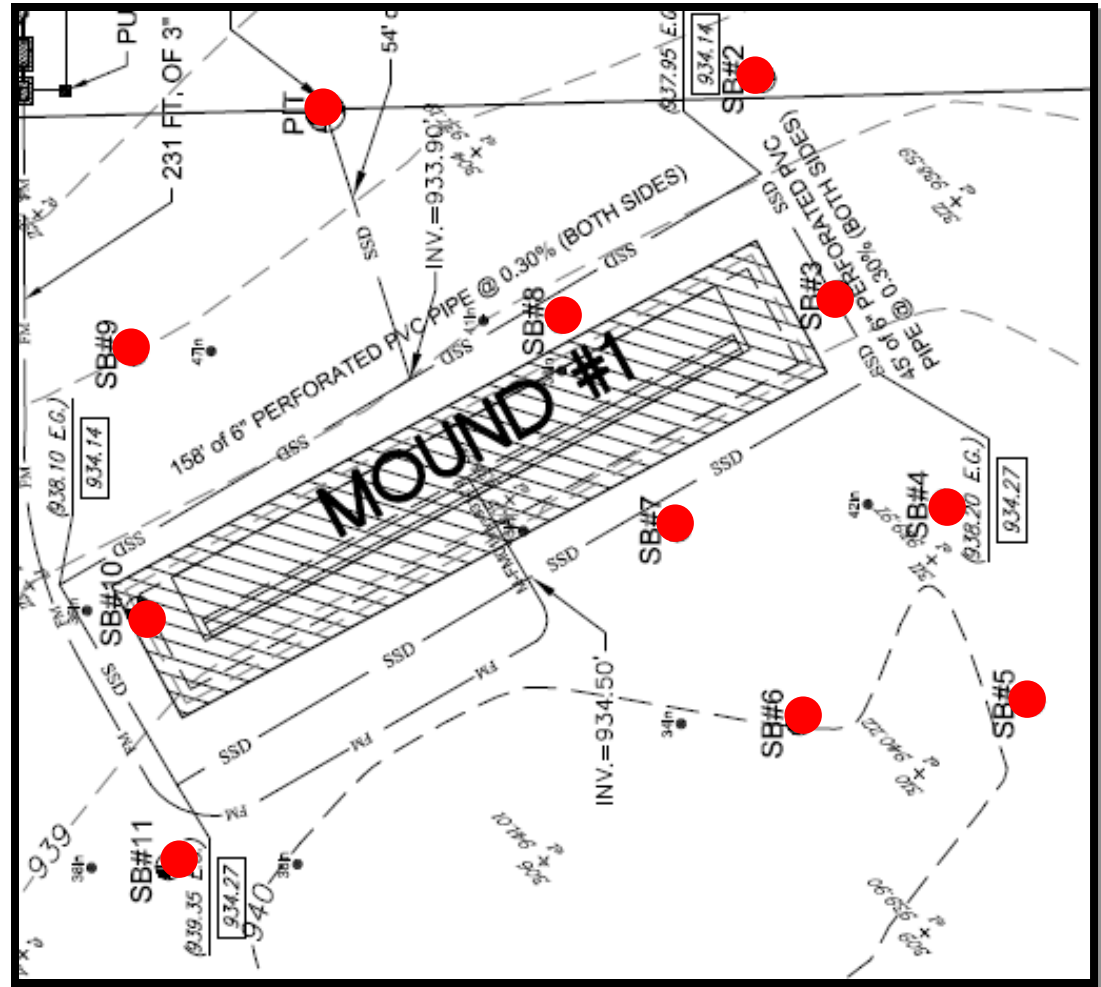
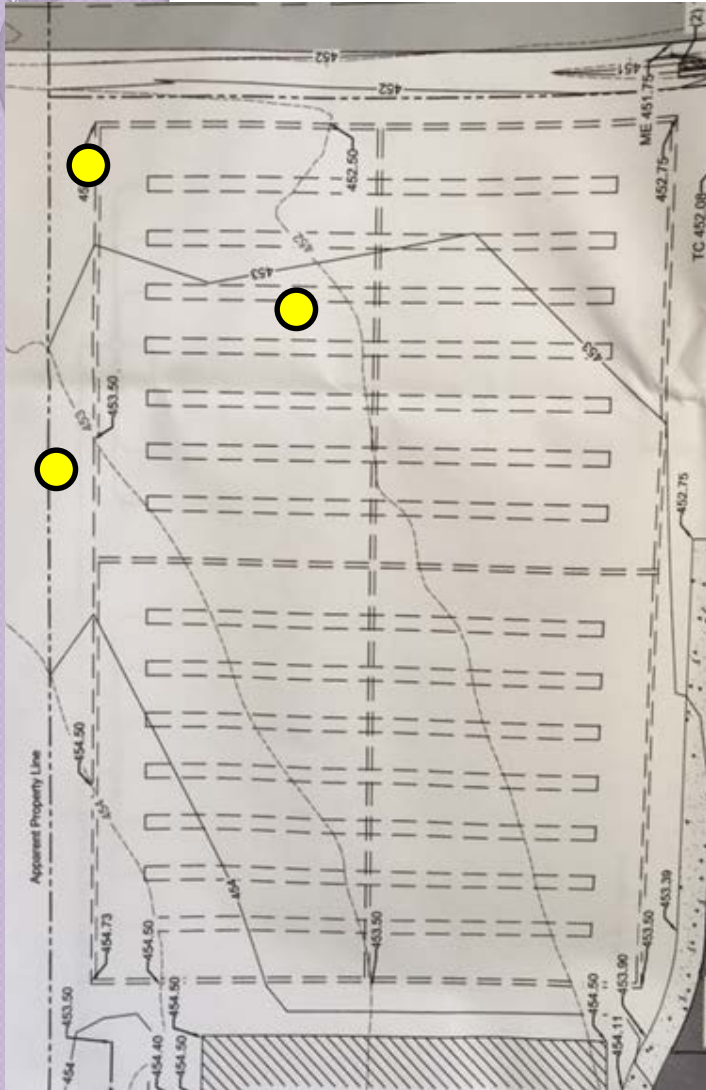
- Square footage per TDS
  - Number of trenches
  - Trench length (max. 100')
  - Trench width (18-36")
  - Aggregate Bed / Basal Area
- Sizing reduction for chambers
- Sand lined system sizing

25% sizing reduction  
1350 ft<sup>2</sup> = 450 LF

6 trenches  
100' long  
3' wide  
6 x 3' x 100' = 1800 ft<sup>2</sup>  
600 LF



# Adequately described?



# References to Contour

## § 51(a)(5) Plan requirements

- Topography with contours at 2' intervals or less

## § 82(g), (n) Subsurface Trenches

- Routed around tress as long as they follow contour
- Shall be constructed along the contour

## § 87(d)(1); 88(g); 89(a) Elevated Sand Mound design

- Long axis of aggregate bed and basal area must be constructed along the contour
- Complex slopes are hard to design and install on contour

## § 94(a)(4); 94(b) ESM site preparation

- Plow along the contour

COMMERCIAL ON-SITE SEWAGE SYSTEMS  
RULE 410 IAC 6-10.1



Indiana State Department of Health  
Environmental Public Health Division  
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Indianapolis, Indiana 46204  
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Rule revised and republished on September 2  
Rule revised and republished on May 1

# Contour

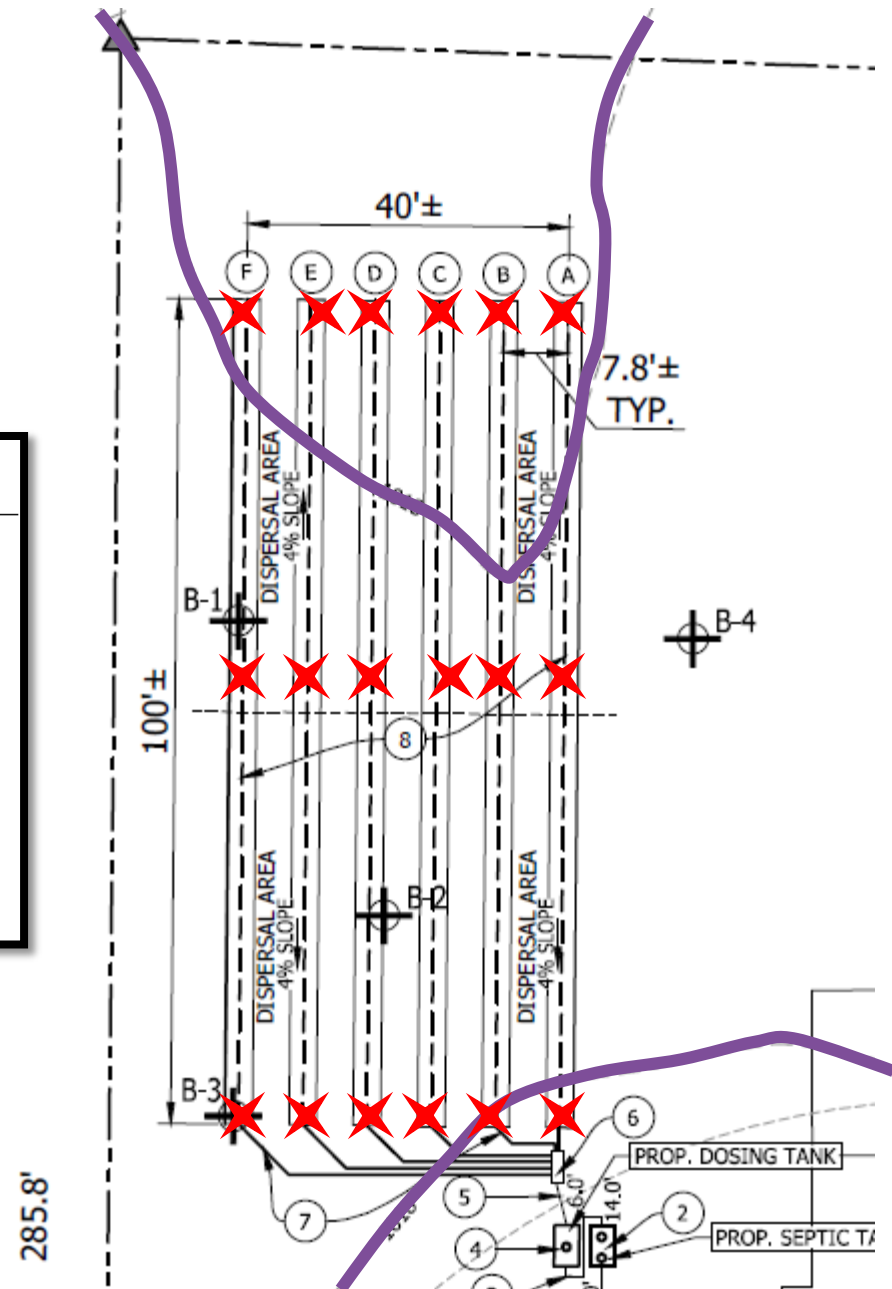


# Contour

## TRENCH ELEVATIONS:

	EXIST. GROUND BEGINNING	EXIST. GROUND MIDDLE	EXIST. GROUND END	PERFORATED PIPE INV.	TRENCH INV.
A	1017.92	1018.29	1018.12	1017.50	1017.00
B	1018.00	1018.28	1018.33	1017.40	1016.90
C	1018.05	1018.28	1018.48	1017.30	1016.80
D	1018.13	1018.32	1018.50	1017.20	1016.70
E	1018.19	1018.30	1018.32	1017.10	1016.60
F	1018.22	1018.31	1018.13	1017.00	1016.50

**A site visit is  
REQUIRED  
to obtain site specific  
grade elevations.**





# Contour and Trench Depth

Designed minimum and maximum trench depths adhere to Tech Data Sheet requirements?

--	--	--	--

746

	Trench #1	Trench #2	Trench #3
Trench Bottom Elev. (feet):	921.00	920.80	920.60
Beginning Grade Elev. (feet):	922.50	922.25	922.10
Middle Grade Elev. (feet):	922.40	922.30	922.05
End Grade Elev. (feet):	922.50	922.25	922.05
On Contour:	1.20	0.60	0.60
Minimum Depth (inches):	16.80	17.40	17.40
Maximum Depth (inches):	18.00	18.00	18.00
	Trench #4	Trench #5	Trench #6
Trench Bottom Elev. (feet):	920.40	920.20	
Beginning Grade Elev. (feet):	921.90	921.70	
Middle Grade Elev. (feet):	921.90	921.68	
End Grade Elev. (feet):	921.90	921.66	
On Contour:	0.00	0.48	0.00
Minimum Depth (inches):	18.00	17.52	0.00
Maximum Depth (inches):	18.00	18.00	0.00
	Trench #7	Trench #8	Trench #9
Trench Bottom Elev. (feet):			
Beginning Grade Elev. (feet):			
Middle Grade Elev. (feet):			
End Grade Elev. (feet):			
On Contour:			
Minimum Depth (inches):			
Maximum Depth (inches):			

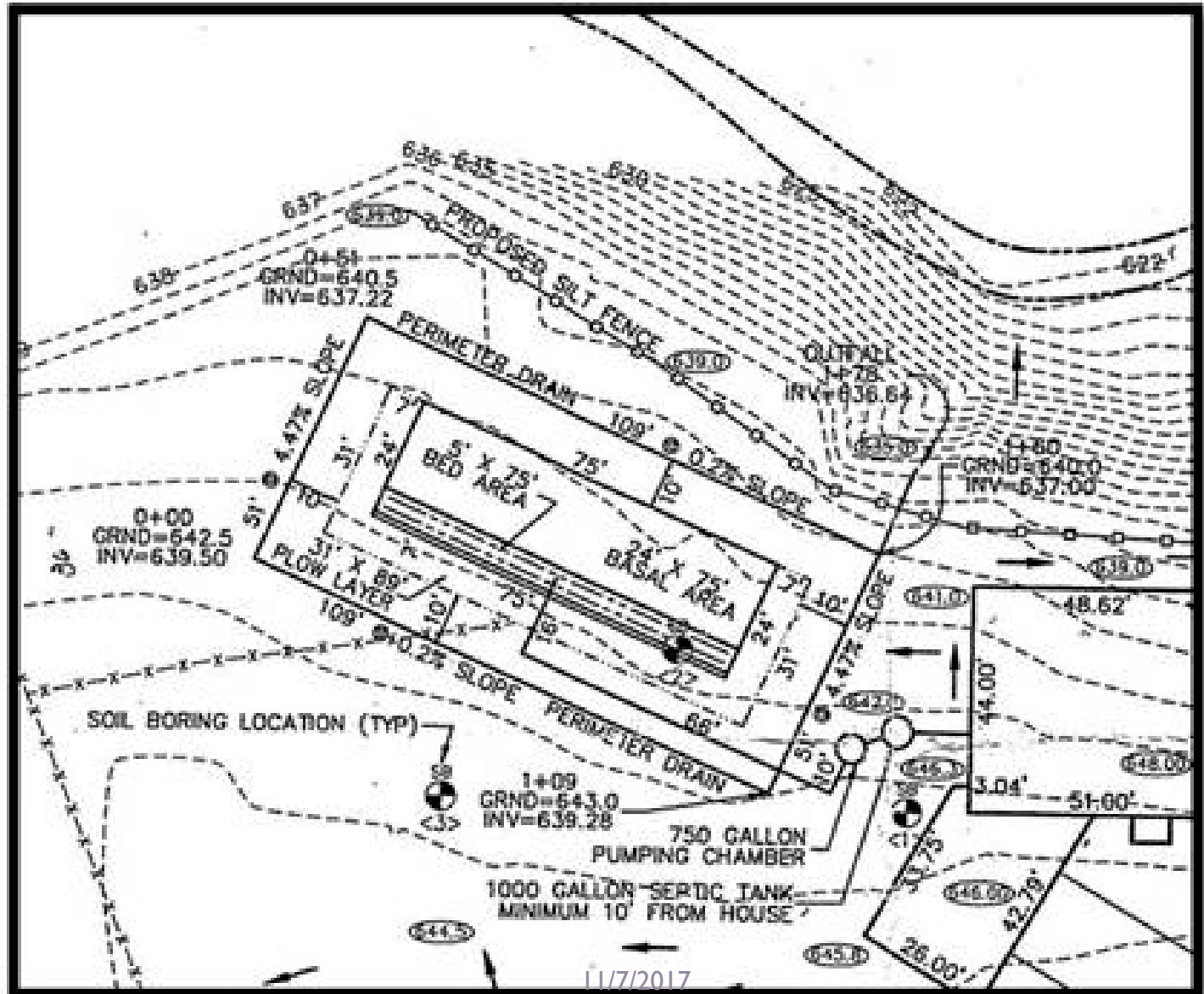
Trench bottom elev  
Existing Grade Elevations

Trench bottom elev  
Existing Grade Elevations

**A site visit is  
REQUIRED  
to obtain site specific  
grade elevations.**

- ✓ On Contour??
- ✓ Minimum Trench Depth
- ✓ Maximum Trench Depth

# On contour?





Parkview

**Structure**



820

860

930

910

890

880

840

880

890

970

960

1000

950

980

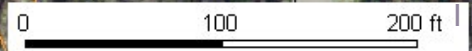
960

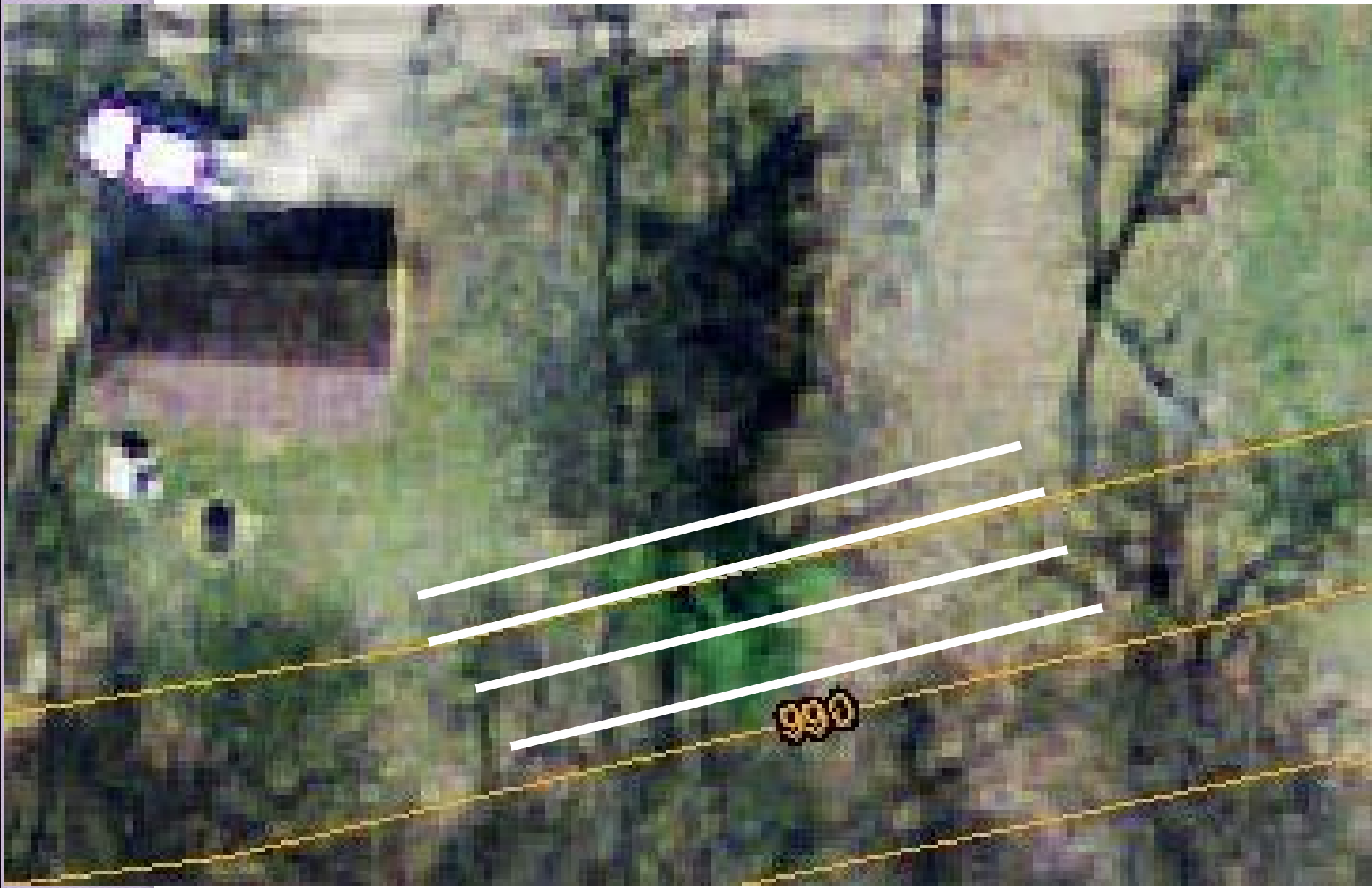
940

960

970

11/7/2017





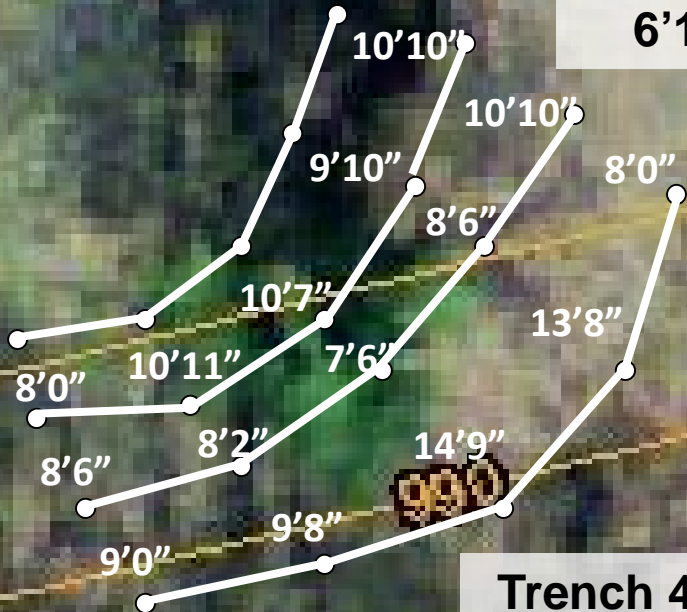
**TBM Rod Reading**  
**5'1½"**



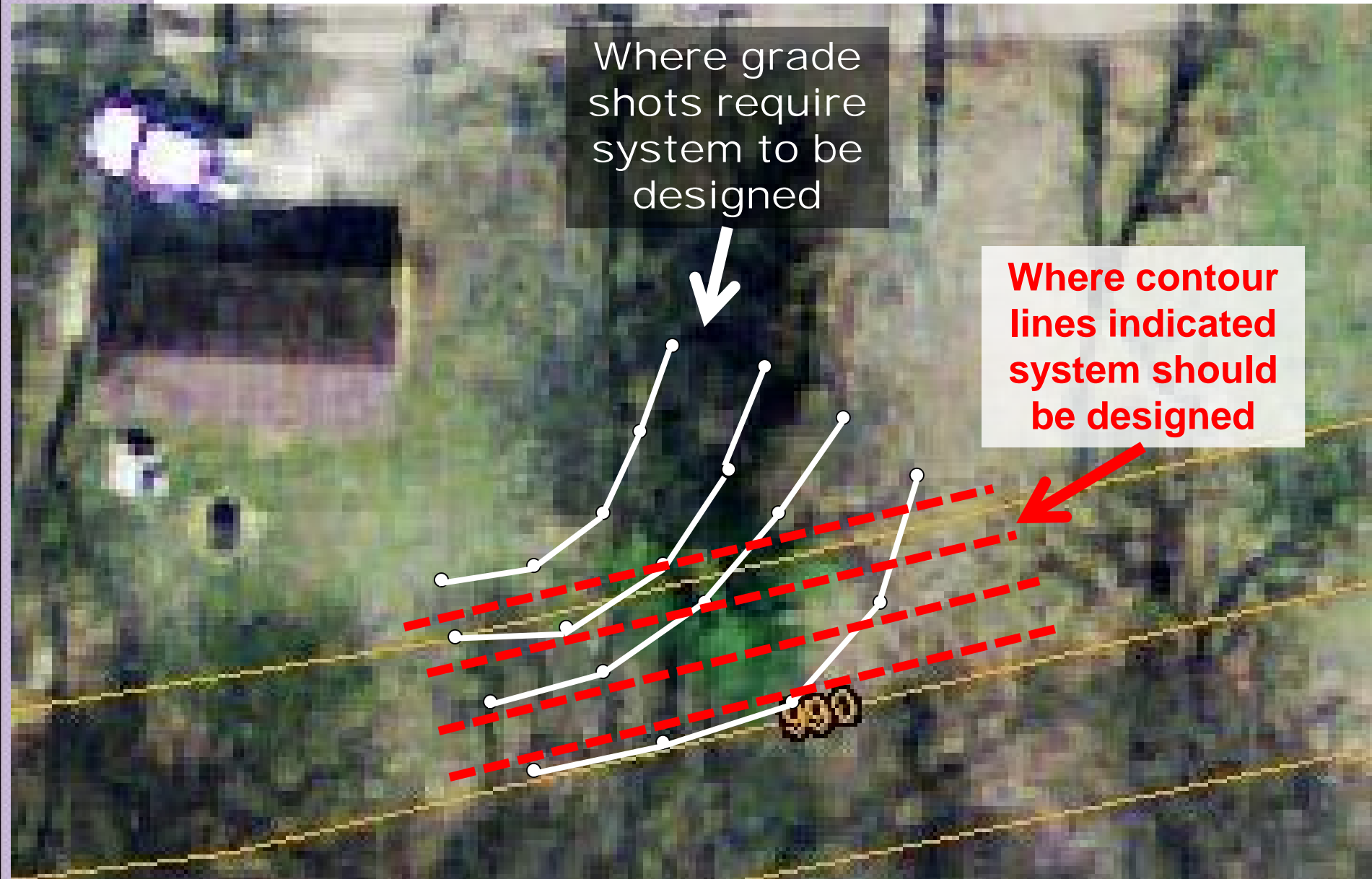
**Trench 1 Rod Reading**  
**4'8"**

**Trench 3 Rod Reading**  
**6'10"**

**Trench 2 Rod Reading**  
**6'0"**



**Trench 4 Rod Reading**  
**7'8¾"**



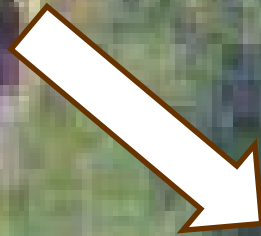
Where grade shots require system to be designed

Where contour lines indicated system should be designed

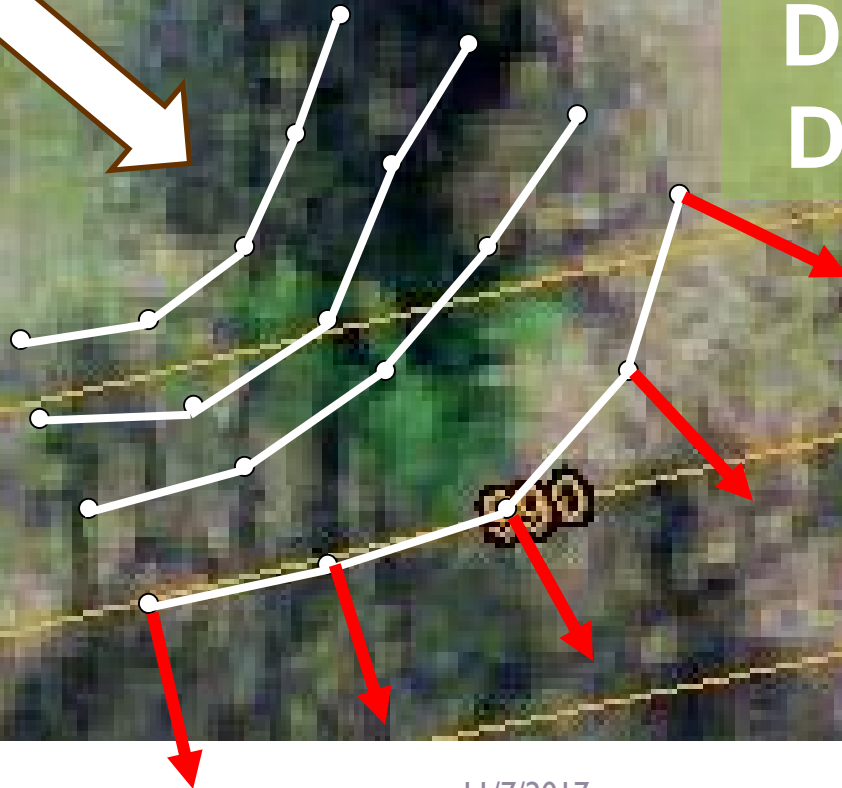
# Special Considerations

**Dispersal Area**

**Slope**



**Divergent Dispersal**

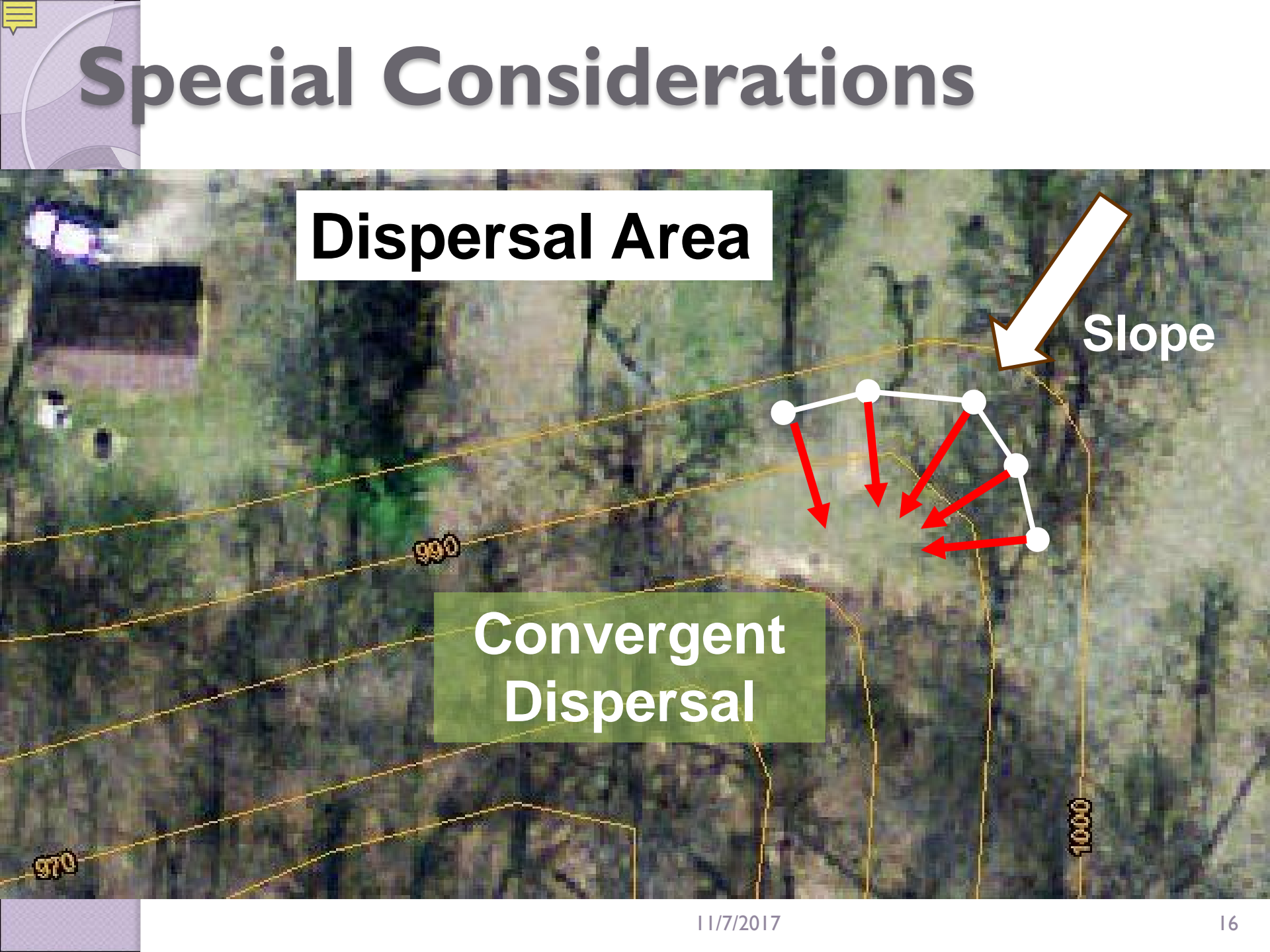


# Special Considerations

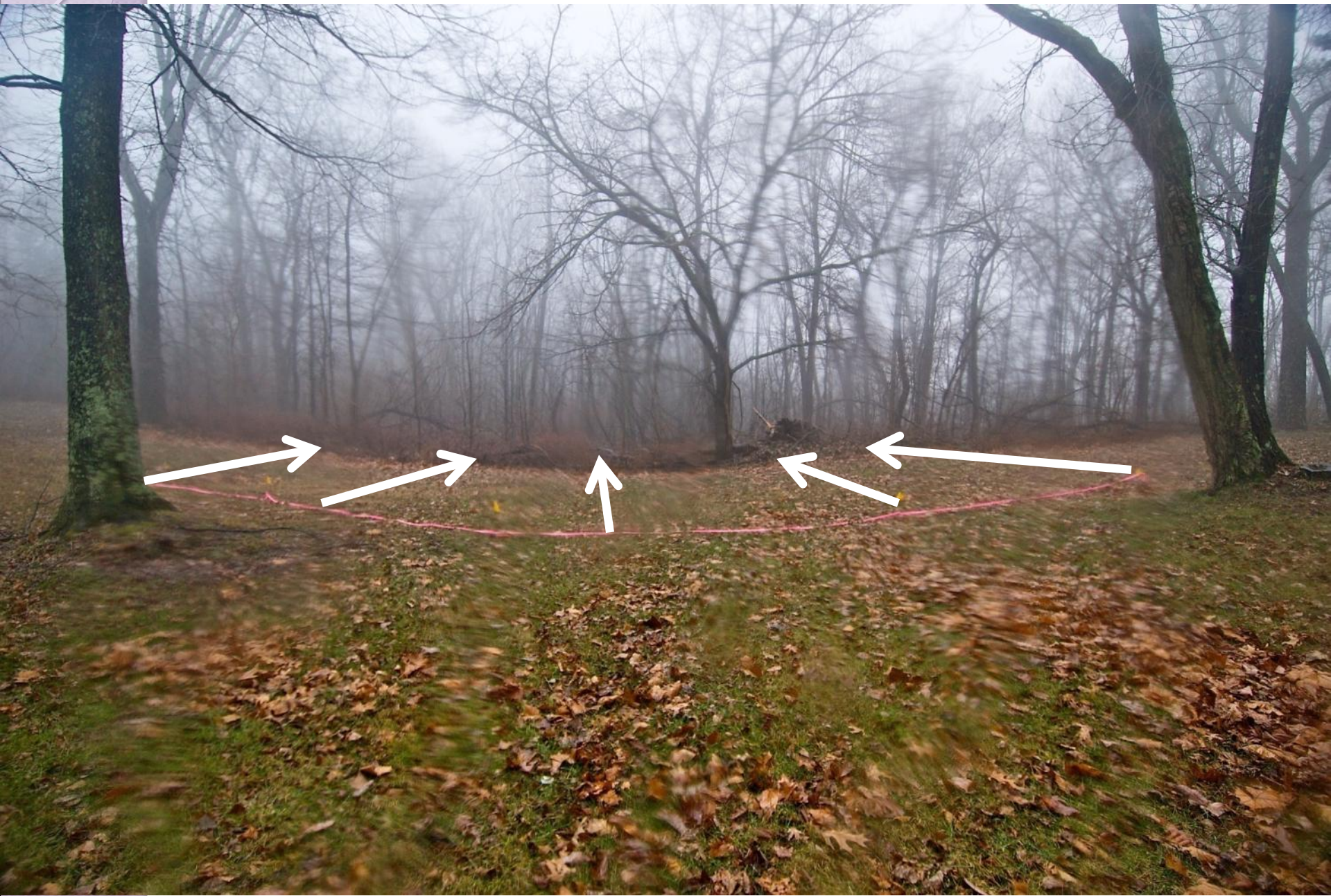
**Dispersal Area**

**Slope**

**Convergent  
Dispersal**







# Subsurface Trench SAF

<input type="checkbox"/>	<input type="checkbox"/>	Subsurface Trench Soil Absorption Field	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	805
		<u>Type of Distribution</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	807
<input type="checkbox"/>		Gravity Feed	<input type="checkbox"/>					
<input type="checkbox"/>		Gravity Feed Alternating Fields	<input type="checkbox"/>					
			<input type="checkbox"/>					
			<input type="checkbox"/>					
		<u>Design Requirements</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	815
<input type="checkbox"/>		Site slope confirmed $\leq 15\%$ ?	<input type="checkbox"/>					817
<input type="checkbox"/>		Bottom of trench level?	<input type="checkbox"/>					819
<input type="checkbox"/>		Proper lateral pipe placement (4-8-12 or 4-8) shown on plan?	<input type="checkbox"/>					821
<input type="checkbox"/>		Lateral pipe level throughout length of trench?	<input type="checkbox"/>					823
<input type="checkbox"/>		Minimum 7.5' on-center lateral spacing? Smallest on-center spacing: <input type="text"/> (feet)	<input type="checkbox"/>					825
<input type="checkbox"/>		Minimum 12" soil cover, crowned over entire absorption field to promote surface runoff?	<input type="checkbox"/>					827
<input type="checkbox"/>		Size, number of trenches, width matches Technical Data: # of trenches: <input type="text"/>	<input type="checkbox"/>					829
		Total length (max 100' for each trench): <input type="text"/> width of trenches (18"-36"): <input type="text"/>	<input type="checkbox"/>					831
<input type="checkbox"/>	<input type="checkbox"/>	Distribution (Lateral) Pipe (check all that apply)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		<u>PVC</u>	<input type="checkbox"/>					
<input type="checkbox"/>		ASTM 2665-12 (4" only)	<input type="checkbox"/>					
<input type="checkbox"/>		ASTM F 891-10 SDR 35 (4" only)	<input type="checkbox"/>					
<input type="checkbox"/>		ASTM D 3034-08 (SDR 26 or 35 - 4" only)	<input type="checkbox"/>					
<input type="checkbox"/>		ASTM D2729-11(4" only)	<input type="checkbox"/>					
		<u>ABS</u>	<input type="checkbox"/>					
<input type="checkbox"/>		ASTM D 2661-11(4" only)	<input type="checkbox"/>					
<input type="checkbox"/>		ASTM D 2680-09 (4" only)	<input type="checkbox"/>					
<input type="checkbox"/>		ASTM D2751-05 SDR 23.5 or 35 (4" only)	<input type="checkbox"/>					
<input type="checkbox"/>		ASTM 480-12 (schedule 40 and 80 - 4" only)	<input type="checkbox"/>					
		<u>OTHER</u>	<input type="checkbox"/>					
<input type="checkbox"/>		ASTM F 480-12 (schedule 40 and 80 - 4" only)	<input type="checkbox"/>					
<input type="checkbox"/>		ASTM F 810-07 or AASHTO M252-09 Type SP (4" only)	<input type="checkbox"/>					
		<i>NOTE: Distribution pipe must have 5/8" or 3/4" holes spaced at 5" or less.</i>						
<input type="checkbox"/>	<input type="checkbox"/>	Approved Materials for Subsurface Trenches (check all that apply)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	852
<input type="checkbox"/>		Stone/gravel or tire chips and pipe	<input type="checkbox"/>					854
		<input type="checkbox"/> Fines, sand, clay removed (washed)	<input type="checkbox"/>					856
		<input type="checkbox"/> Aggregate/stone is a mixture of 1/2" - 2 1/2" size	<input type="checkbox"/>					858
		<input type="checkbox"/> Proper cross section on plans (6"-4"-2")	<input type="checkbox"/>					860
		<input type="checkbox"/> Tire chips with a nominal size of 2" with mixture of 1/2" - 4"	<input type="checkbox"/>					862
		<input type="checkbox"/> Approved barrier material <a href="#">(see ISDH approved list)</a>	<input type="checkbox"/>					864
<input type="checkbox"/>		Chamber	<input type="checkbox"/>					866
		Chamber Manufacturer: <input type="text"/>	<input type="checkbox"/>					868
		Chamber Model: <input type="text"/>	<input type="checkbox"/>					870
		<input type="checkbox"/> % reduction in size (max. 25%): <input type="text"/> (%)	<input type="checkbox"/>					



# Trench Cross Section

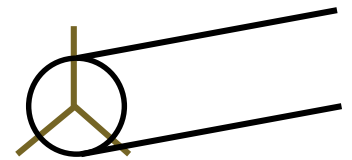
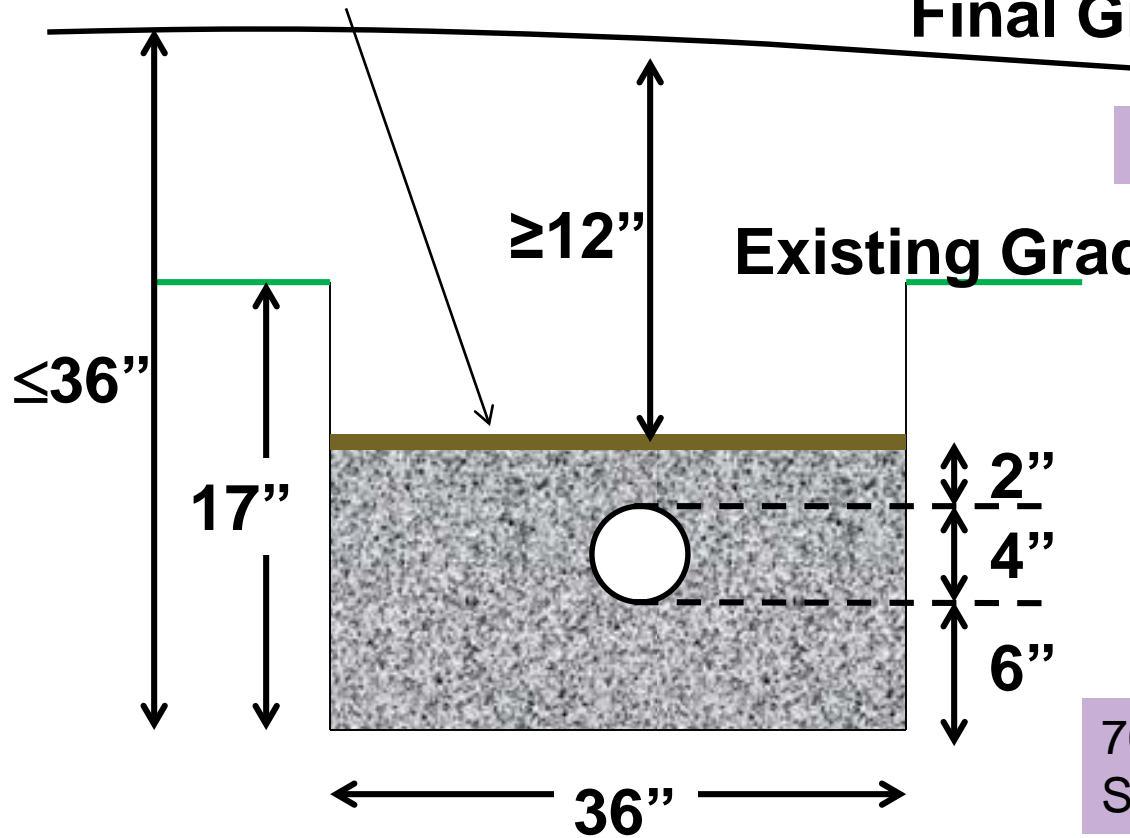
**Geotextile  
Barrier Material**

77 - Barrier Material Specification

**Final Grade**

75 - Pipe Specification

**Existing Grade**



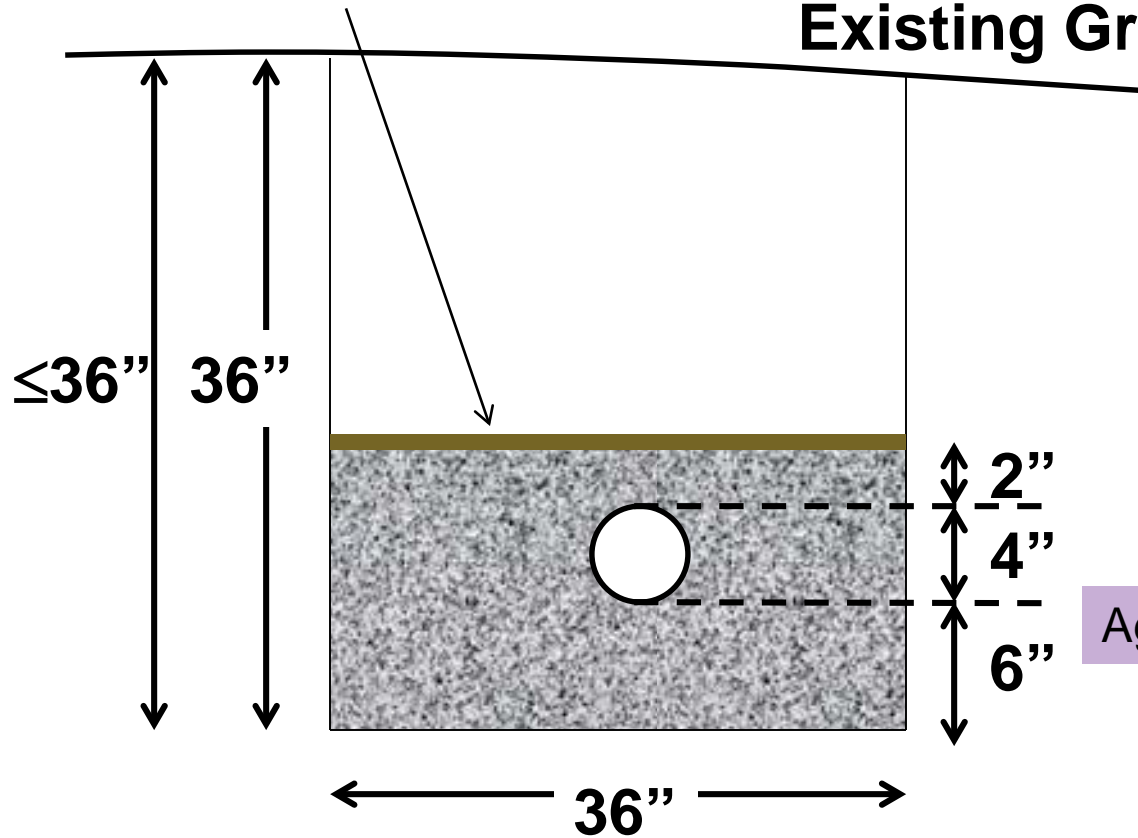
76 - Aggregate  
Specification

# Trench Cross Section

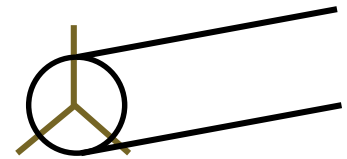
**Geotextile  
Barrier Material**

Barrier Material Specification

**Existing Grade = Final Grade**

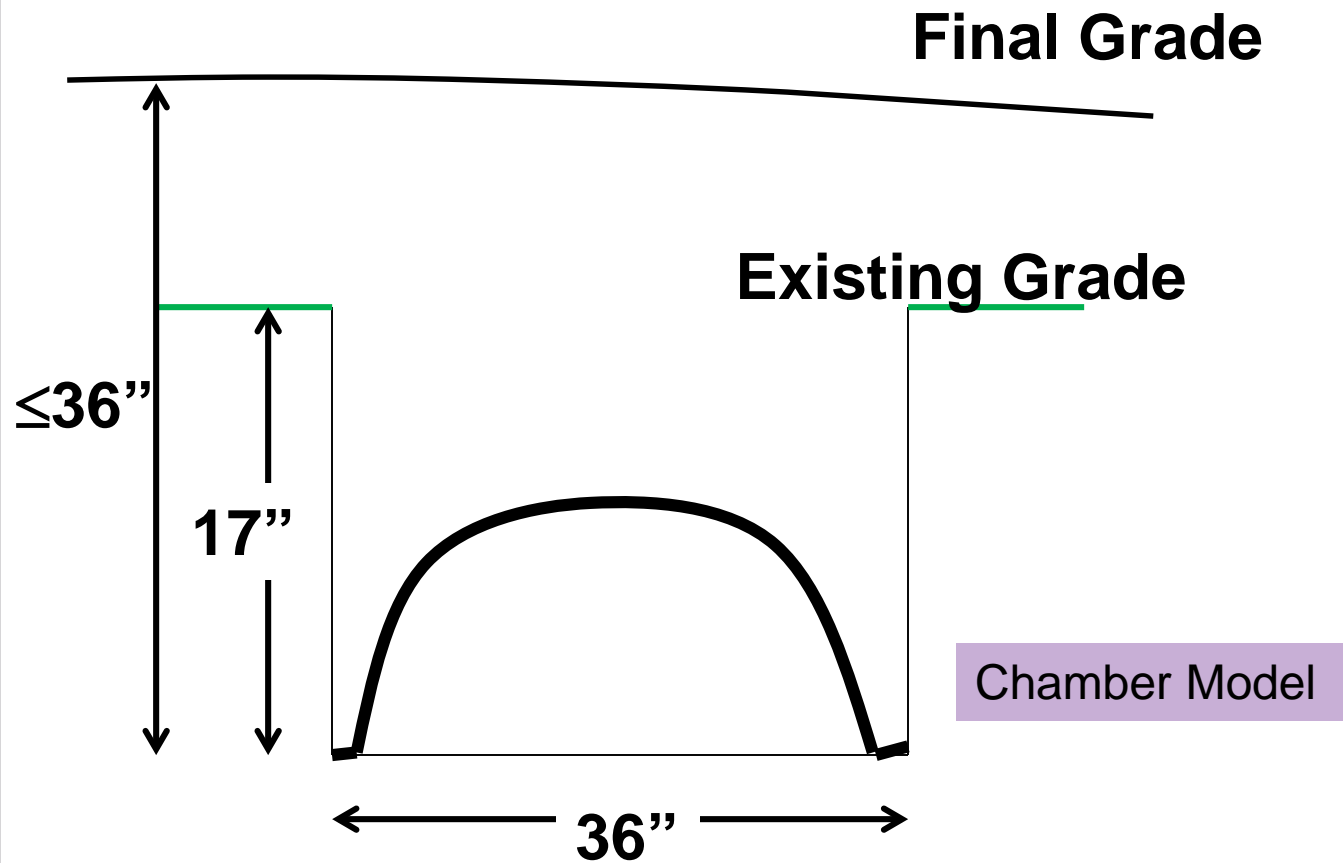


Pipe Specification

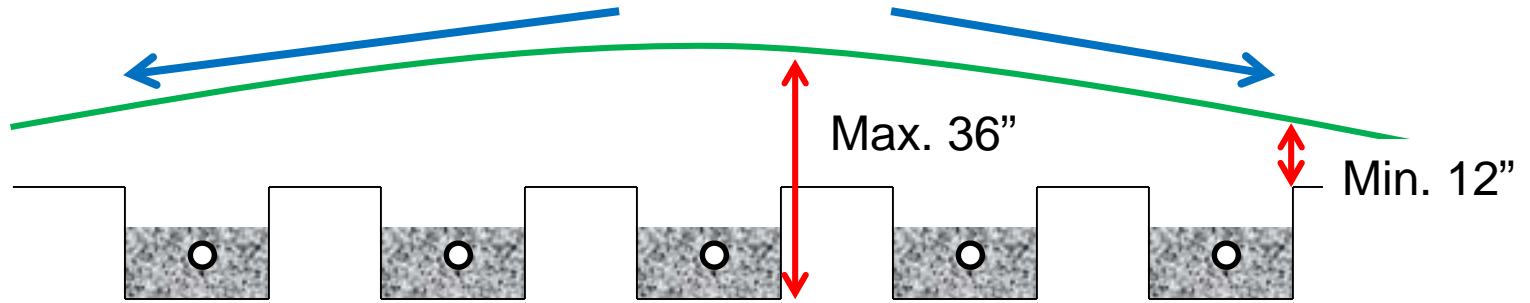


Aggregate Specification

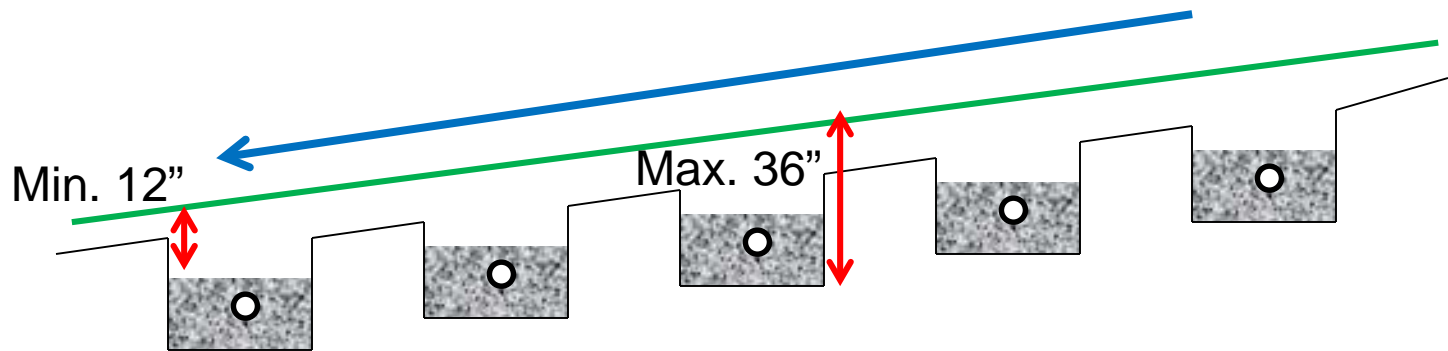
# Trench Cross Section



# Soil Absorption Trenches



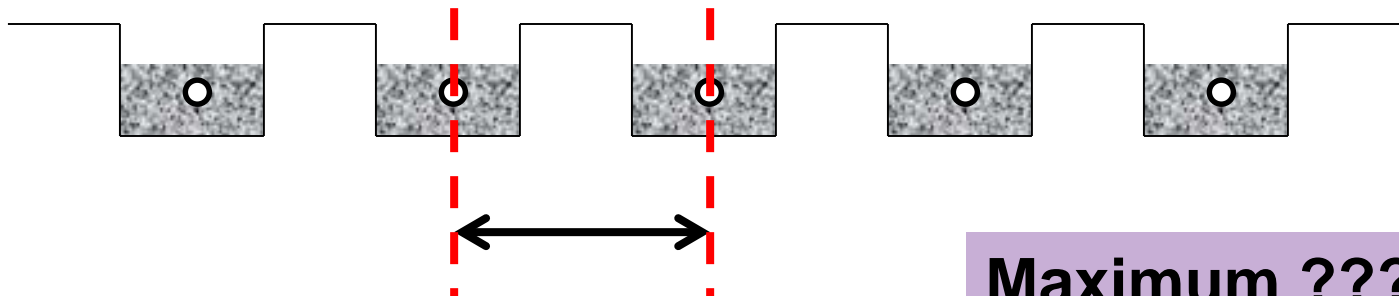
**Flat Site**



**Sloping Site**

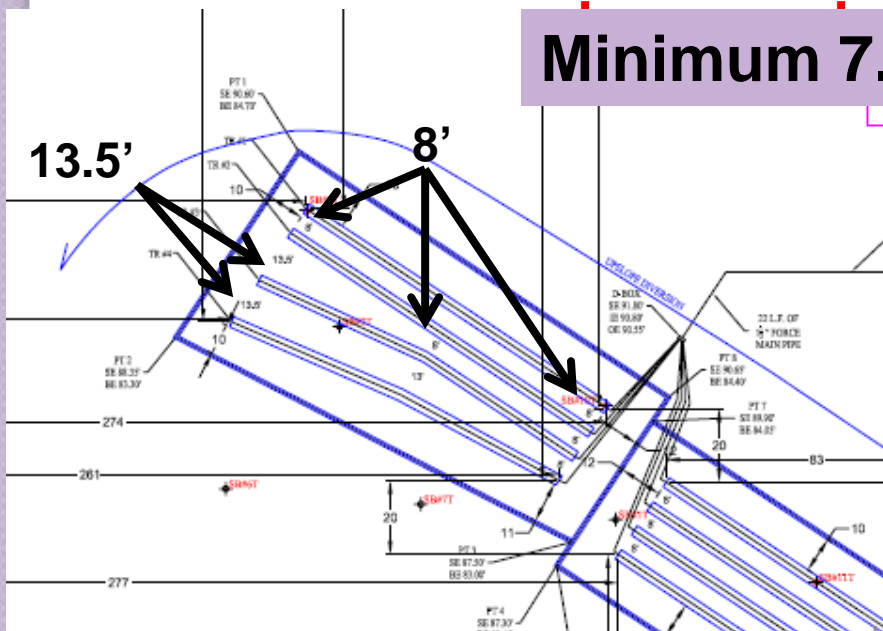
# Soil Absorption Trenches

## On-Center Separation



Minimum 7.5'

Maximum ???



Trenches do not have to run N-S or E-W

Trenches do not have to be parallel

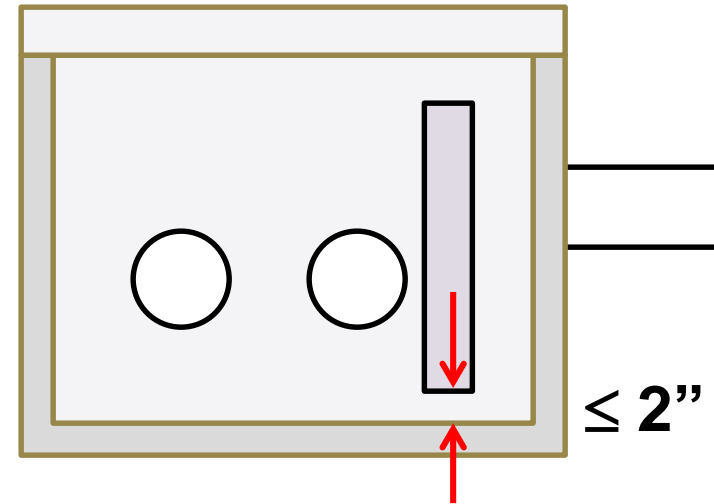
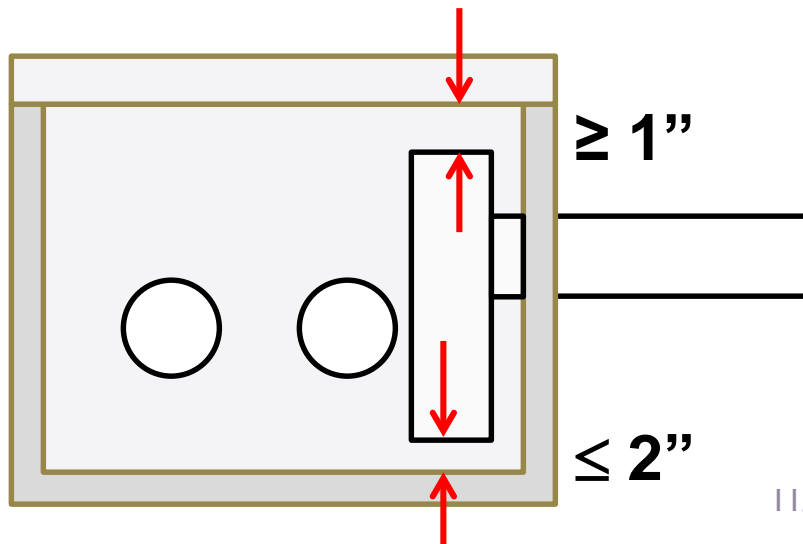


# Distribution Box

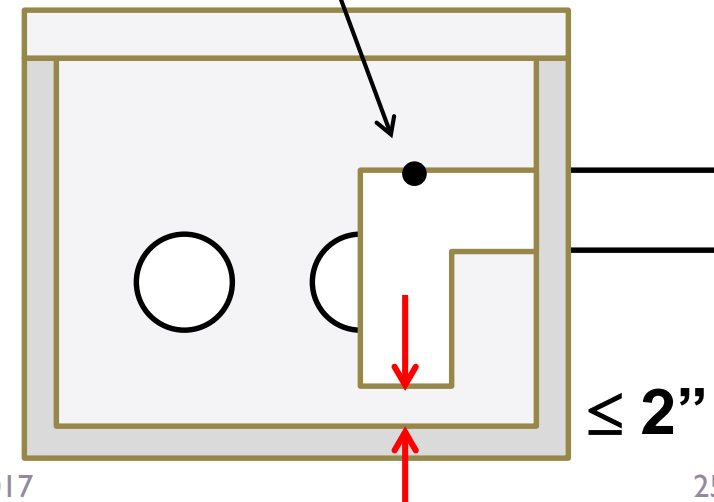
- Baffle
  - $\leq 2''$  from bottom of tee to bottom of box
- Sanitary Tee
  - $\geq 1''$  head clearance
- 90° Elbow with weep hole

Drawings for illustrative purposes only.

**Use the manufacturer's cut sheet**

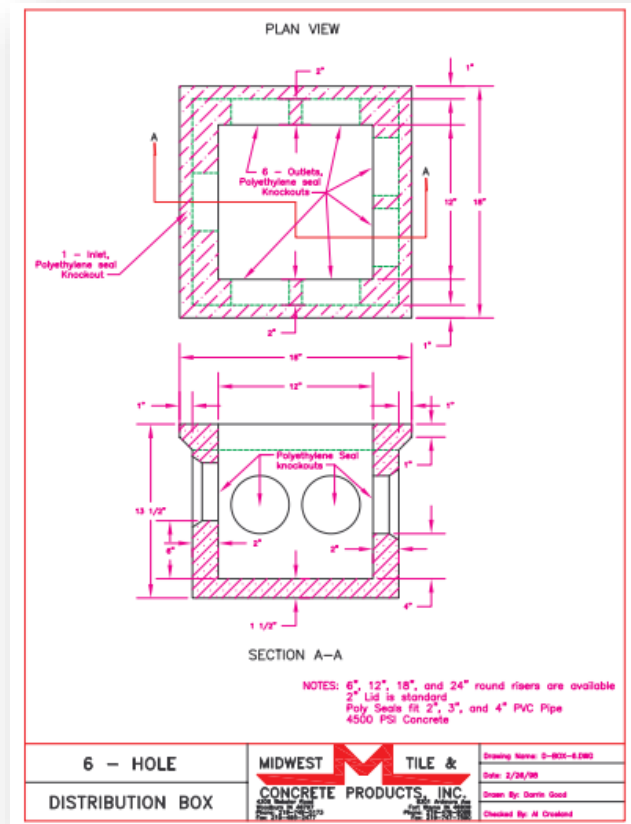


Weep hole



# Distribution Box

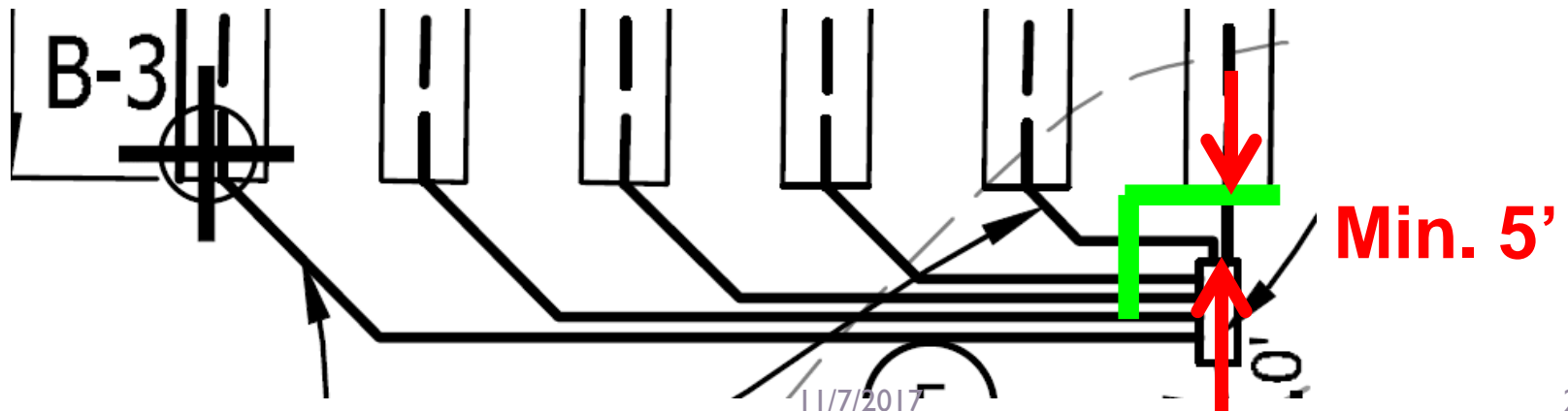
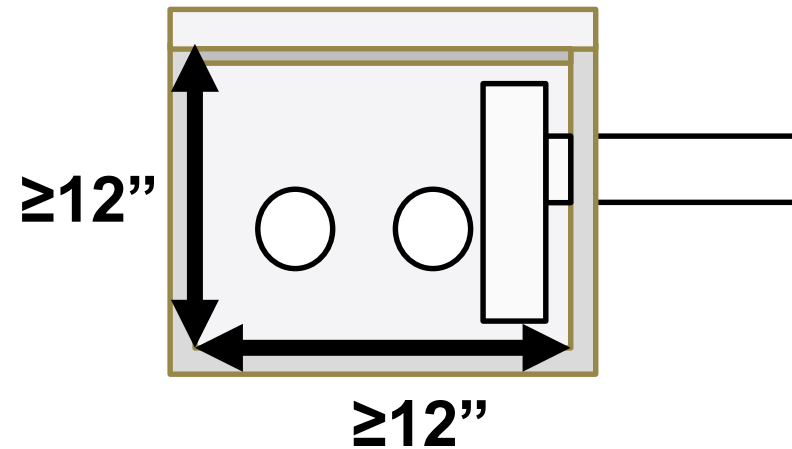
## Manufacturer's cut sheet



YES	N/A		Meets or Exceeds	Does Not Meet	Additional Information	N/A	
	<input type="checkbox"/>	<i>Check here if no "Distribution Box and Header Pipes" in this project and skip to the next section.</i>					
		Distribution Box (Dbox) and Header Pipes	<a href="#">(410 IAC 6-10.1-74)</a>	<a href="#">(410 IAC 6-10.1-83)</a>			
		Cross section view provided with all necessary information? (see 410 IAC 6-10.1-74 above)				605	
		Minimum 12" interior dimensions? (show on plans)				607	
		Risers to at least grade level? (not required but is recommended)				609	
		Distribution box is at least 10 feet from perimeter drain?				611	
		Watertight, removable lid? (require this on plans)				613	
		Equal distribution of effluent? (i.e. each lateral has its own dbox outlet)				615	
		Baffling (check selected option below and show on plans)				617	
		<input type="checkbox"/> Sanitary tee ( show ≤ 2" clearance below and ≥ 1" from top on plans)				619	
		<input type="checkbox"/> Elbow with weephole (show 90 degree turned down ≤ 2" clearance below on plans)				621	
		<input type="checkbox"/> Baffle (show <=2" clearance below on plans)				623	

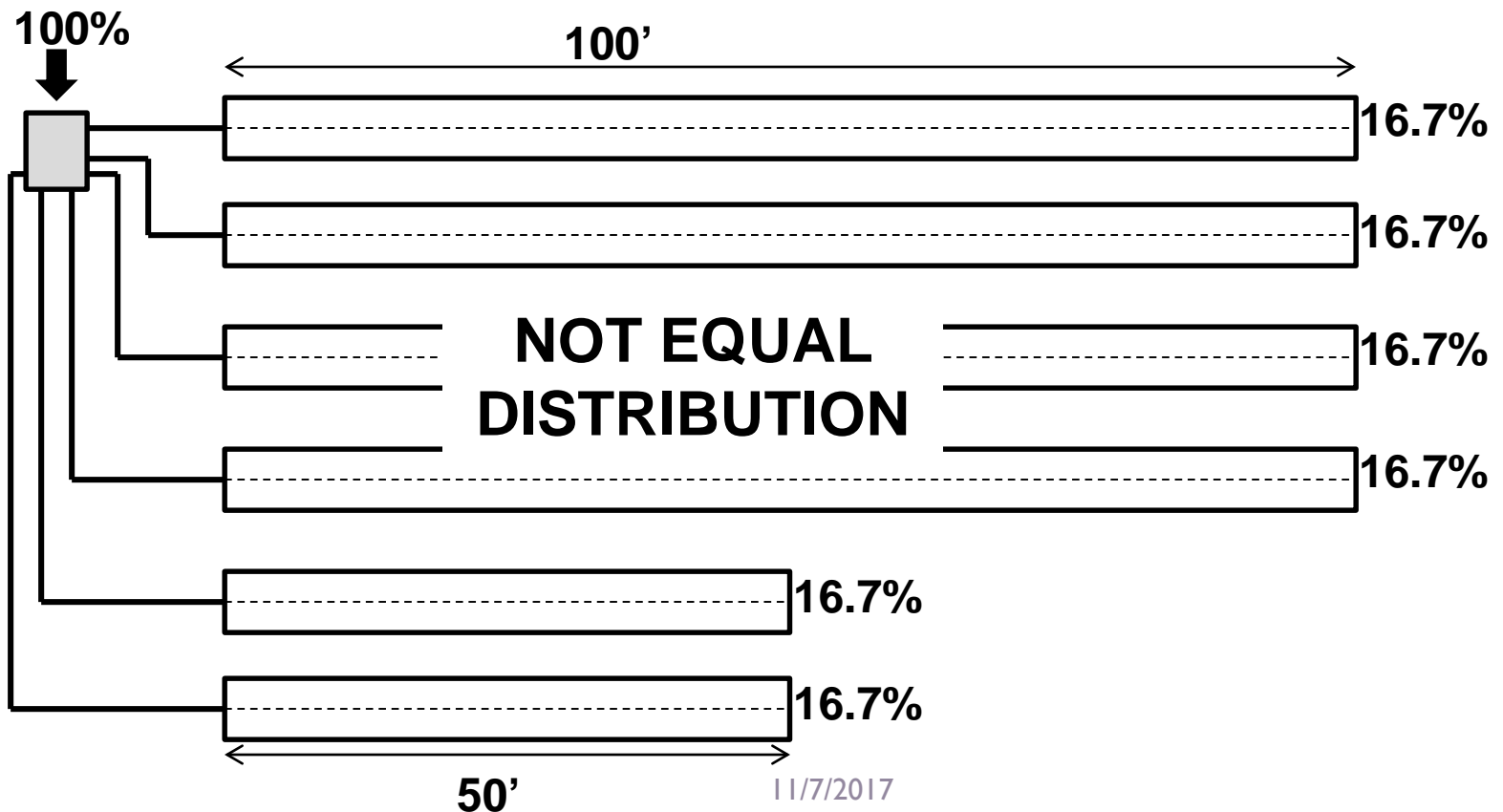
# Distribution Box

- Water tight removable lid
- Minimum interior dimensions 12"
- 5' between box and trench



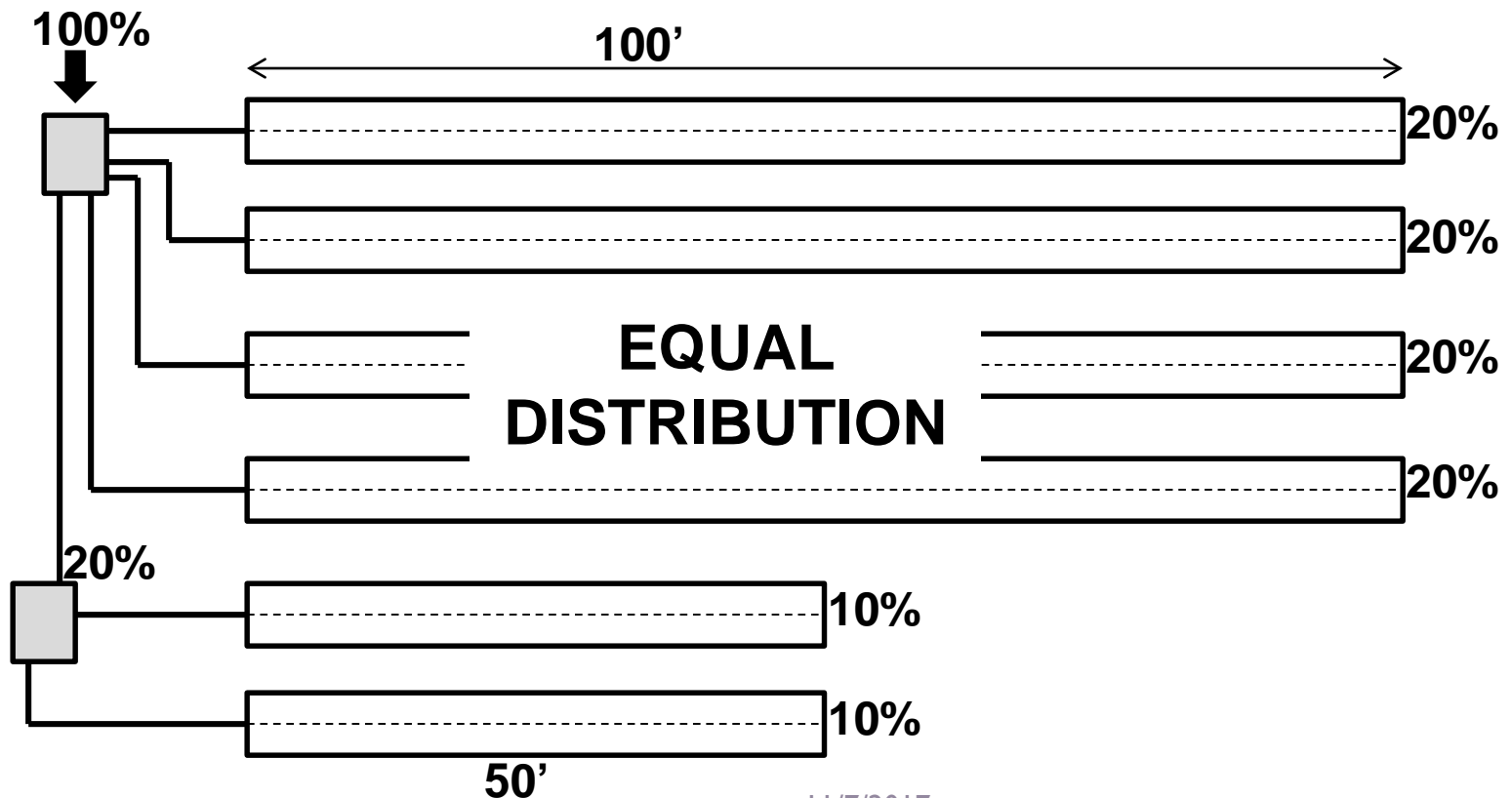
# Equal Distribution

- Intent: Each square foot of absorption trench receives proportionate amount of effluent.

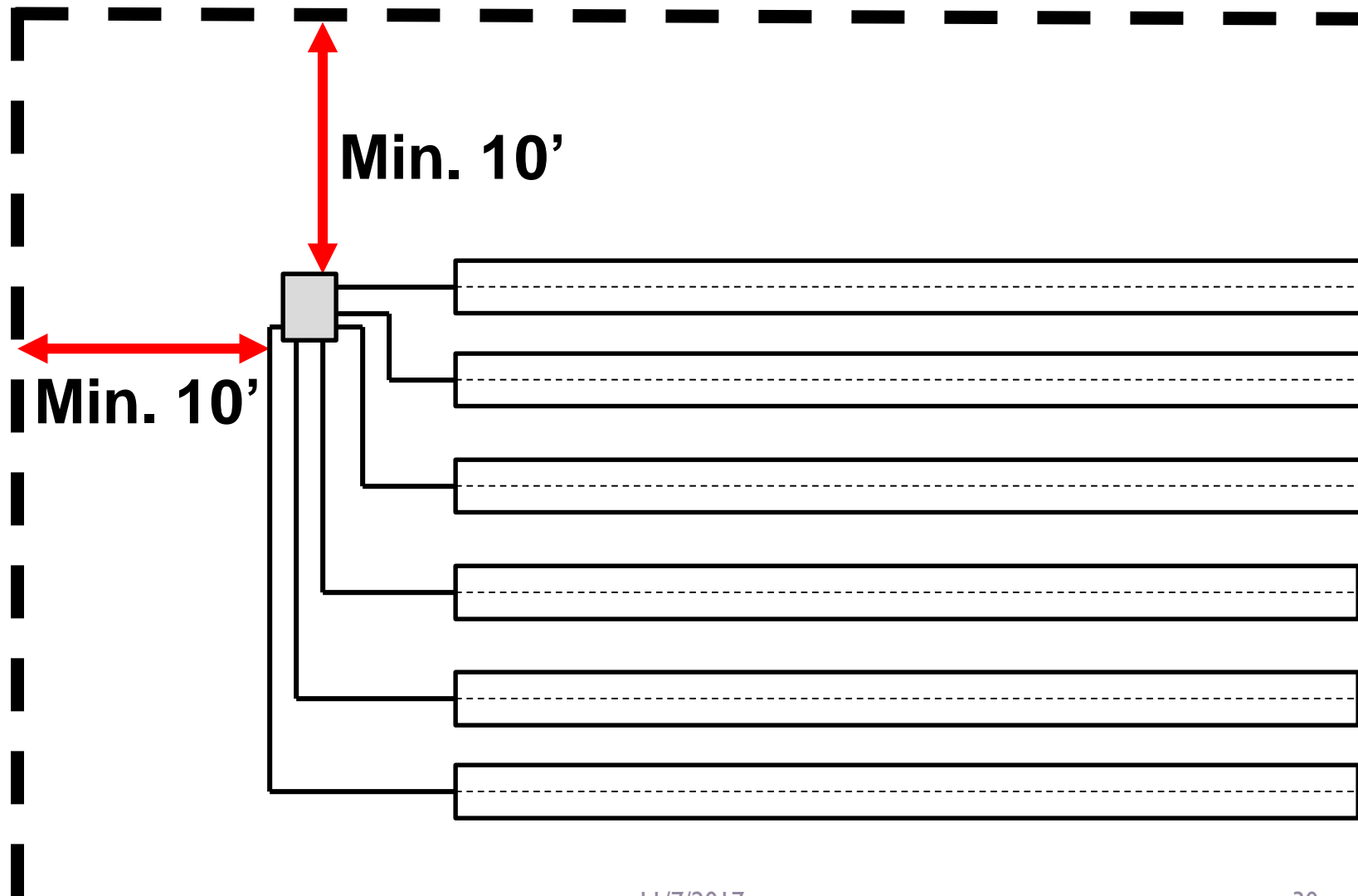


# Equal Distribution

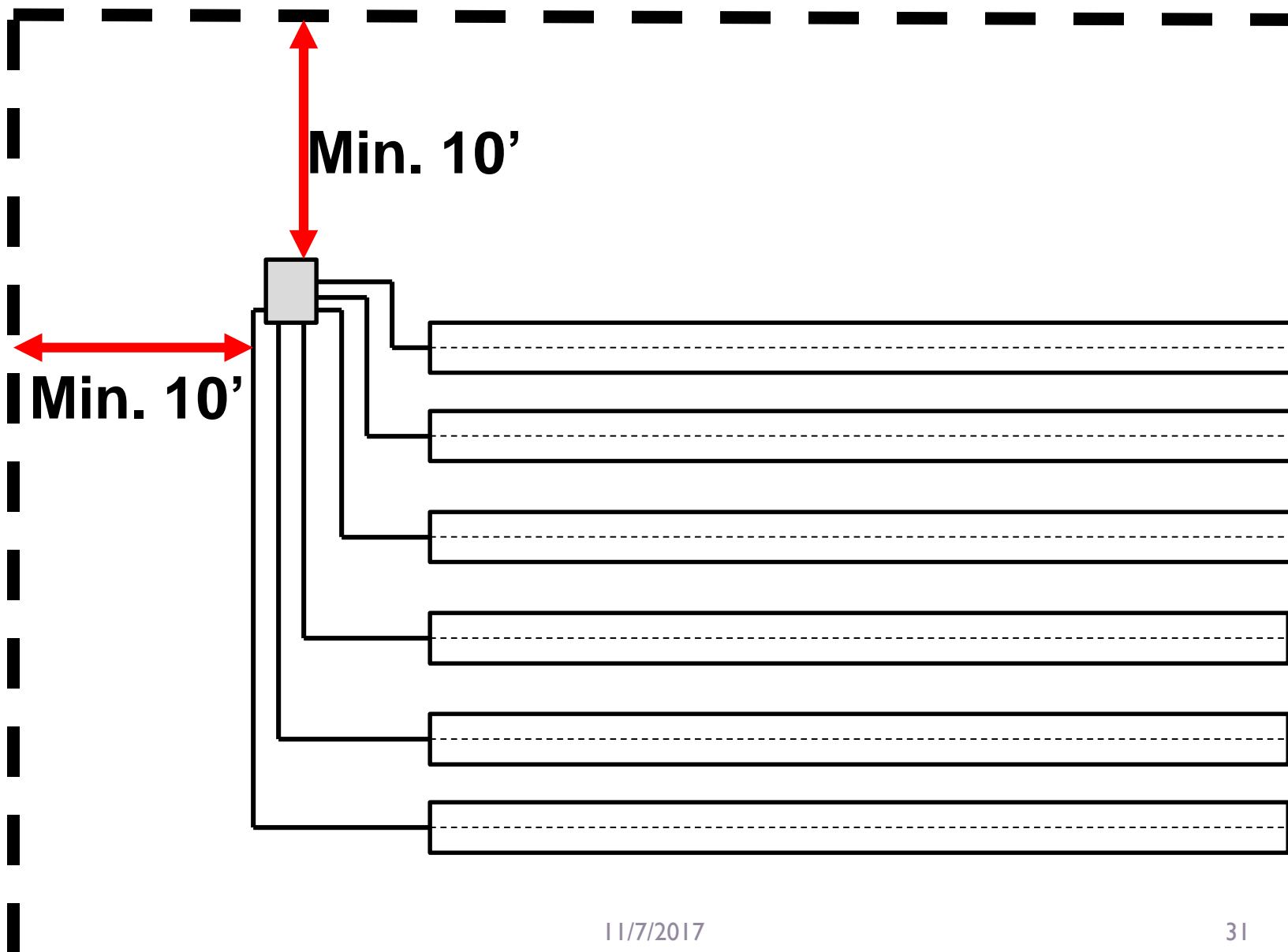
- Intent: Each square foot of absorption trench receives proportionate amount of effluent.



# D-Box and Drainage Separation



# D-Box and Drainage Separation



# Elevated Sand Mound

<input type="checkbox"/>		<i>Check here if no "Elevated Sand Mounds" in this project and skip to the next section.</i>							
YES	N/A	Elevated Sand Mound (ESM) System	<a href="#">(410)AC 6-10.1-87</a>	Example Drawing					
<input type="checkbox"/>		Acceptable Design of Elevated Sand Mound System (check all that apply)							877
<input type="checkbox"/>		Sloping site (> 1/2% but less than 6%) with aggregate bed upslope							879
<input type="checkbox"/>		All bed bottoms are above the 100 year floodplain elevation?							881
<input type="checkbox"/>		Grade shots at both ends and the middle of the upslope and downslope toes of the aggregate bed are on plans <b>and</b> a note is placed on the plans stating: "Existing grade shots obtained on-site are provided for the soil absorption field. The affixed stamp of the engineer or architect certifies that this has been done and that the grade shots provided for the soil absorption field were not extrapolated from computer generated topography for the purposes of establishing							883
<input type="checkbox"/>		Grade shots at both ends and the middle of downslope toe of the basal area are on plans?							885
<input type="checkbox"/>		Level site ( $\leq$ 1/2%) with aggregate bed centered							887
<input type="checkbox"/>		Force main installed with minimal disturbance to basal area							889
<input type="checkbox"/>		Additional 1' sand surrounding aggregate <a href="#">(410)AC 6-10.1-87(d)(5)</a>							891
<input type="checkbox"/>		Additional sand with minimum 3:1 slope on ends of elevated sand mound							893
<input type="checkbox"/>		Additional sand with minimum 3:1 slope on upslope of ESM (sloping sites only)							895
<input type="checkbox"/>		Properly Sized ESM							897
		Minimum Aggregate Bed Area = DDF#1.2:	<input type="text" value="0"/>	(ft <sup>2</sup> )					
		Choose applicable DDF range:	<input type="text"/>						
		Choose slope range:	<input type="text"/>						
		* Maximum Aggregate Bed Width:	<input type="text" value="#N/A"/>	(ft)					
		Minimum Length of Aggregate Bed:	<input type="text" value="#N/A"/>	(ft)					
		Minimum Basal Area:	<input type="text" value="#DIV/0!"/>	(ft <sup>2</sup> )					
		Minimum Length of Basal Area:	<input type="text" value="#N/A"/>	(ft)					
		Minimum Basal Area Width:	<input type="text" value="#N/A"/>	(ft)					
		ESM Minimum Length:	<input type="text" value="#N/A"/>	(ft)					
		ESM Minimum Width:	<input type="text" value="#N/A"/>	(ft)					
<p><i>* For DDF <math>\leq</math> 150 gpd, the aggregate bed width must be at least 4 feet and not greater than 10 feet and no greater than calculated maximum width. For DDF &gt; 150 gpd and SLR is <math>\leq</math> 0.50, the aggregate bed width must not be greater than 15 feet and no greater than calculated maximum width. For DDF &gt; 150 gpd and SLR &gt; 0.50, the aggregate bed width must not be greater than 20 feet and no greater than calculated maximum width.</i></p>									





# Elevated Sand Mound

- Plan View

- Dimensions

- Aggregate Bed
- Basal Area

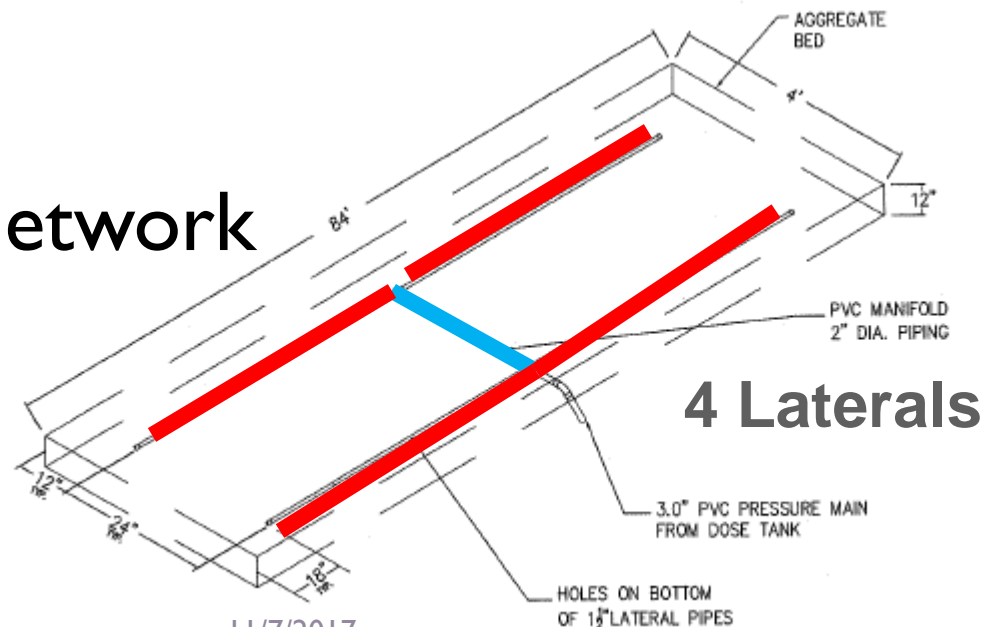
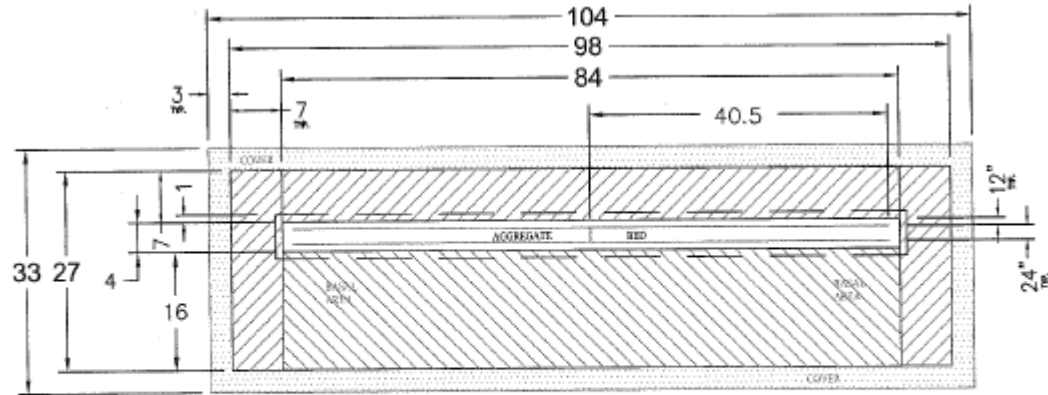
- 1' sand border

- Soil cap

- Distribution Network

- Manifold

- Laterals



11/7/2017







# ESM Site Preparation and Installation



