March 2016
Septic Training

*Presentation Topics

- EEP updates
- Web page items
- Safety, Sizing and Siting
- MLSS

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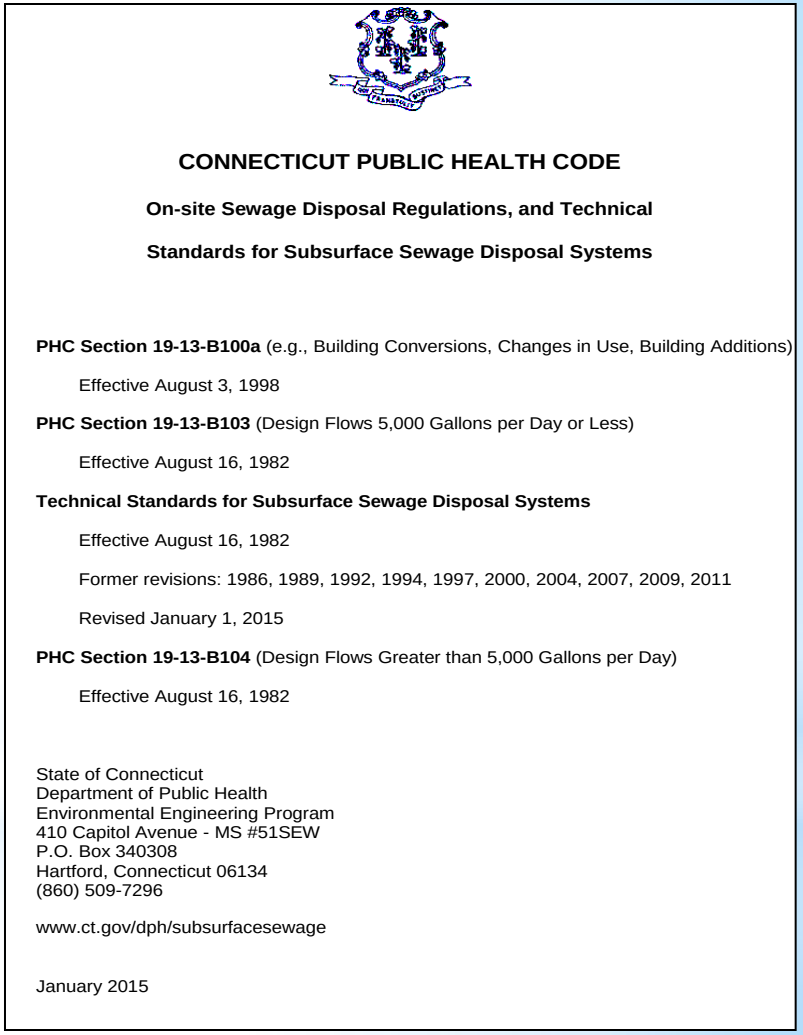
*Technical Standards

*Code Advisory Committee

- *CT Department of Energy & Environmental Protection
- *CT Home Builders & Remodelers Association
- *CT Environmental Health Association
- *CT Association of Directors of Health
- *CT Engineering Associations
- *CT On-site Wastewater Recycling Association
- *CT Soil Scientists
- *DPH



CONNECTICUT PUBLIC HEALTH CODE

On-site Sewage Disposal Regulations, and Technical

Standards for Subsurface Sewage Disposal Systems

PHC Section 19-13-B100a (e.g., Building Conversions, Changes in Use, Building Additions)

Effective August 3, 1998

PHC Section 19-13-B103 (Design Flows 5,000 Gallons per Day or Less)

Effective August 16, 1982

Technical Standards for Subsurface Sewage Disposal Systems

Effective August 16, 1982

Former revisions: 1986, 1989, 1992, 1994, 1997, 2000, 2004, 2007, 2009, 2011

Revised January 1, 2015

PHC Section 19-13-B104 (Design Flows Greater than 5,000 Gallons per Day)

Effective August 16, 1982

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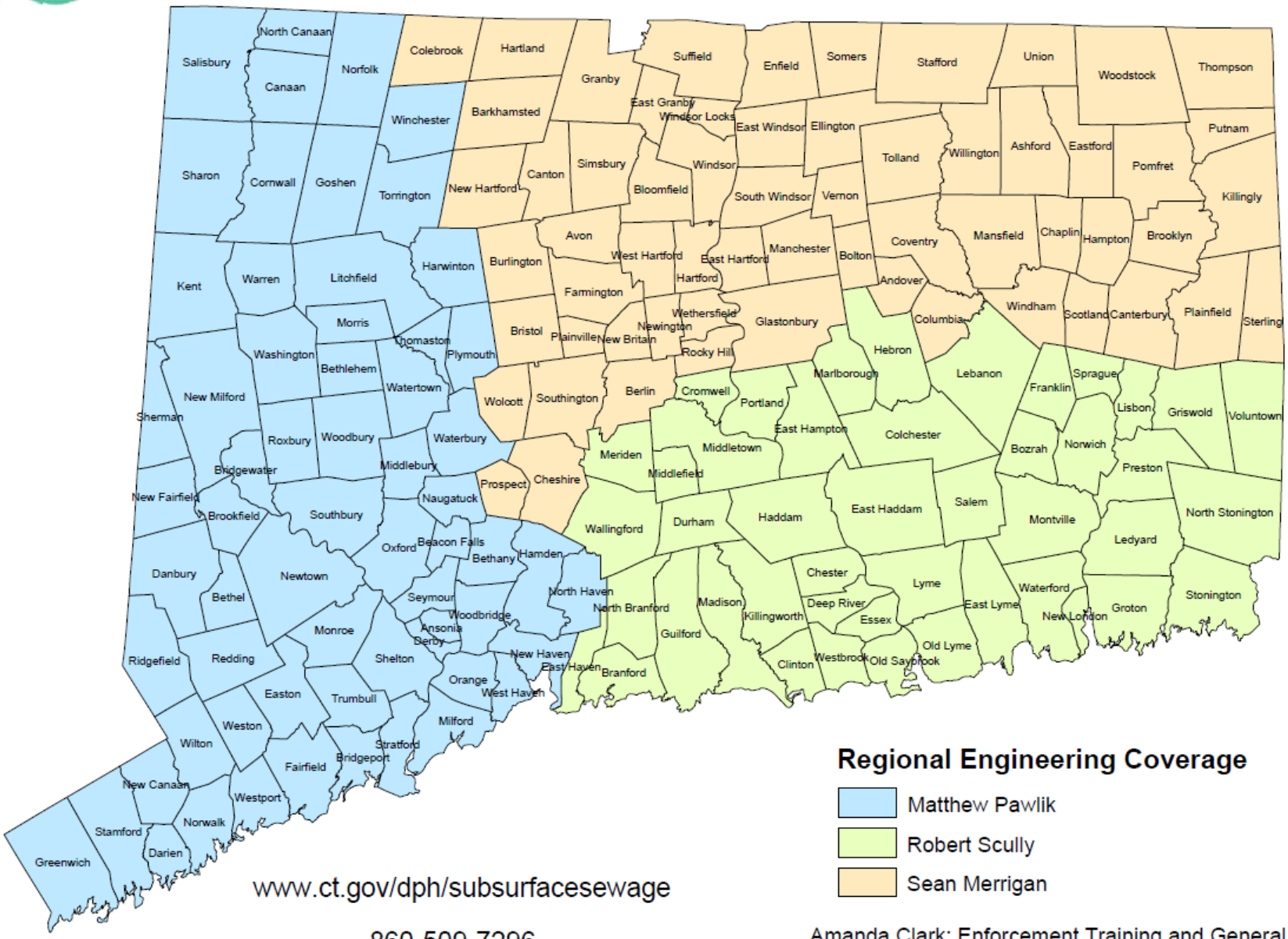
January 2015

Environmental Engineering Program



Regional Engineering Coverage

- Matthew Pawlik
- Robert Scully
- Sean Merrigan

www.ct.gov/dph/subsurfacesewage

860-509-7296

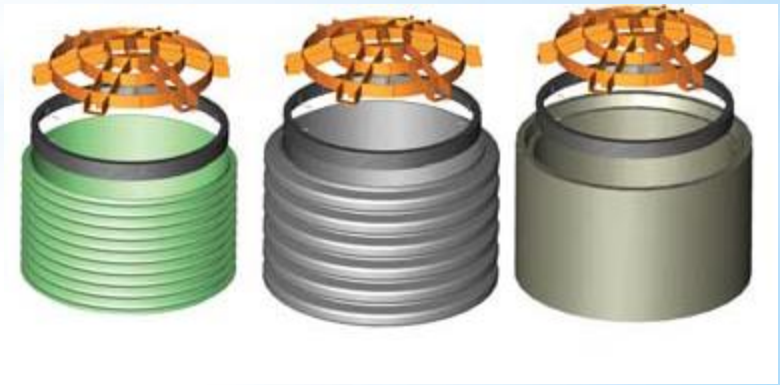
Amanda Clark: Enforcement, Training and General Questions

2/8/2016

*Secondary Safety Lid

* **Septic tank, pump chamber, holding tanks and grease interceptor tank covers** shall be kept on the tank when riser assemblies are utilized, and in no case shall a cover be left off a tank when the riser cover weighs less than 59 pounds unless a secondary safety lid or device is provided below the riser cover.

* Retroactive requirement



*Secondary Safety Lid

*Sizing

* **Outbuilding** means an ancillary structure *served by a water supply and sewage system* that is located on a lot with an associated primary residential building, which cannot be split off and sold separately from the primary building. Outbuildings: detached garages w/ ½ bath, pool house cabanas, guest bedroom/rec bldg., in-law apartments, etc.

*Sizing

- *Reserve areas are not required for outbuildings w/ design flows of 150 GPD or less on single-family residential building lots.
- *1-bedroom leaching system sizing for residential outbuildings on single-family residential building lots. Minimum ELA is 50% of the required 2-bedroom ELA. MLSS Flow Factor would be 0.5

*Sizing Multi-family

* Table 5: includes the minimum septic tank capacities for residential buildings.

B. Septic tank capacities

1. Residential Buildings

The minimum liquid capacities/volumes of septic tanks serving residential buildings shall be based on Table 5.

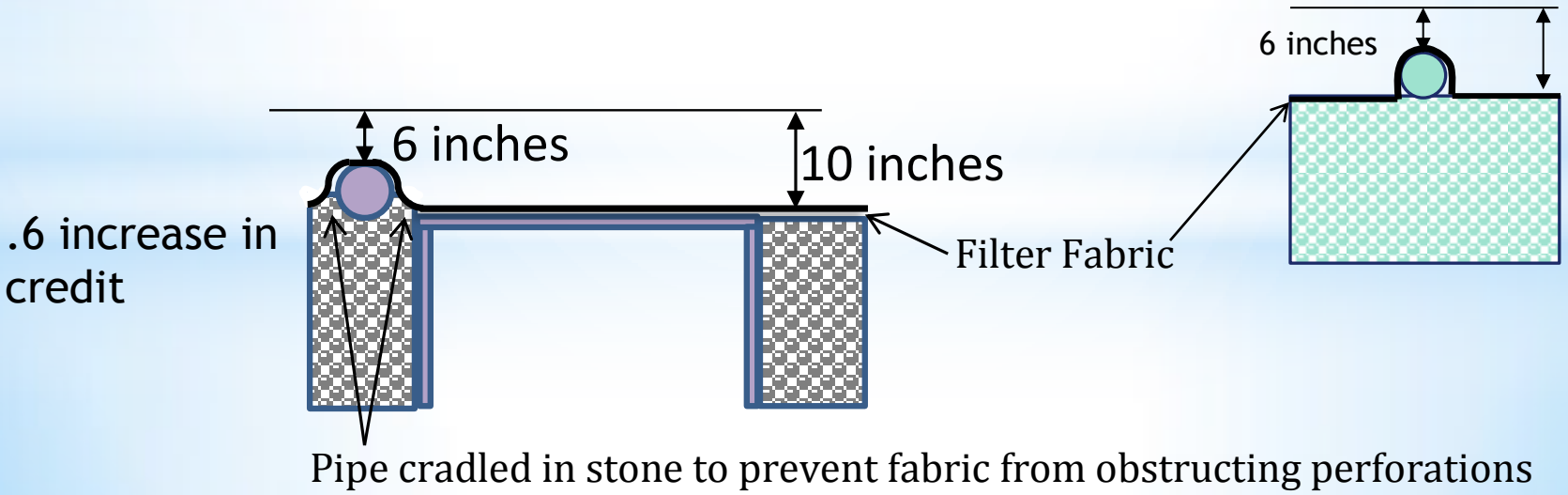
Table 5

	Single-family	Multi-family
1-3 bedrooms	1,000 gallons	1250 gallons
4 bedrooms	1250 gallons	1250 gallons
For each bedroom beyond 4	Add 125 gallons per bedroom	Add 250 gallons per bedroom

* Table 6: Required ELA for multi-family residential building shall be based on a minimum of 4 bedrooms.

*Sizing: Leaching Systems

* **Leaching trenches and galleries** with perforated piping (SDR 35) on the top of the system's stone: ELA credit increased by 0.6 SF/LF for trenches and 12 inch galleries. All other galleries ELA credit increased by 0.8 SF/LF.



*Sizing

- ***Proprietary pressure-dosed dispersal system** added to Technical Standards.
- *A manufactured dosing and dispersal system that uniformly applies effluent into the receiving soil via small diameter holes in small diameter distribution piping.
- *Sized based on 3 foot trench equivalent.

*Sizing

- **Perc Rite drip irrigation (dispersal) system**
- DPH Approval stipulates minimum linear footage to be 4 times the required linear footage of a 3-foot wide trench system.
- Minimum tube spacing is 1.5 feet center to center (minor deviations allowed- around tree, etc.).

*Sizing: Center to Center

- *Reduced center to center spacing for certain leaching systems possible, upon application to DPH
- *Approval for Geomatrix GeoMat spacing reduction pending.

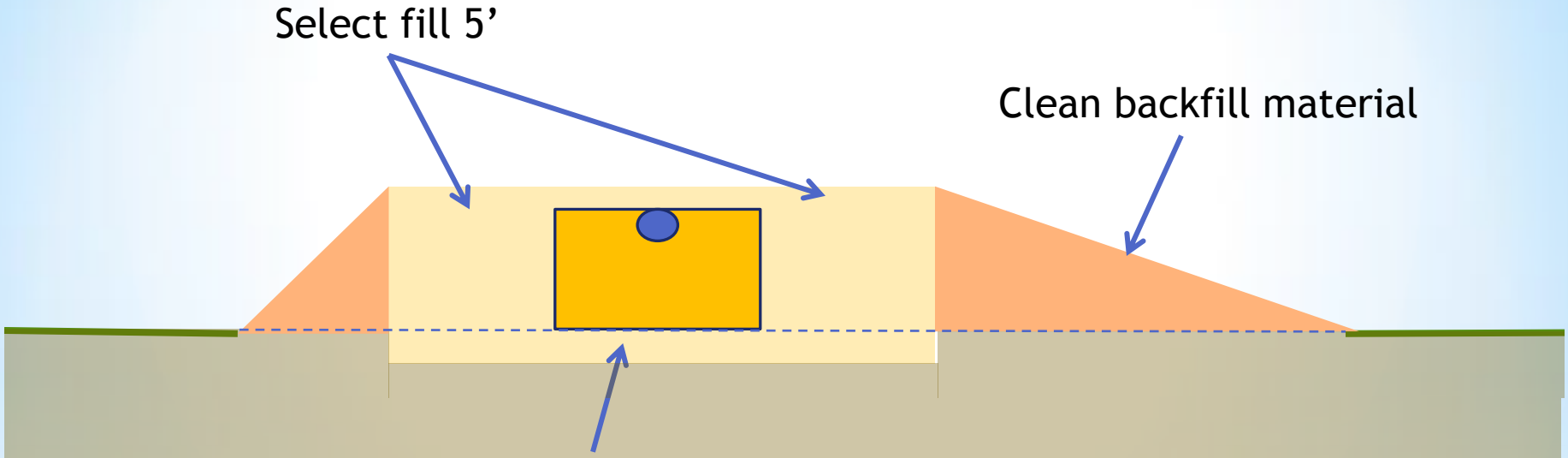
*Sizing

*Leaching system elevated entirely in select fill can be sized on anticipated perc rate of select fill. (changed from 10.1-20 minimum)

*Confirmation perc test required.

*Elevated Entirely in Select Fill

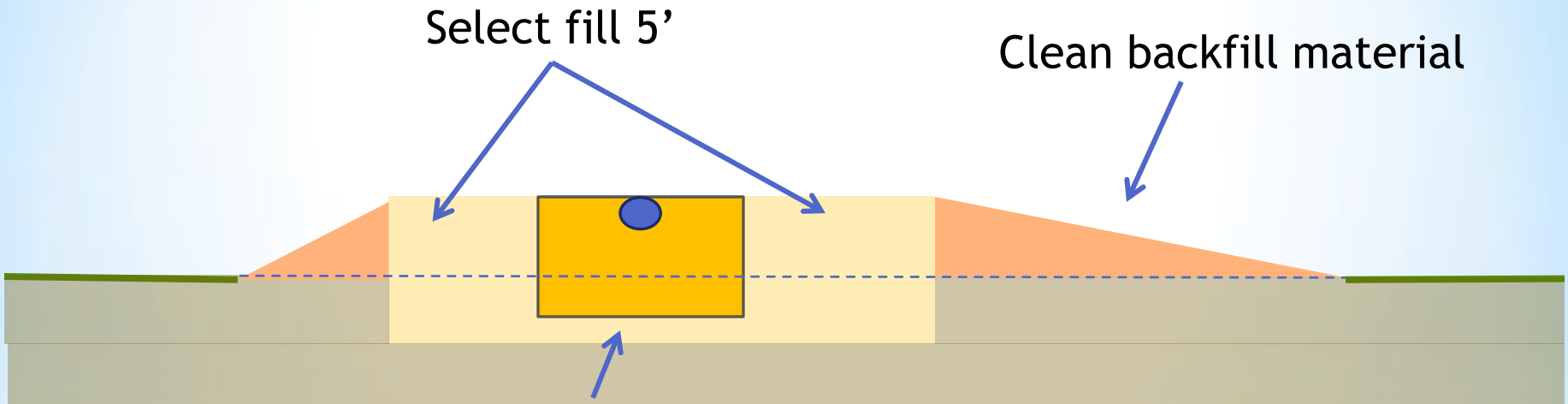
*Elevated means 50% or more of the system above existing grade.



System bedded in a minimum of 2” of select fill to be considered entirely in select septic fill.

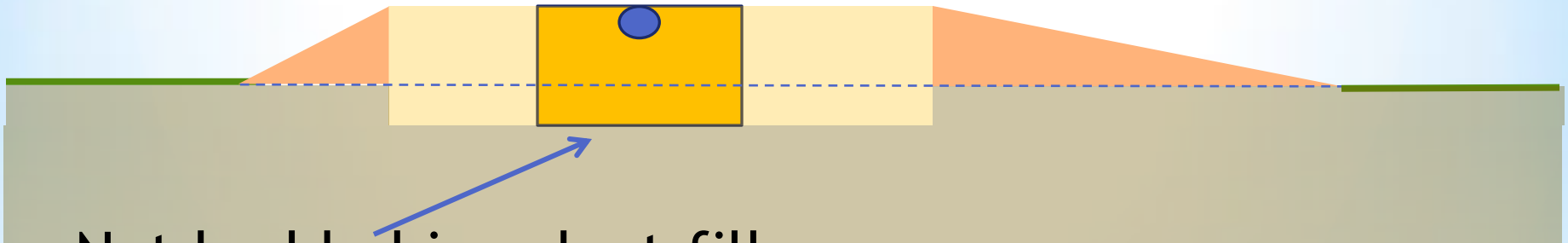
*Elevated Entirely in Select Fill

*Elevated means 50% or more of the system above existing grade.



System bedded in a minimum of 2” of select fill to be considered entirely in select septic fill.

*Not Entirely in Select Fill

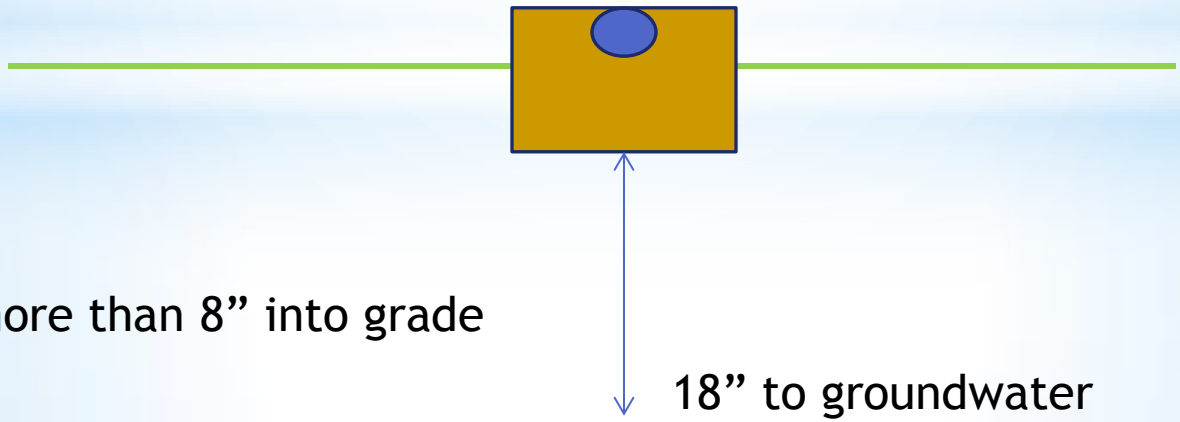


Not bedded in select fill

- ELA calculated on perc rate in natural soil

*Siting: Vertical Control

- ***Non-Engineered** repair plans shall include information about the placement of the leaching system relative to *restrictive layers*.
- *How deep into grade?



*Siting: Table 1 Item S

- ***Grade cuts or soil disturbances** down gradient of a leaching system.
- *Grade cuts within 50 feet not allowed if bleed-out may be a concern.
- *LHD may reduce distance if demonstrated that cut/soil disturbance does not diminish the receiving soil necessary for the proper operation of the leaching system.

*Siting: Costal Areas

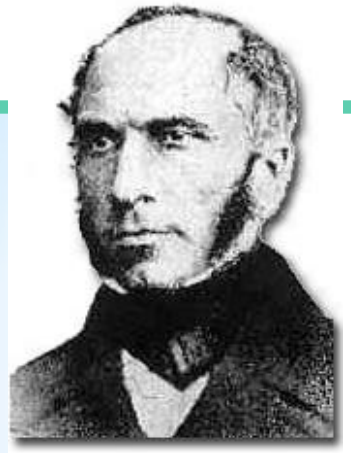
- *Sites with tidally impacted groundwater table
  - *Minimum separation distance for the bottom of the leaching system above maximum groundwater shall be 24 inches.
  - *Max. groundwater determination shall take into account water level rise associated with high tides.

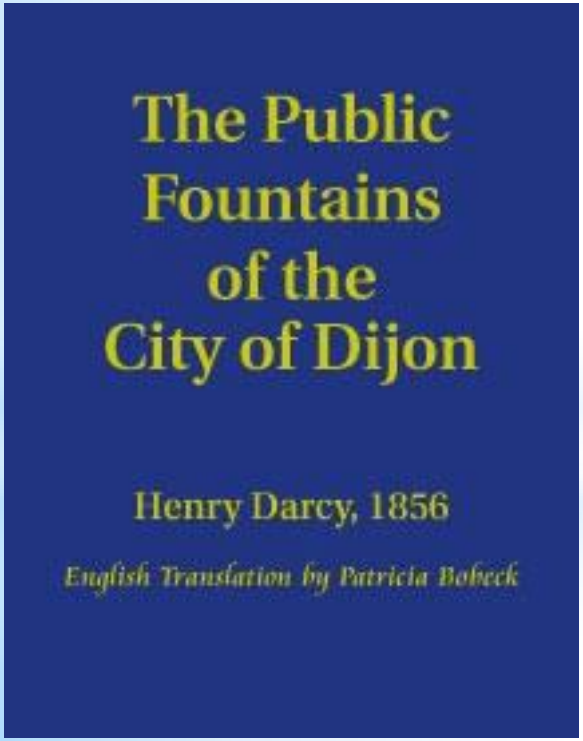
*Minimum Leaching System Spread (MLSS)

*Pre-MLSS

- *1982 Health Code requires sufficient naturally occurring soil to handle sewage flow and allows for hydraulic assessments.
- *Natural soil does not include fill
- *Design Manual for early 80's provides guidance on hydraulic assessments based on Darcy's law.

*Henry Darcy

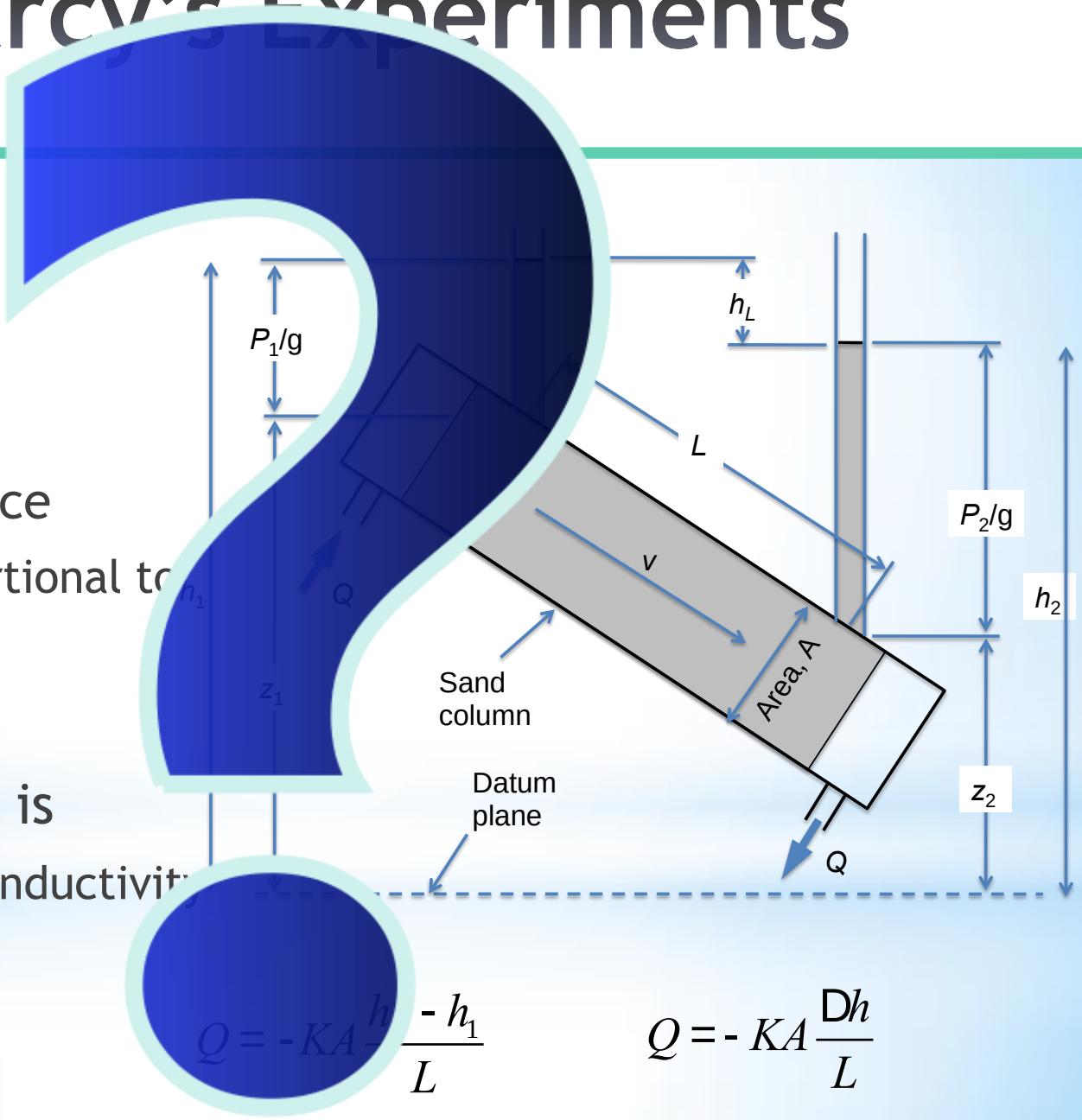




- Henry Darcy, a French engineer, was commissioned by the city of Dijon to find a solution for cleaning the city's water supply contaminated by the waste of the mustard industry.
- Darcy conducted experiments with sand packed filters .
- The work of Darcy published in 1856 and provides the law of fluid flow through a porous media.

*Darcy's Experiments

- *Discharge is
  - Proportional to
    - *Area
    - *Head difference
  - Inversely proportional to
    - *Length
- *Coefficient of proportionality is
  - *K* = hydraulic conductivity



$$Q \propto A\frac{h_1 - h_2}{L}$$

$$Q = -KA\frac{h_2 - h_1}{L}$$

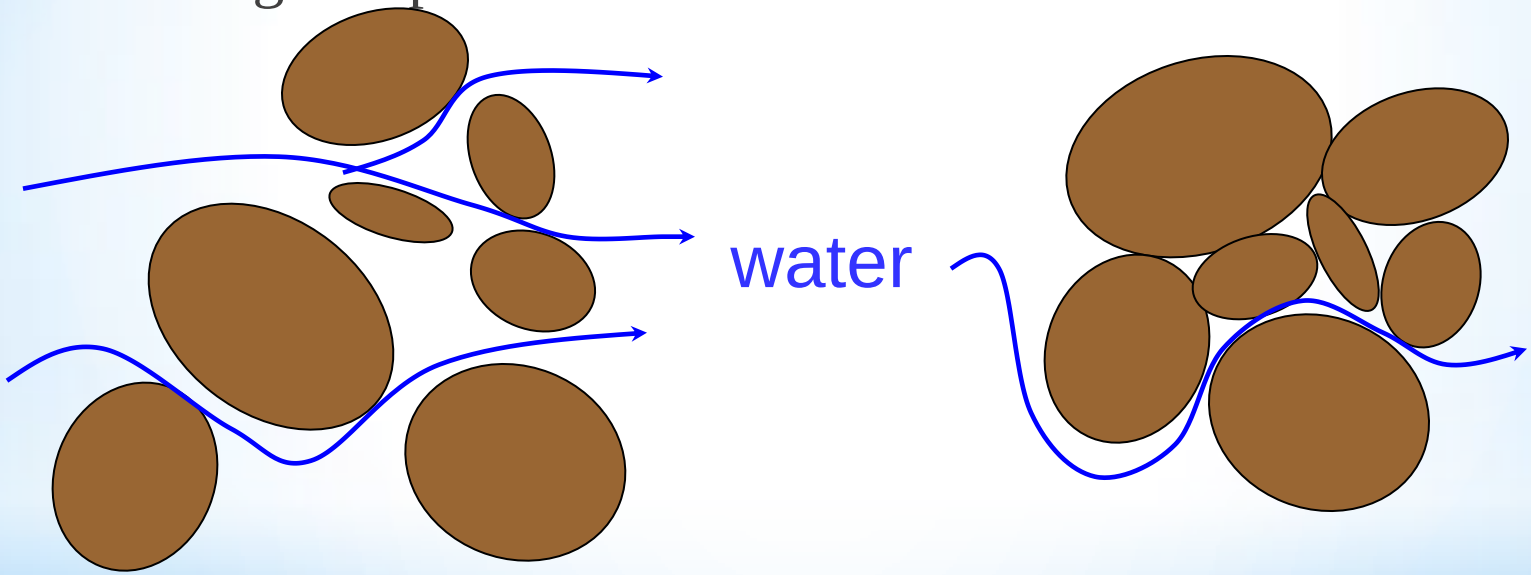
$$Q = -KA\frac{\Delta h}{L}$$

*Site Hydraulics

- *Modified Darcy's Law
- *Q=KiA
  - *Q= Flow
  - *K= Permeability
  - *i= Hydraulic gradient
  - *A= Soil Area

*What is Permeability?

*Permeability is the measure of the soil's ability to permit water to flow through its pores or voids.



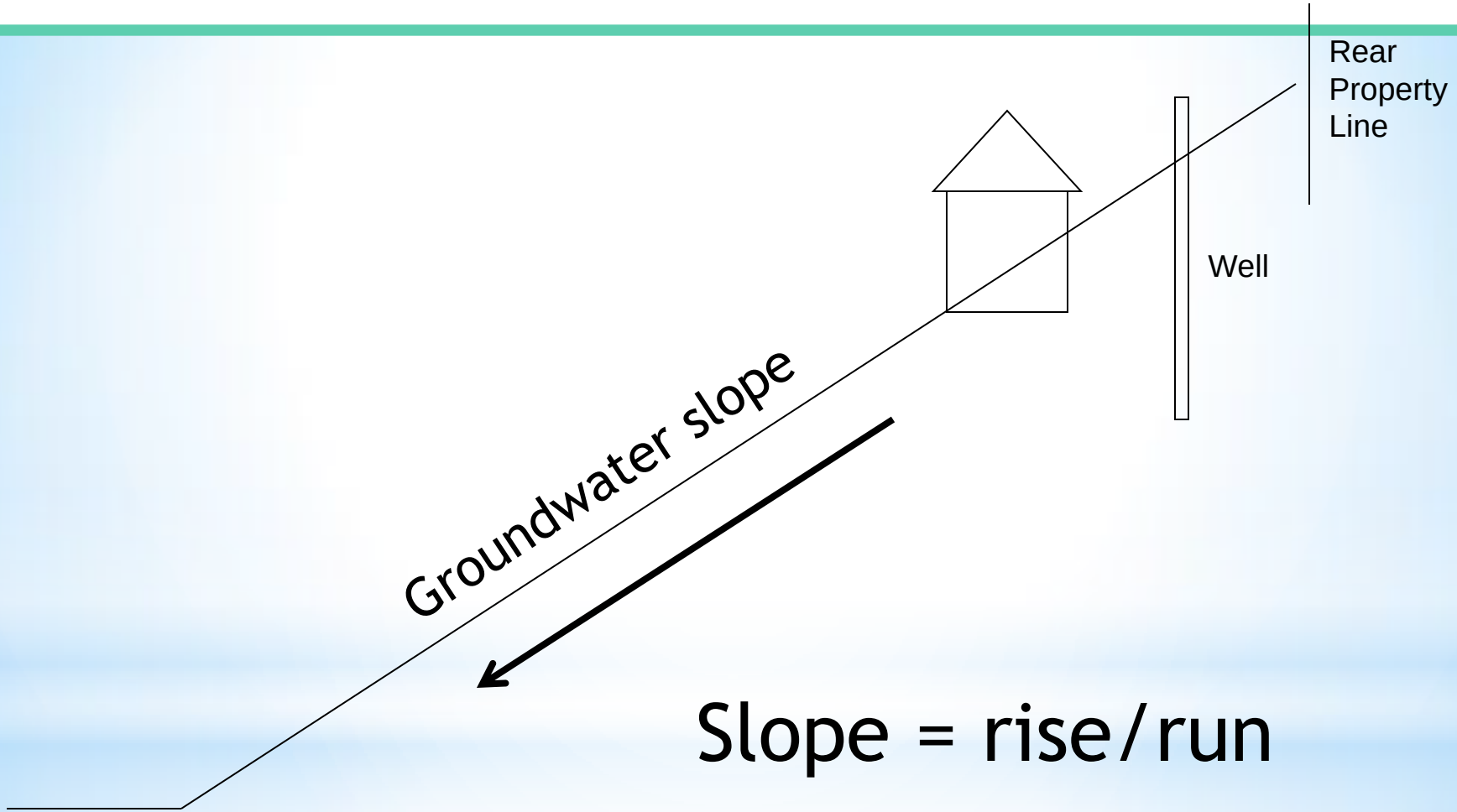
Loose soil

- easy to flow
- **high** permeability

Dense soil

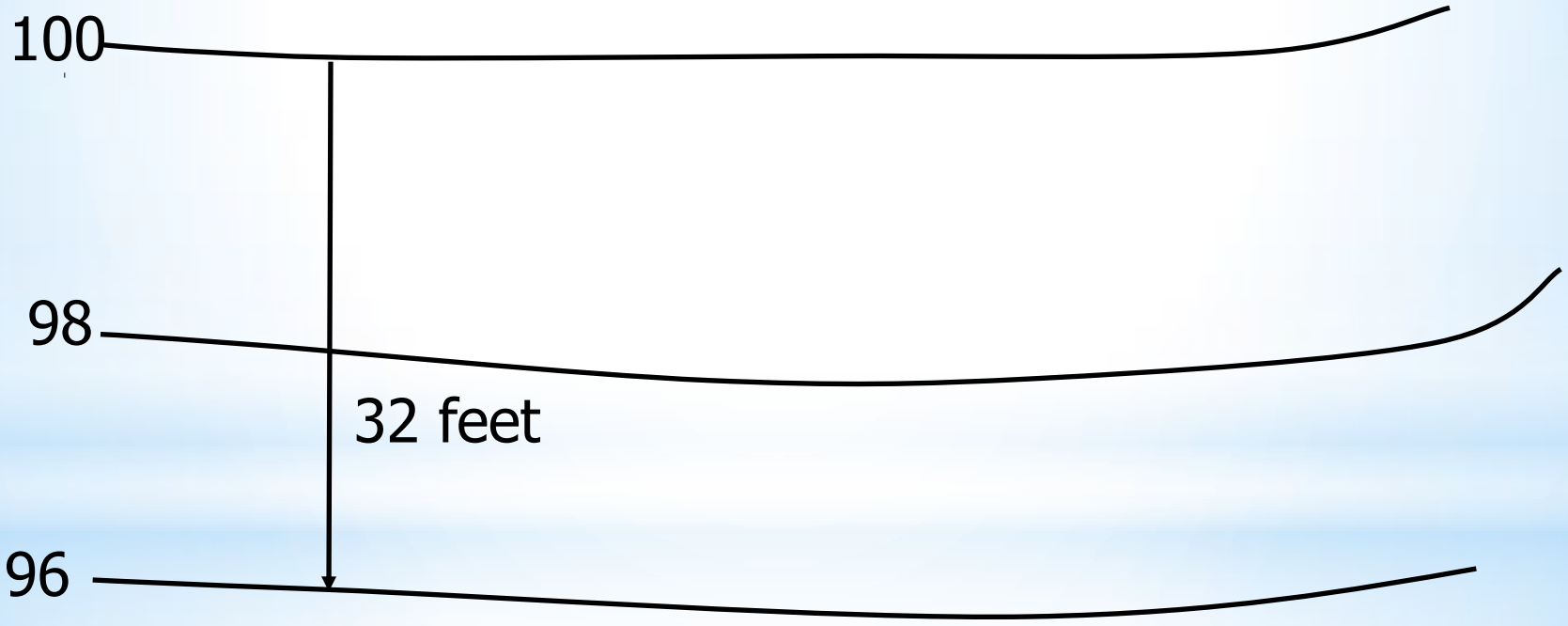
- difficult to flow
- **low** permeability

*Hydraulic gradient



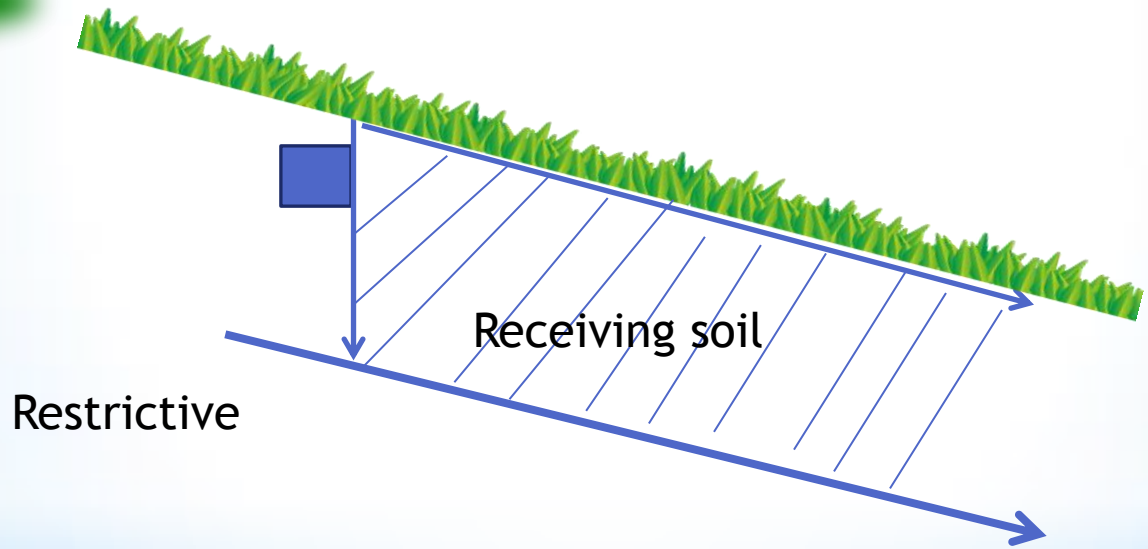
Slope = rise/run

*Calculating Slope



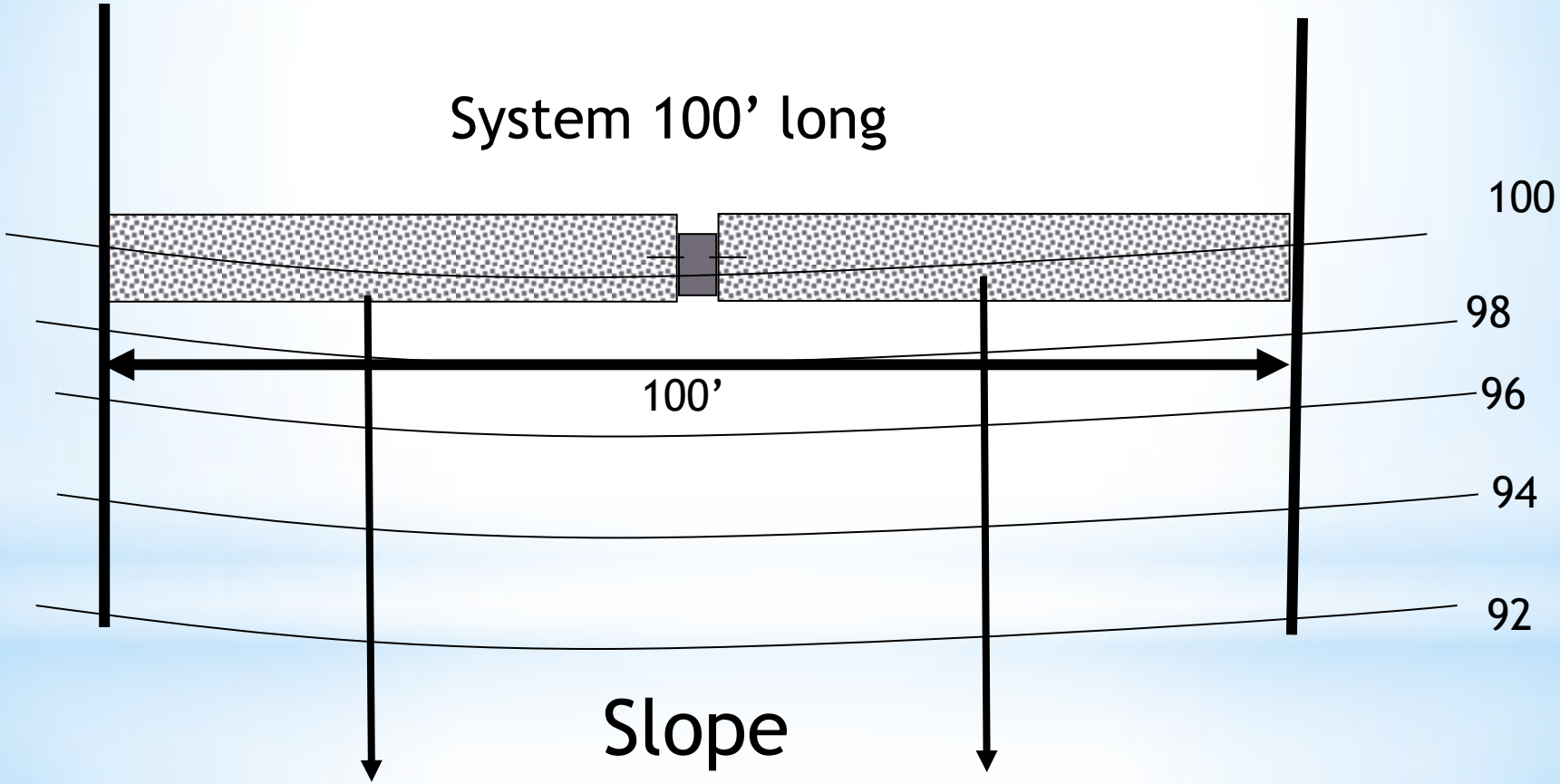
4 / 32 x 100 = 12.5%

*Area



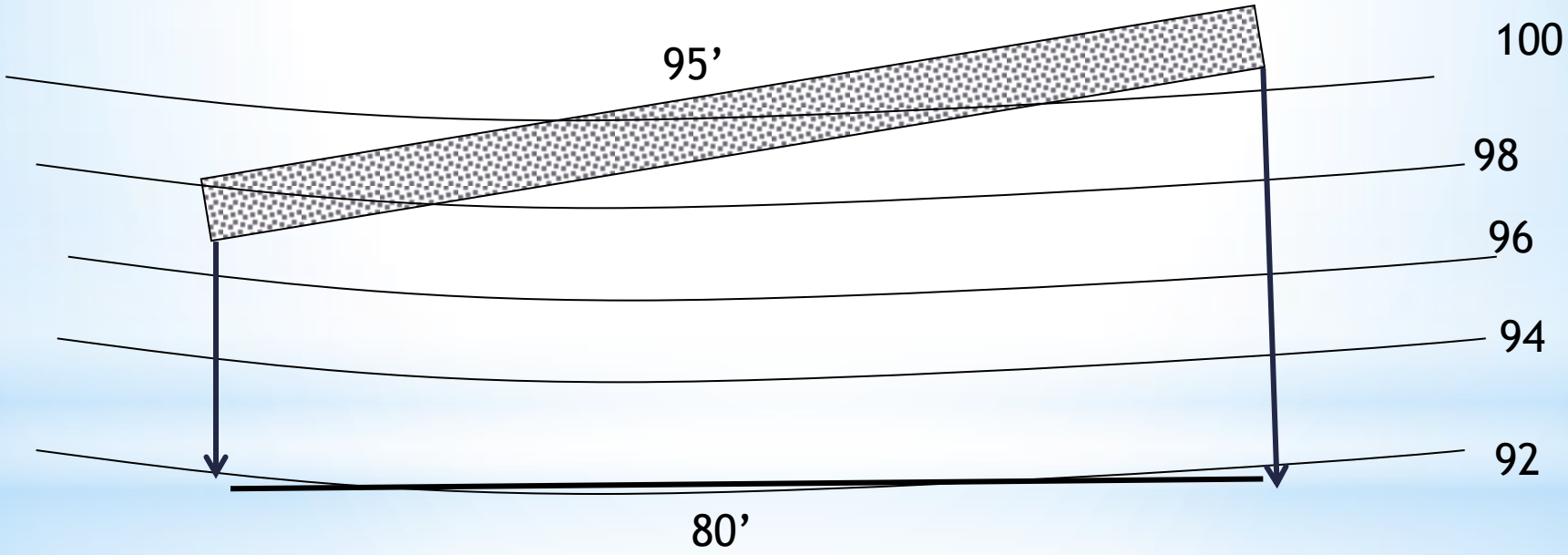
Height x Spread = Area

*Spread and Slope



100 feet of MLSS being provided

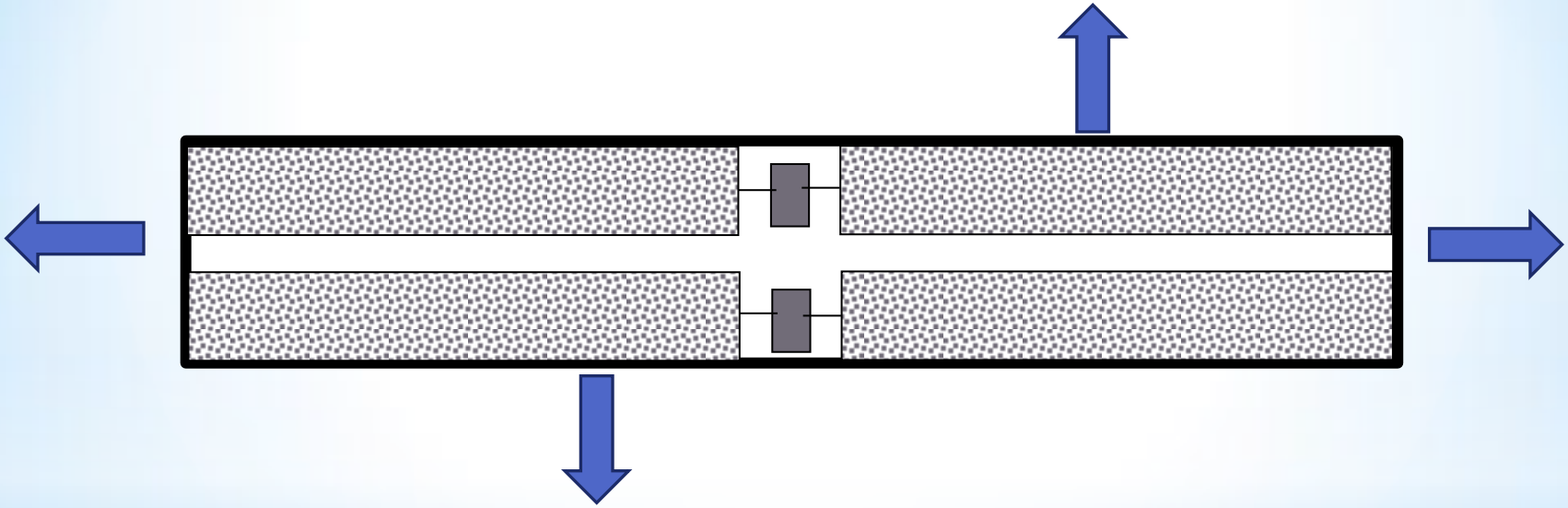
*Spread and Slope



Only 80 feet of MLSS being provided

*Spread Flat GW

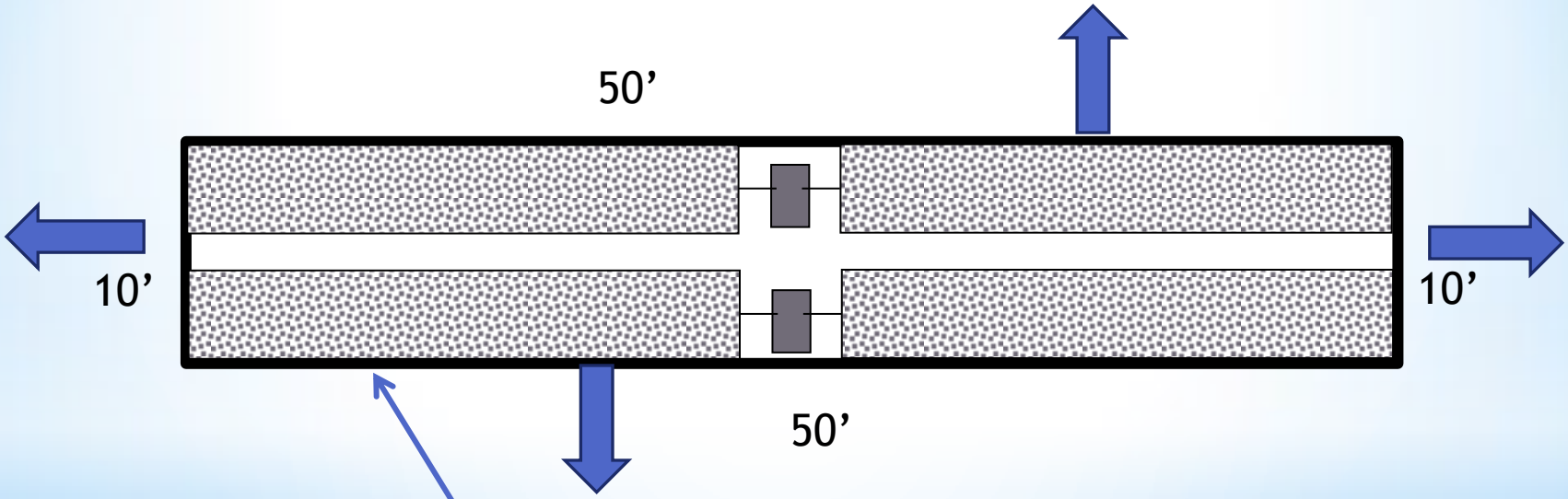
What is a flat GW table lot?



- Typically found in areas with sand and gravel type soils such as shoreline sites.
- Radial flow occurs
- Determination should be made based on actual GW elevations in the area

*Spread Flat GW

Spread flat GW lots



Spread can be measured around the perimeter of leaching system

MLSS = 50+50+10+10 = 120’ total

*Minimum Leaching System Spread (MLSS)

- *Simplified method to address site hydraulics based on Darcy's law introduced into the TS in 1994 based on natural soils only.
- *Not applicable for reserve areas.
- *Minimum spread based on design flow, perc rate, hydraulic gradient and available depth of receiving soil.
- *Hydraulic Analysis not needed if MLSS compliance is demonstrated.

*MLSS

- *In 2011 modified to consider fill (select or existing) for repairs thru a Non-Compliant Repair (NCR) analysis.
- *In 2015 further modified:
  - PE plan requirement reduced to 25% or less of required MLSS.
  - Standardized determination of depth of receiving soil.

*MLSS Definitions

- **Hydraulic gradient** means the percent slope of the naturally occurring grade, or when demonstrated slope of restrictive layer.
  - If groundwater table that has been confirmed to be flat (essentially 0%), then radial flow applies.
  - Slope based on naturally occurring soil shall be evaluated in leaching system area and to at least 25 feet down-gradient.

- **Leaching system spread** means the leaching system length of effluent application to the receiving soil.

*MLSS Definitions

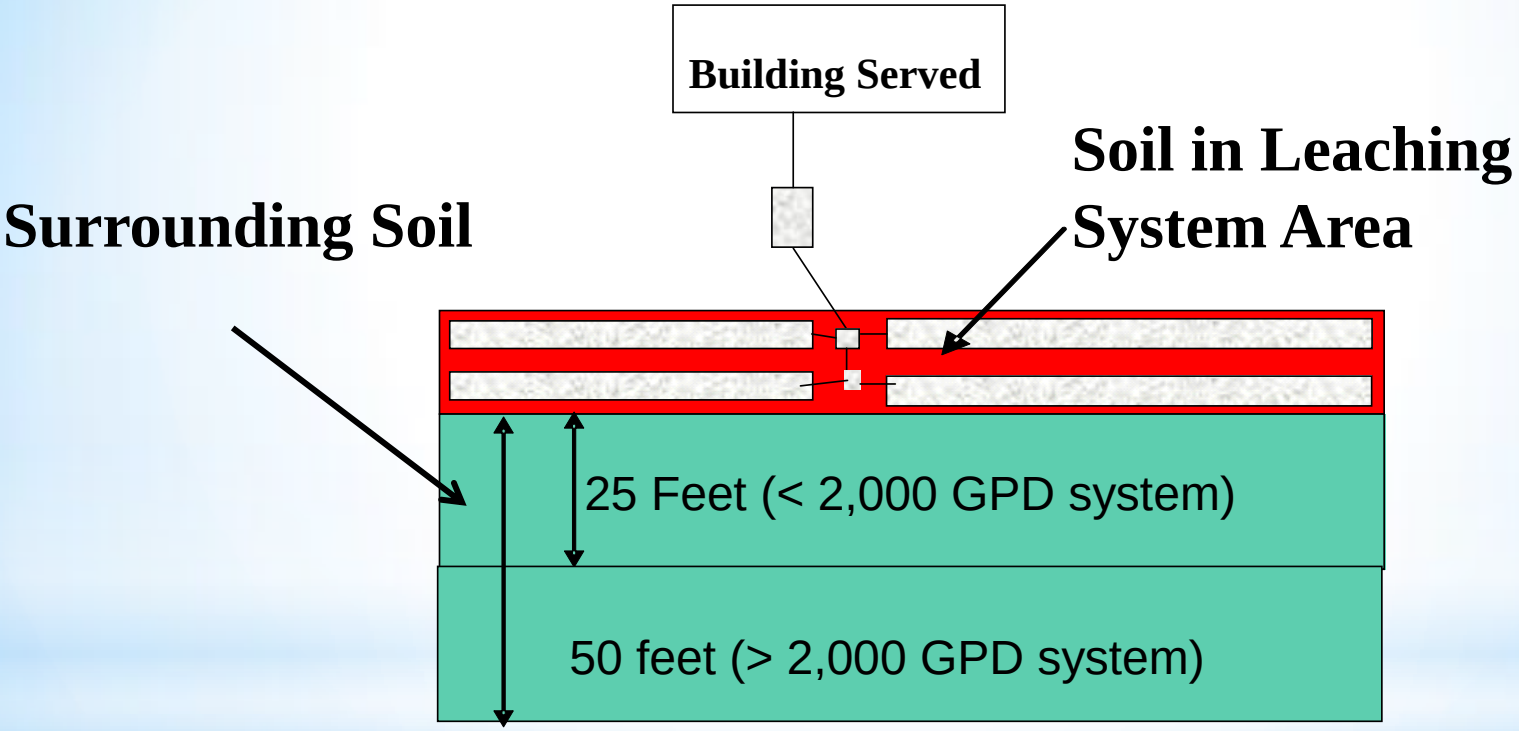
- **Restrictive layer** means the first layer beneath the receiving soil that impedes downward movement of effluent.
  - ledge rock
  - maximum groundwater (redoximorphic features/mottling or groundwater monitoring)
    - ➢ groundwater monitoring: average of at least 5 consecutive weekly readings taken during the most restrictive 30-day period of the wet season (Feb. 1 – May 31)
  - impervious soil (percolation rate slower than 60 minutes per inch).

*MLSS Definitions

- **Receiving soil** is the soil in the leaching system area and surrounding soil
  - flat groundwater table includes the soil within 25 feet around the perimeter of the leaching system.
  - Lots with a slope
    - Includes the soil 50 feet down-gradient of a large system (2,000 GPD or greater)
    - Includes the soil at least 25 feet down-gradient of a small system.

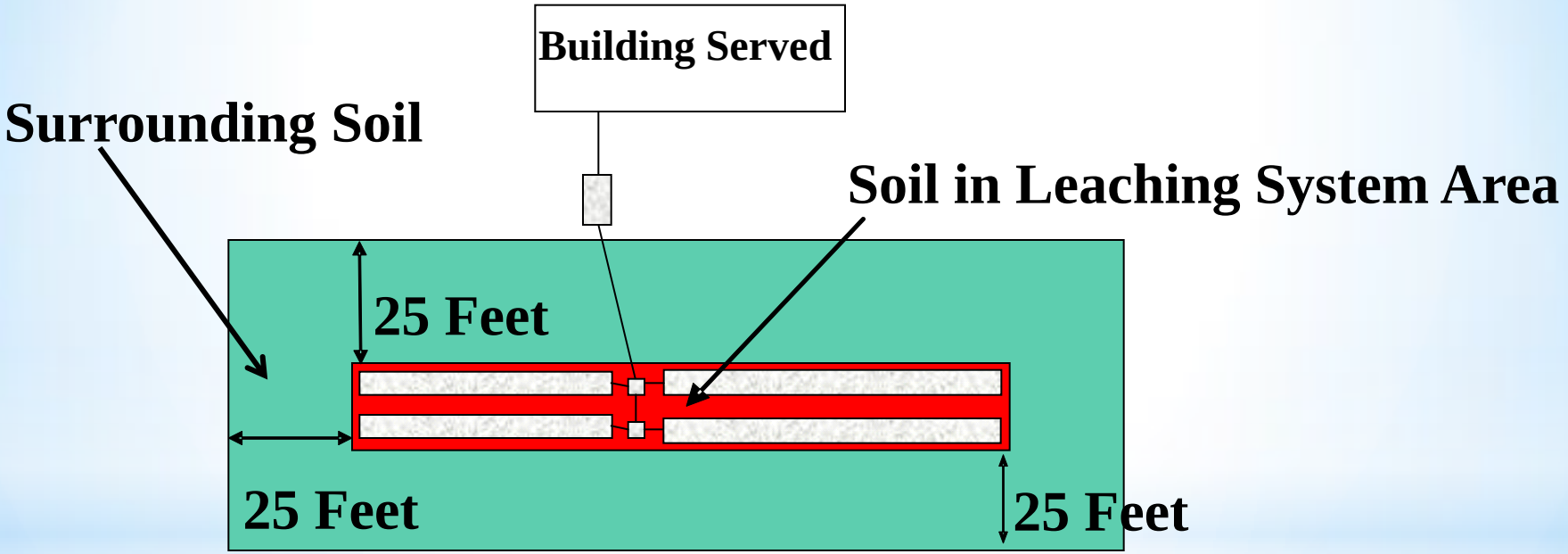
- **Receiving soil depth (RS Depth)** means the <u>average</u> depth of receiving soil (soil in a leaching system area and surrounding soil) measured down to the restrictive layer.

*Receiving Soil on Sloped Lots



RS Depth = average depth of receiving soil in system area and surrounding soil

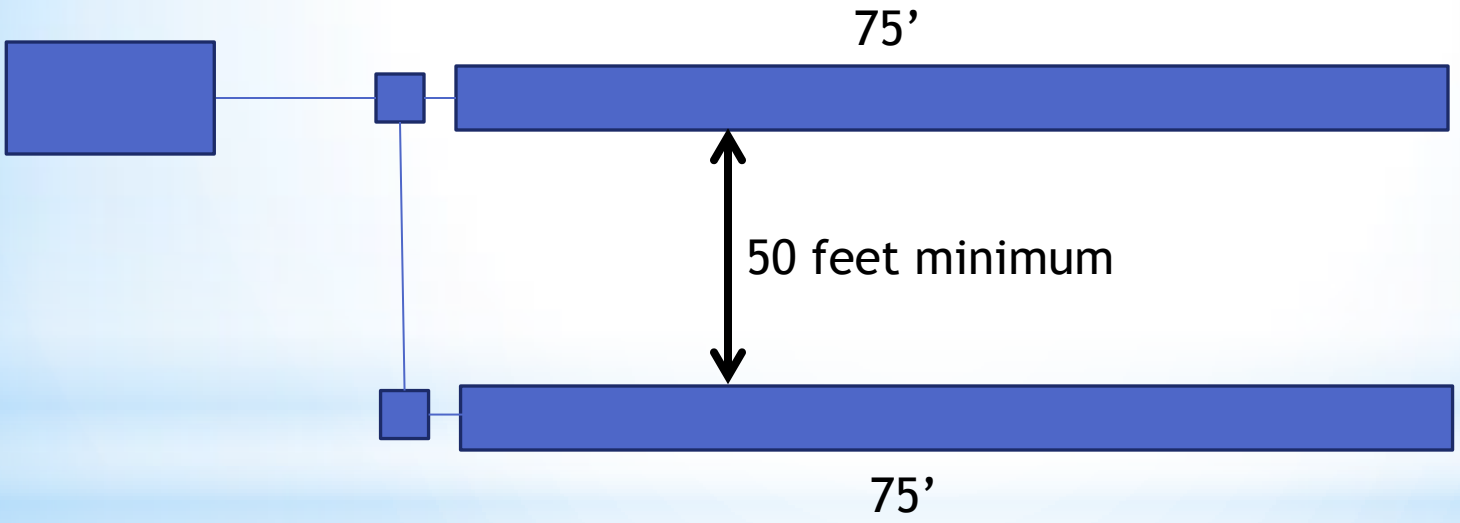
*Receiving Soil on Flat Water Table Lots



RS Depth = average depth of receiving soil in system area and surrounding soil.

*MLSS

*Leaching systems or leaching rows at least 50’ apart on a sloped lot can be viewed independently.



Spread Provided = 75’ + 75’ = 150’

*MLSS Formula

- *Hydraulic Factor (HF)
- *Percolation Factor (PF)
- *Flow Factor (FF)

- *MLSS = HF x PF x FF

*MLSS

*Factor tables

HYDRAULIC FACTORS (HF)

Hydraulic Gradient (% Slope)

Receiving Soil Depth (Inches)	<1.0	1.0-2.0	2.1-3.0	3.1-4.0	4.1-6.0	6.1-8.0	8.1-10.0	10.1-15.0	>15.0
0.1 - 17.9	See Comments in Section VIII A								
18.0 - 22.0	72	62	54	48	42	34	30	28	26
22.1 - 26.0	66	56	48	42	34	30	28	26	24
26.1 - 30.0	56	49	42	34	30	28	26	24	20
30.1 - 36.0	48	42	34	30	28	26	24	20	18
36.1 - 42.0	42	36	30	28	26	24	20	18	16
42.1 - 48.0	36	32	28	26	24	20	18	16	14
48.1 - 60.0	30	28	24	22	20	18	16	14	10
>60.0	MLSS Need Not be Considered								

FLOW FACTORS (FF)

Flow Factor = Design Flow/300

Residential: Design Flow for each bedroom is 150 gallons per day (GPD) except for bedrooms beyond 4 in single-family residential buildings, which have a 75 GPD per bedroom design flow.

Single-family lots:	**FF**	
1 Bedroom = 150/300	0.5	
2 Bedroom = 300/300	1.0	
3 Bedroom = 450/300	1.5	
4 Bedroom = 600/300	2.0	
5 Bedroom = 675/300	2.25	Increase FF by 0.25 for each additional bedroom

Multi-family buildings:
Minimum FF is 2.0 (4 bedrooms) and each additional bedroom increases FF by 0.5.

Non-Residential: Design Flow (GPD) / 300

PERCOLATION FACTORS (PF)

Percolation Rate	Percolation Factor (PF)
Up to 5.0 Minutes/Inch	1.0
5.1 to 10.0 Minutes/Inch	1.2
10.1 to 20.0 Minutes/Inch	1.5
20.1 to 30.0 Minutes/Inch	2.0
30.1 to 45.0 Minutes/Inch	3.0
45.1 to 60.0 Minutes/Inch	5.0

*Flow Factor

- *FF = Flow Factor-Based on the number of bedrooms in residential buildings, and design flow for non residential.
- *Single family lots flow factors:
  - *1 Bedroom = .5 (including outbuildings)
  - *2 bedrooms = 1.0
  - *3 bedrooms = 1.5
  - *4 bedrooms = 2.0

Flow Factor

FLOW FACTORS (FF)

Flow Factor = Design Flow/300

Residential: Design Flow for each bedroom is 150 gallons per day (GPD) except for bedrooms beyond 4 in single-family residential buildings, which have a 75 GPD per bedroom design flow.

Single-family lots:	FF	
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Multi-family buildings:
Minimum FF is 2.0 (4 bedrooms) and each additional bedroom increases FF by 0.5.

Non-Residential: Design Flow (GPD) / 300

*MLSS Perc Factor

*PF = Percolation Factor-Based on the percolation rate of the receiving soil

PERCOLATION FACTOR (PF)

Percolation Rate	Percolation Factor (PF)
Up To 5.0 Minutes/Inch	1.0
5.1 To 10.0 Minutes/Inch	1.2
10.1 To 20.0 Minutes/Inch	1.5
20.1 To 30.0 Minutes/Inch	2.0
30.1 To 45.0 Minutes/Inch	3.0
45.1 To 60.0 Minutes/Inch	5.0

Large impact on MLSS requirement.

Percolation Factor

* The percolation rate of the naturally occurring soil is always used for the PF for new systems, B100a code-complying areas (CCAs), new lot layouts and MLSS compliant repairs.
* The percolation rate of the receiving soil is used for non-compliant repairs (NCR MLSS).

Hydraulic Factor

Hydraulic analysis

HYDRAULIC FACTORS (HF)

Hydraulic Gradient (% Slope)

Receiving Soil Depth (Inches)	<1.0	1.0-2.0	2.1-3.0	3.1-4.0	4.1-6.0	6.1-8.0	8.1-10.0	10.1-15.0	>15.0
0.1 - 17.9	See Comments in Section VIII A								
18.0 - 22.0	72	62	54	48	42	34	30	28	26
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30.1 - 36.0	48	42	34	30	28	26	24	20	18
36.1 - 42.0	42	36	30	28	26	24	20	18	16
42.1 - 48.0	36	32	28	26	24	20	18	16	14
48.1 - 60.0	30	28	24	22	20	18	16	14	10
>60.0	MLSS Need Not be Considered								

RS Depth: means the average depth of soil (soil in leaching system area and surrounding soil) measured down to the restrictive layer.

*Use of MLSS Formula

*MLSS categories:

1) New systems, B100a code-complying areas (CCAs), and conceptual layouts for new lots
2) MLSS compliant leaching system repairs and B100a potential repair areas.
3) Non-compliant MLSS repairs and B100a potential repair areas.

Conceptual B100a CCAs and system layouts for new lots

* RS depth based on naturally occurring soil only.

* No consideration given for septic fill.

* New and B100a Code Compliant Leaching System (LS) Installations

* Keep shallow (top of system 12” or less below natural grade) to include full natural soil depth in LS area. If not, depth measured from top of LS.

New and B100a Code Compliant Leaching System (LS) Installations*

Count up to 24” of select fill in the leaching system area for elevated systems on sites with at least 18” of naturally occurring receiving soil on the property (25’/50’ downgrade for small/large systems).

LS repairs and B100a (MLSS compliant) potential repair areas (PRAs)

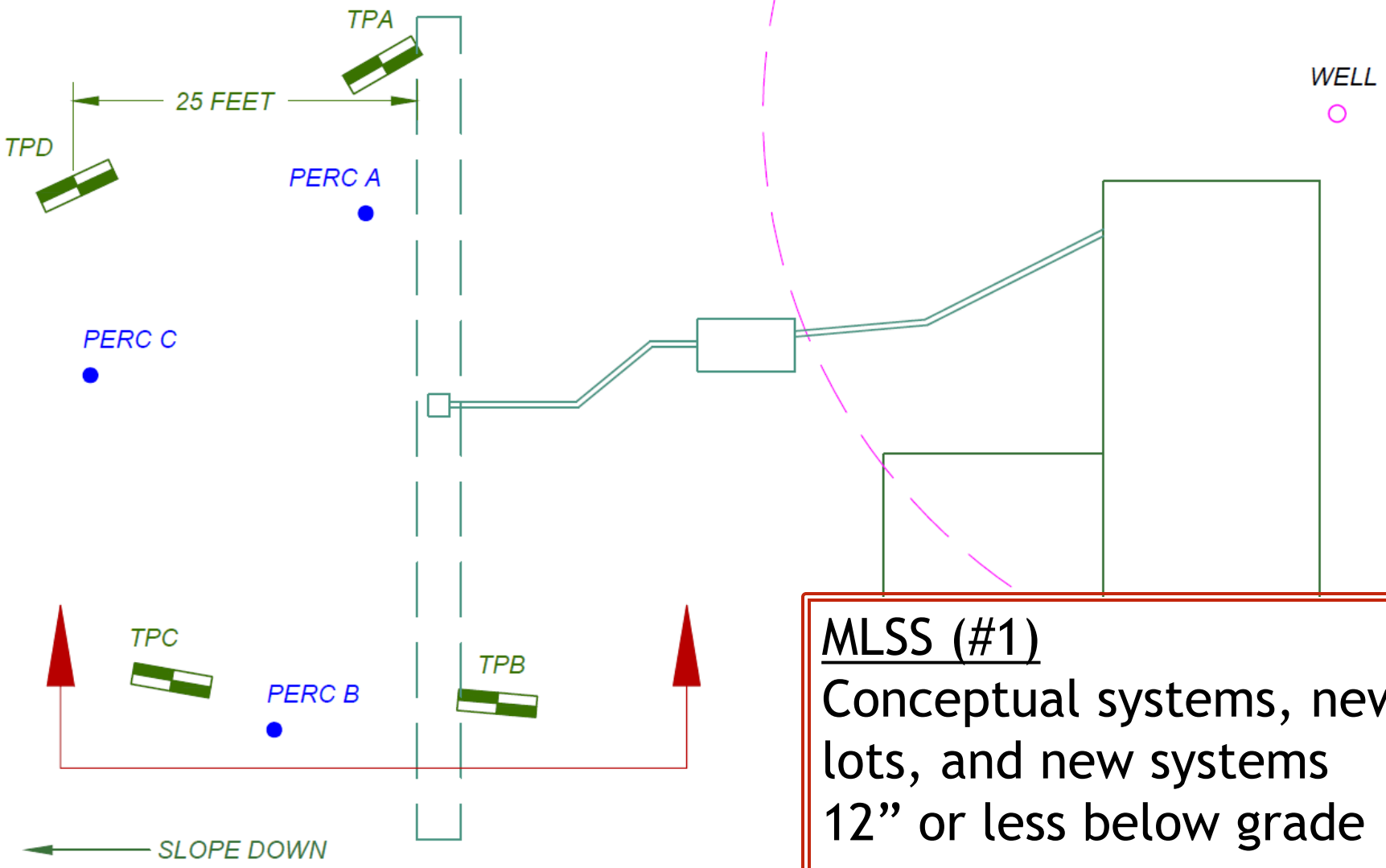
- Conceptual B100a PRAs consider natural receiving soil only
- LS installations:
- Keep system shallow as possible; however still can count full natural soil depth in the LS area even if top of LS is more than 12” below natural grade.

LS repairs and B100a (MLSS compliant) potential repair areas (PRAs)

LS Installations:

Count up to 24” of select fill in the leaching system area for elevated systems on sites with at least 18” of naturally occurring receiving soil on the property (25’/50’ downgrade for small/large systems).

TEST PIT A	TEST PIT B	TEST PIT C	TEST PIT D
0-6 TOPSOIL	0-6 TOPSOIL	0-6 TOPSOIL	0-6 TOPSOIL
6-40 BRN SANDY LOAM	6-40 BRN SANDY LOAM	6-36 BRN SANDY LOAM	6-36 BRN SANDY LOAM
40-81 GRY SILT LOAM	40-85 GRY SILT LOAM	36-81 GRY SILT LOAM	36-81 GRY SILT LOAM
REDOX AT 40	REDOX AT 40	REDOX AT 36	REDOX AT 36

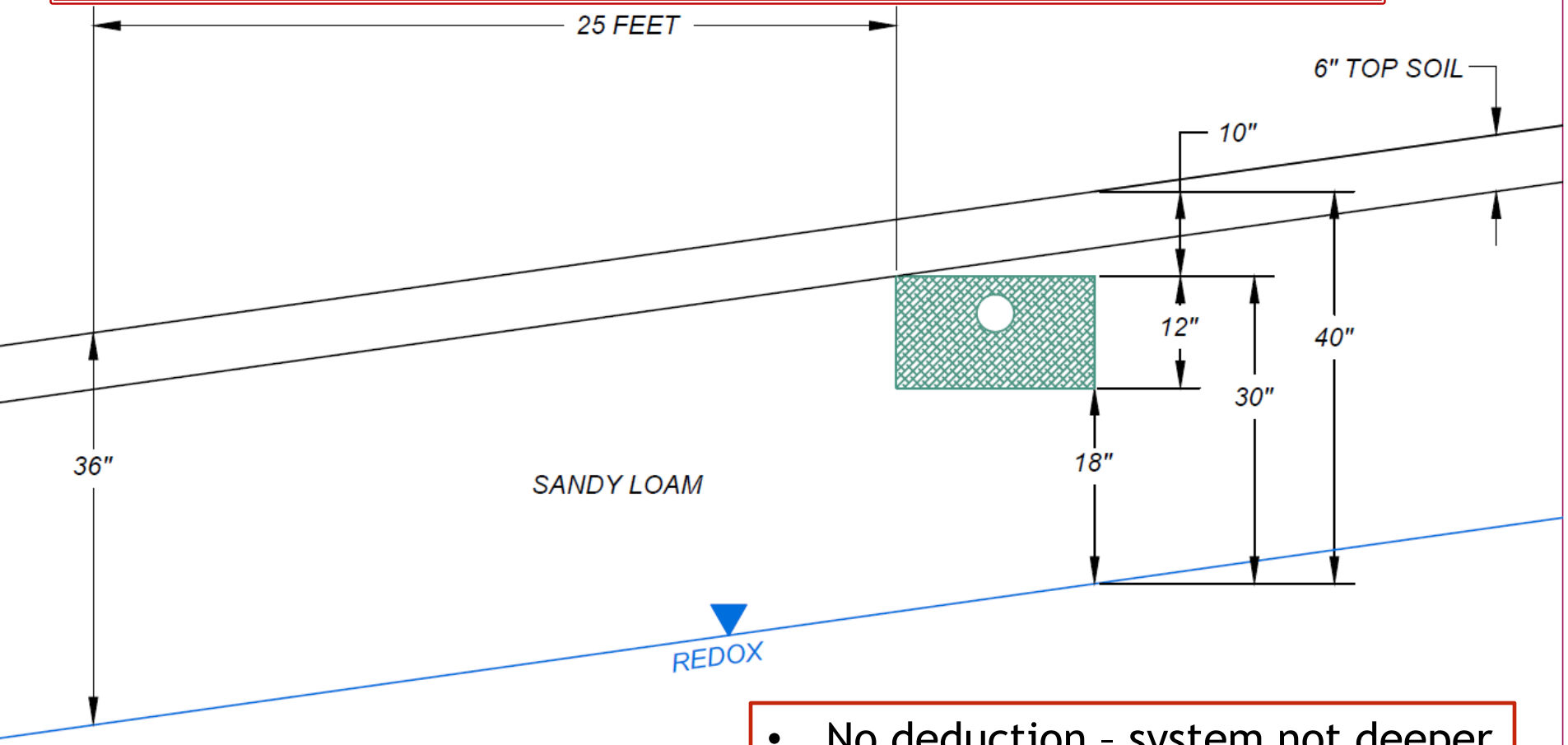


MLSS (#1)

Conceptual systems, new lots, and new systems 12” or less below grade

DRAWING 3 J.M.LAUDANO FEB 2016

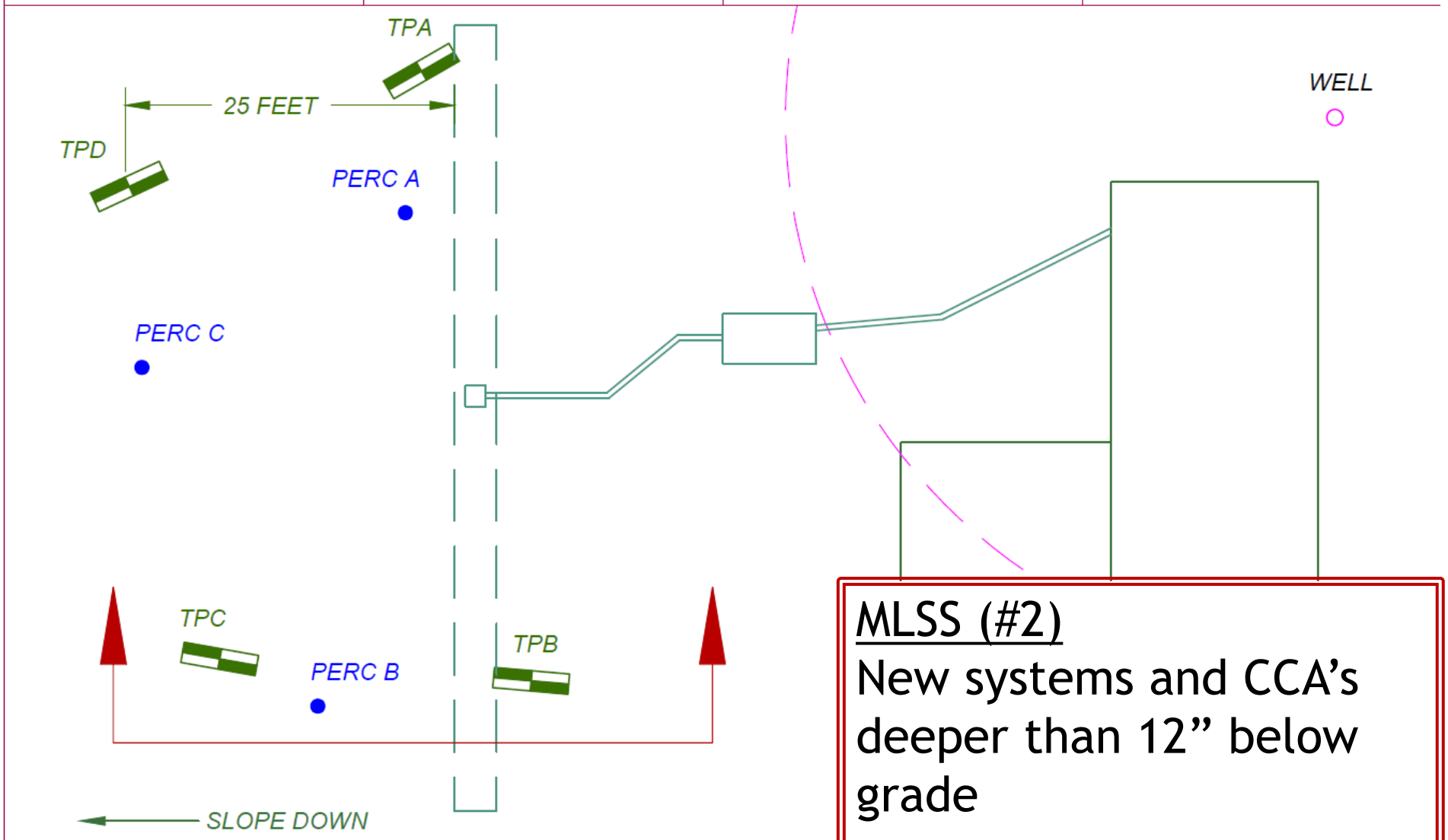
MLSS (#1): Conceptual systems, new lots, and new systems 12” or less below grade



- No deduction – system not deeper than 12” below grade
- RS Depth = 38”

MLSS IS BASED ON RECEIVING SOIL DEPTH OF (40" + 36") / 2 = 38"

TEST PIT A	TEST PIT B	TEST PIT C	TEST PIT D
0-6 TOPSOIL	0-6 TOPSOIL	0-6 TOPSOIL	0-6 TOPSOIL
6-46 BRN FINE SANDY LOAM	6-46 BRN FINE SANDY LOAM	6-40 BRN FINE SANDY LOAM	6-40 BRN FINE SANDY LOAM
46-81 GRY SILT LOAM	46-81 GRY SILT LOAM	40-81 GRY SILT LOAM	40-81 GRY SILT LOAM
REDOX AT 46	REDOX AT 46	REDOX AT 40	REDOX AT 40

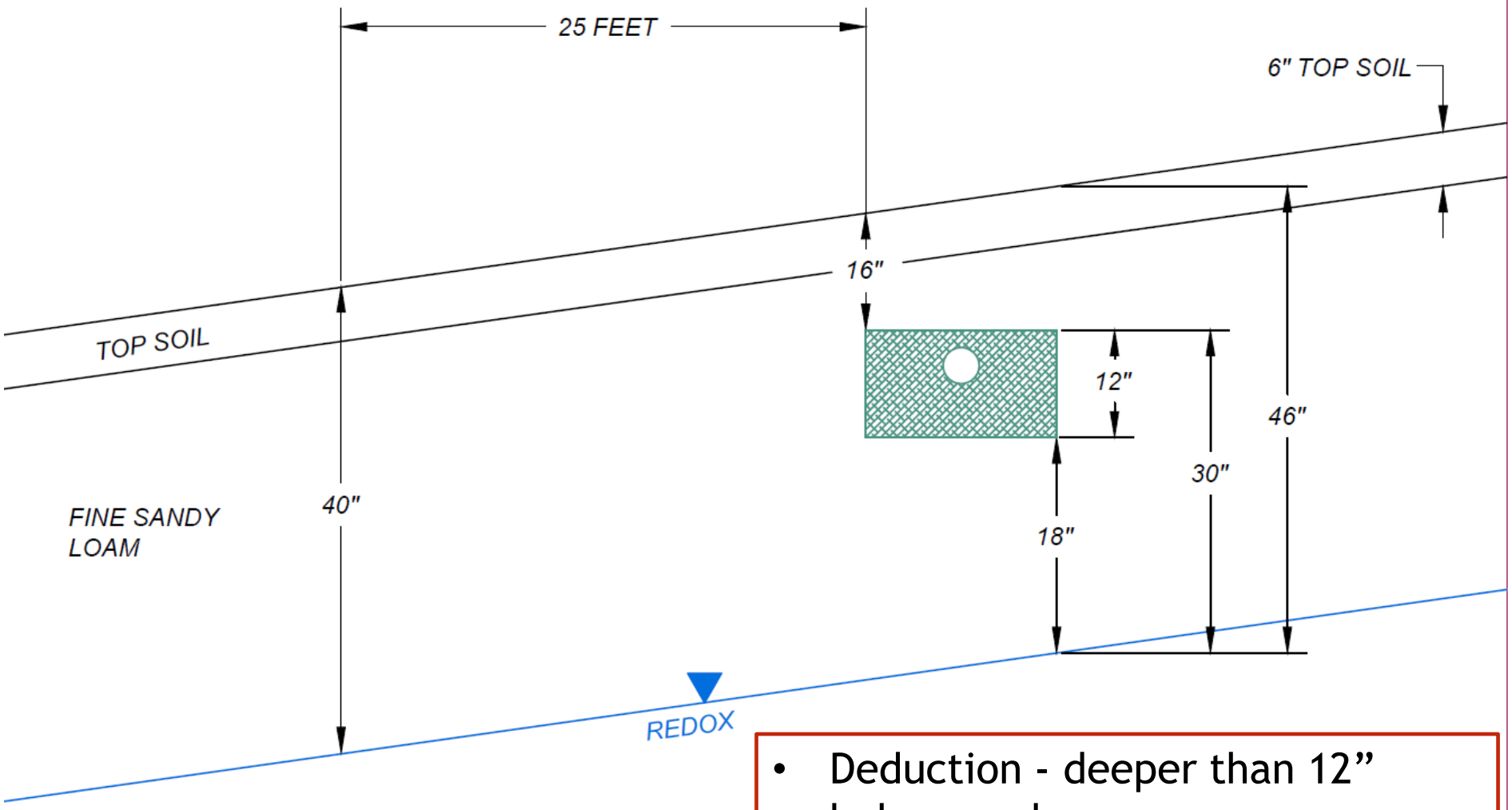


MLSS (#2)

New systems and CCA's deeper than 12" below grade

DRAWING 1 J.M.LAUDANO FEB 2016

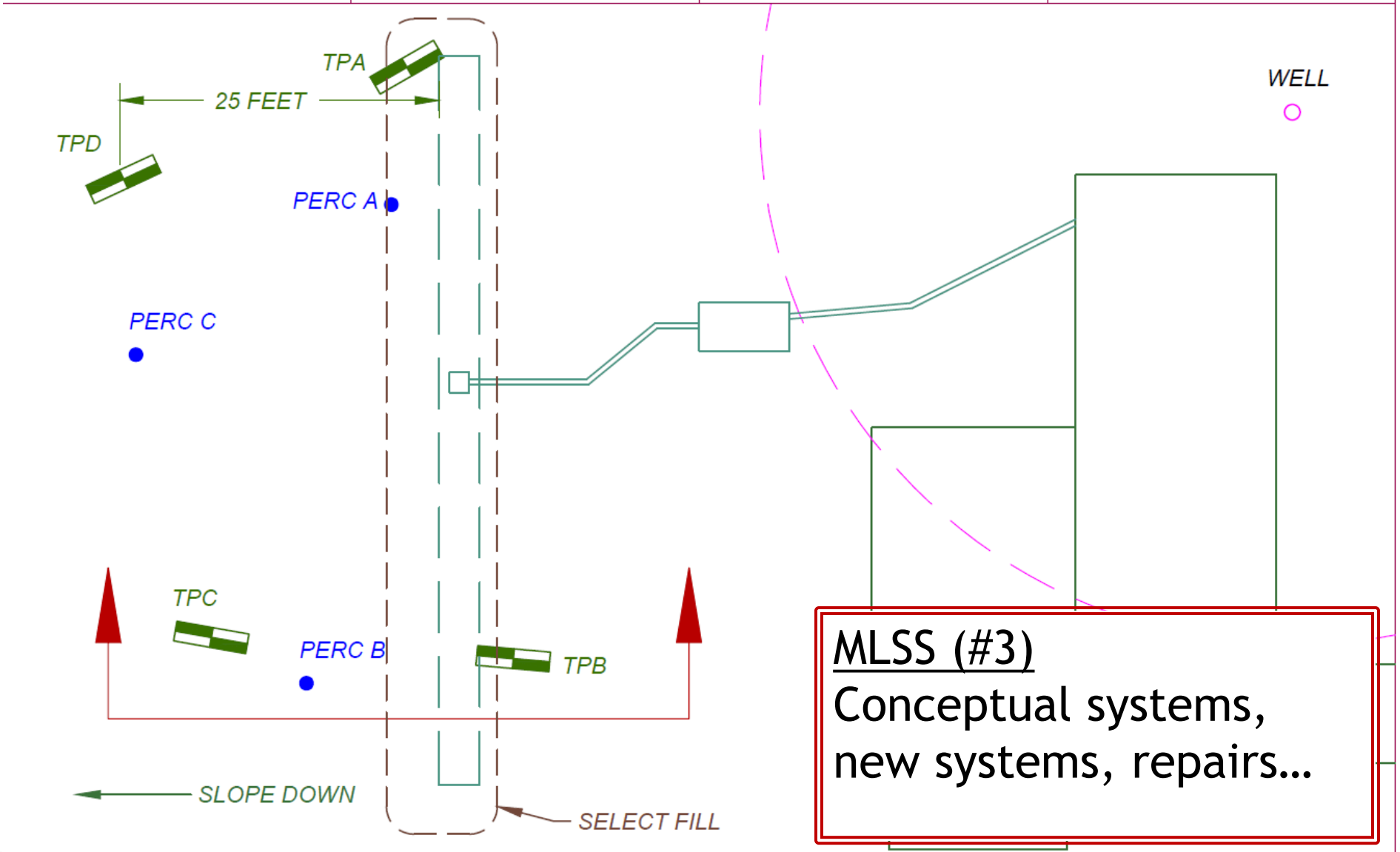
MLSS (#2): New systems/CCA's deeper than 12" below grade



- Deduction - deeper than 12" below grade
- Receiving soil measured from top of system
- RS Depth = 35"

MLSS IS BASED ON RECEIVING SOIL DEPTH OF (30" + 40") / 2 = 35"

TEST PIT A	TEST PIT B	TEST PIT C	TEST PIT D
0-10 TOPSOIL	0-10 TOPSOIL	0-10 TOPSOIL	0-6 TOPSOIL
10-36 BRN SANDY LOAM	10 -36 BRN SANDY LOAM	10-12 BRN SANDY LOAM	10-12 BRN SANDY LOAM
36-61 GRY SILT LOAM	36-65 GRY SILT LOAM	12-48 GRY SILT LOAM	12-48 GRY SILT LOAM
REDOX AT 36	REDOX AT 36	REDOX AT 12	REDOX AT 12

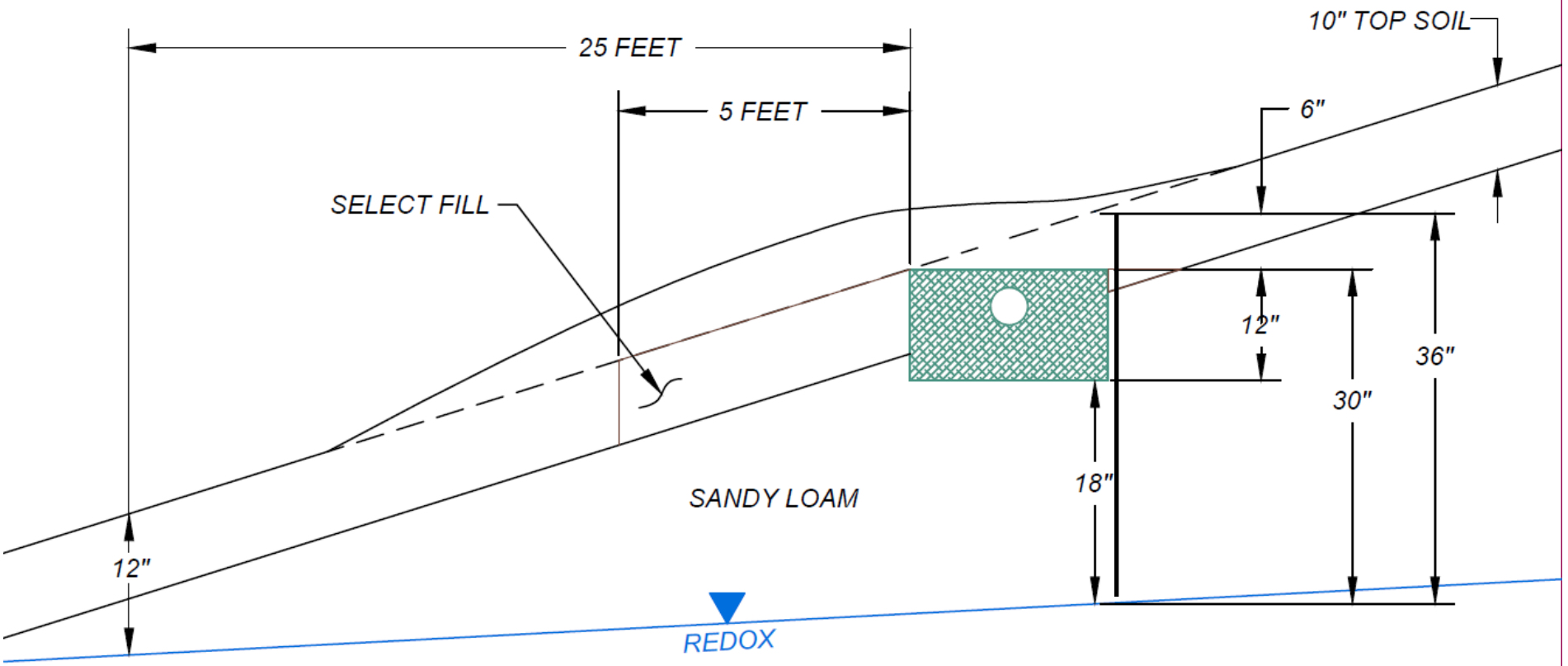


MLSS (#3)

Conceptual systems, new systems, repairs…

DRAWING 4 J.M.LAUDANO FEB 2016

MLSS (#3): Conceptual systems, new systems, repairs…

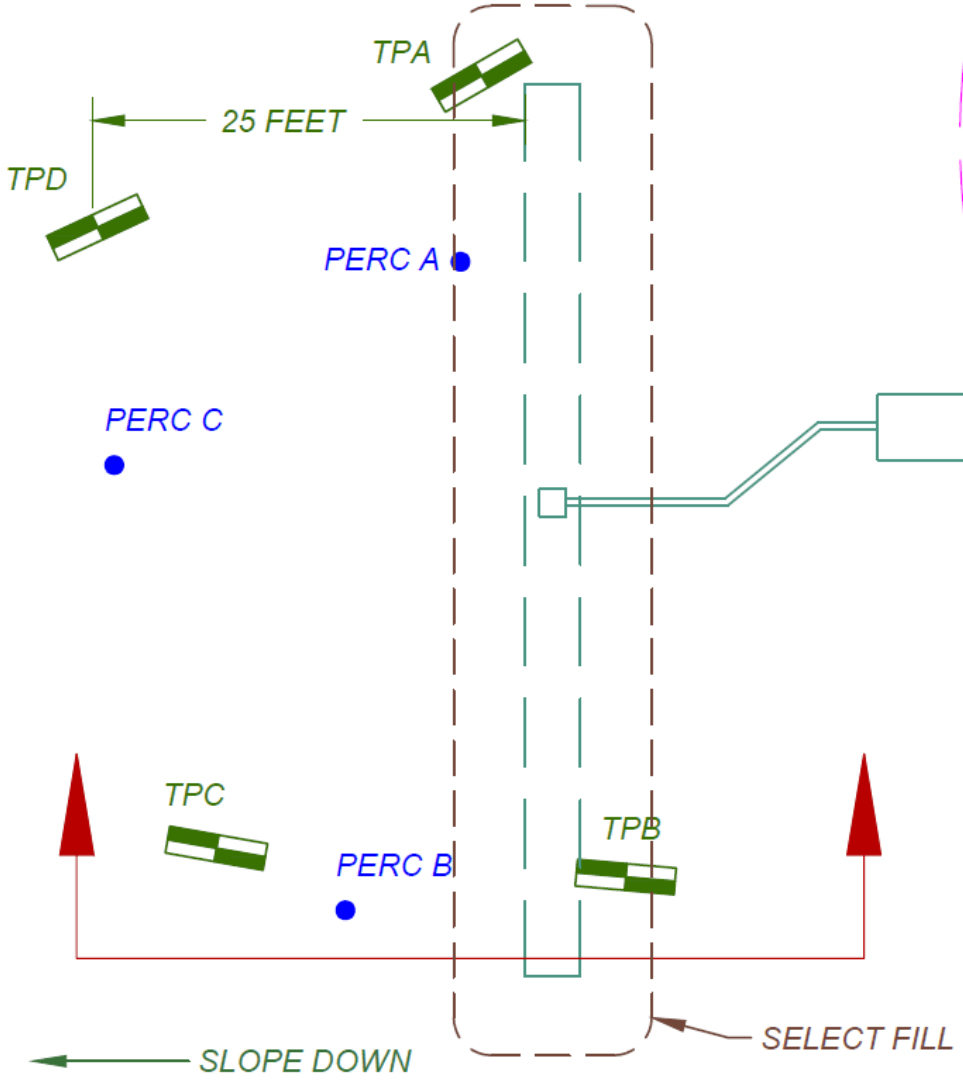


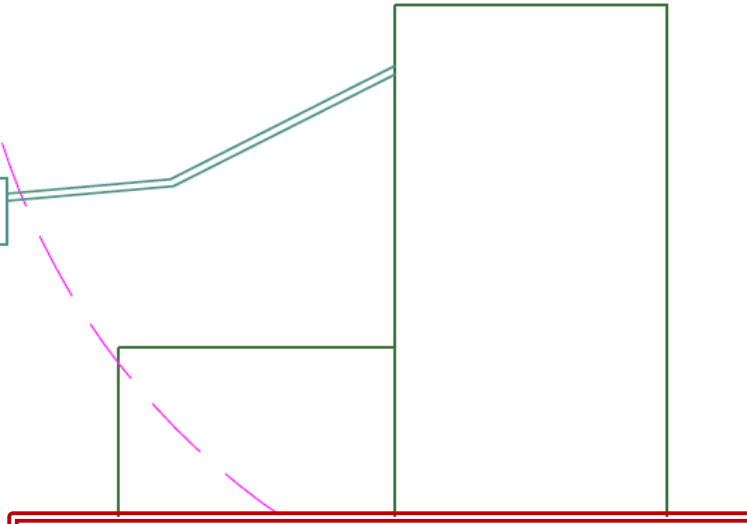
MLSS IS BASED ON RECEIVING SOIL DEPTH OF (36" + 12") / 2 = 24"

- Receiving soil measured from grade.
- <18” downgradient; RS Depth = 24”

DRAWING 4A J.M.LAUDANO FEB 2016

TEST PIT A	TEST PIT B	TEST PIT C	TEST PIT D
0-10 TOPSOIL	0-10 TOPSOIL	0-10 TOPSOIL	0-6 TOPSOIL
10-24 BRN LOAMY SAND	10 -24 BRN LOAMY SAND	10-12 BRN LOAMY SAND	10-12 BRN LOAMY SAND
24-61 GRY SILT LOAM	24-65 GRY SILT LOAM	12-42 GRY SILT LOAM	12-45 GRY SILT LOAM
REDOX AT 24	REDOX AT 24	REDOX AT 12	REDOX AT 12



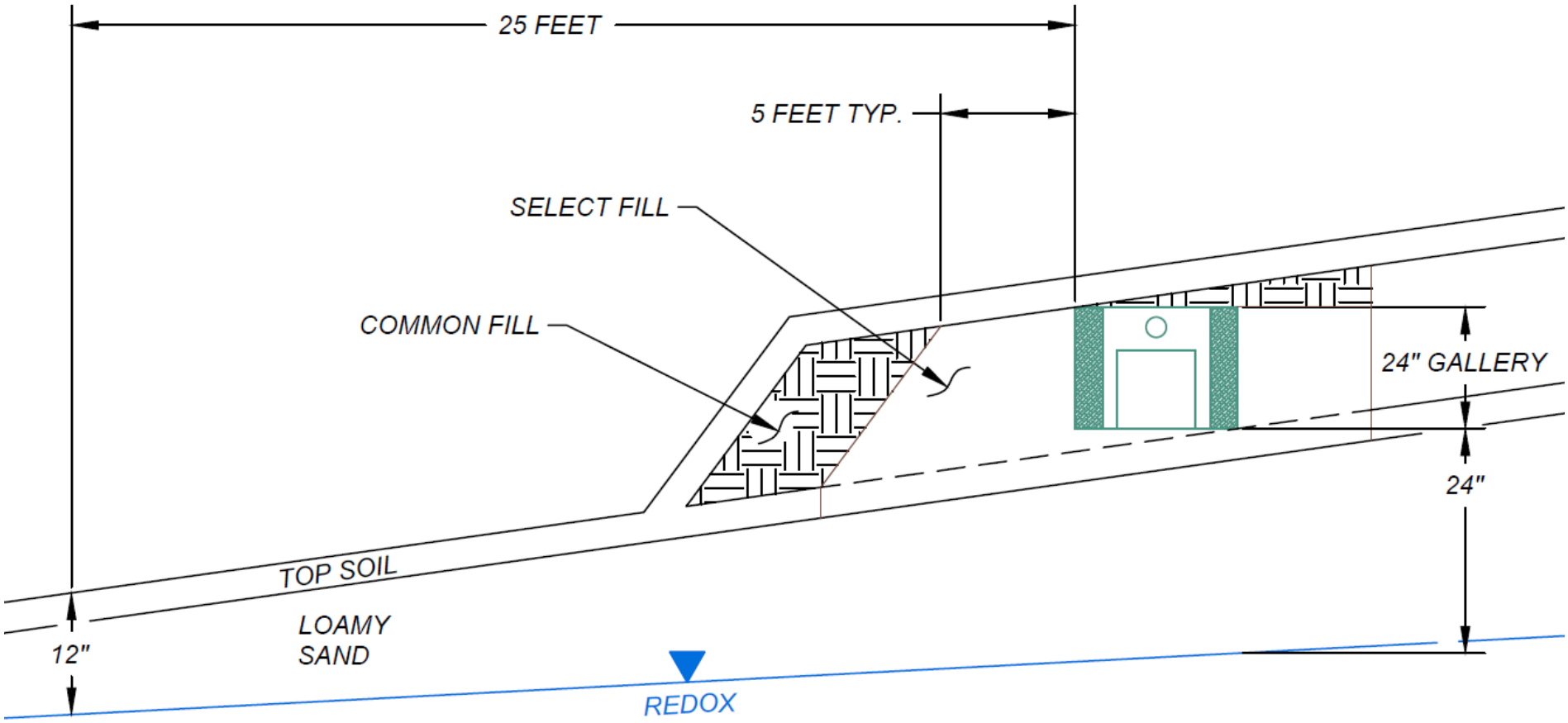


MLSS (#4)

Conceptual systems, new lots, repairs, CCA's, MLSS compliant potential repairs

DRAWING 5 J.M.LAUDANO FEB 2016

MLSS (#4): Conceptual systems, new lots, repairs, CCA's, B100a potential repair areas

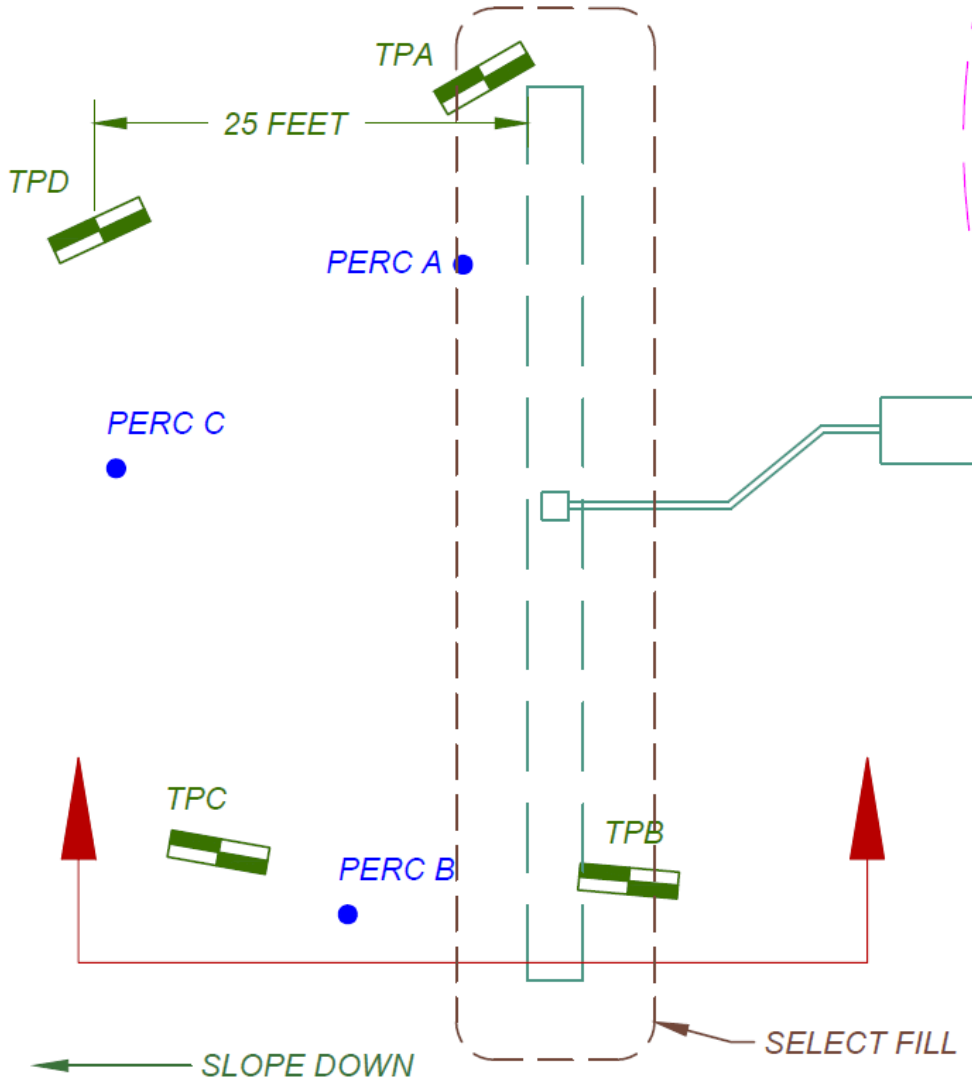


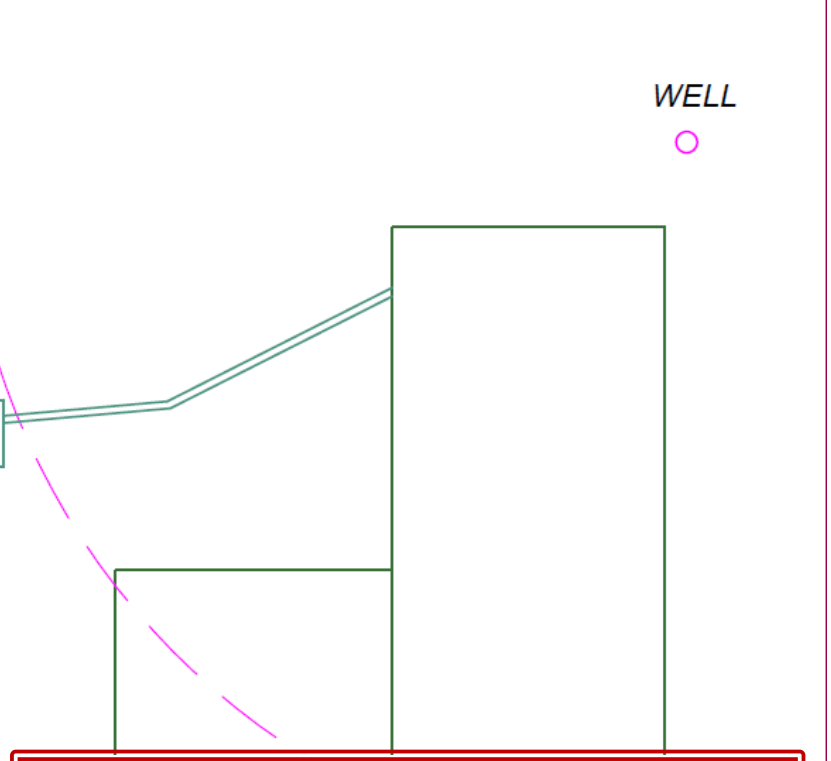
MLSS IS BASED ON RECEIVING SOIL DEPTH OF (24" + 12") / 2 = 18"

- <18" downgradient; therefore NO additional credit given for select fill
- RS Depth = 18"

DRAWING 5A J.M.LAUDANO FEB 2016

TEST PIT A	TEST PIT B	TEST PIT C	TEST PIT D
0-10 TOPSOIL	0-10 TOPSOIL	0-10 TOPSOIL	0-6 TOPSOIL
10-24 BRN LOAMY SAND	10 -24 BRN LOAMY SAND	10-18 BRN LOAMY SAND	10-18 BRN LOAMY SAND
24-61 GRY SILT LOAM	24-65 GRY SILT LOAM	18-42 GRY SILT LOAM	18-45 GRY SILT LOAM
REDOX AT 24	REDOX AT 24	REDOX AT 18	REDOX AT 18



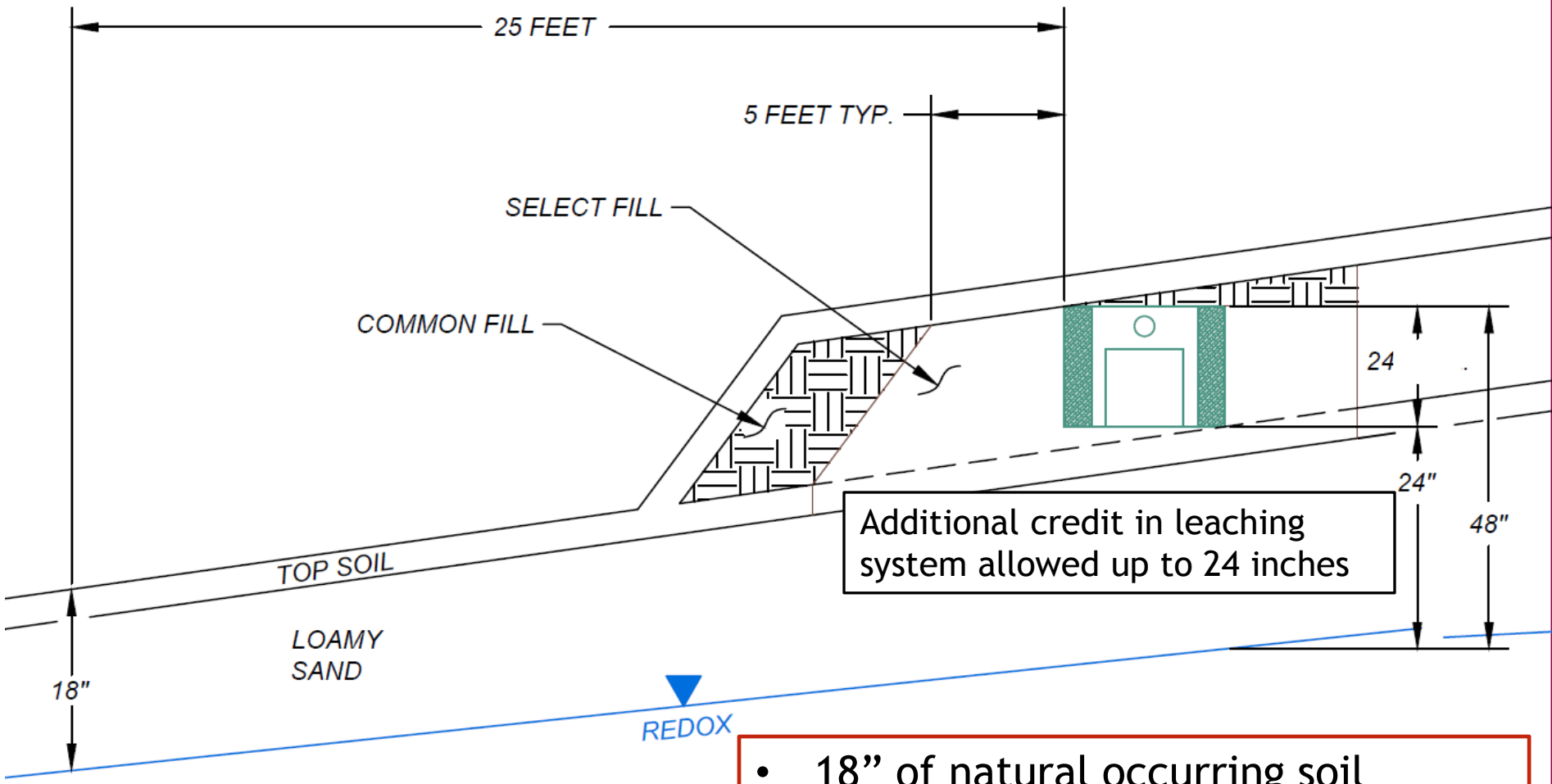


MLSS (#5)

New systems, repairs, CCA systems being installed

DRAWING 6 J.M.LAUDANO FEB 2016

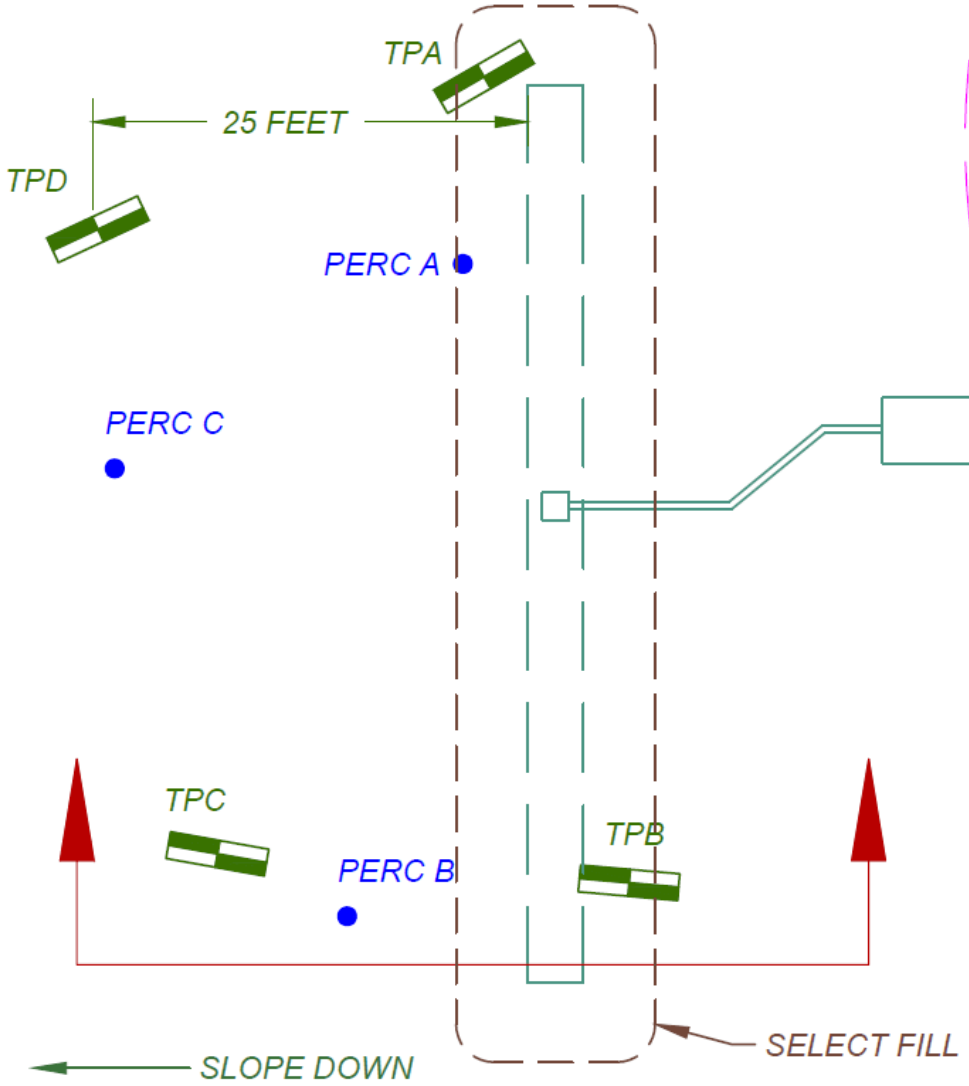
MLSS (#5): New systems, repair, CCA systems being installed

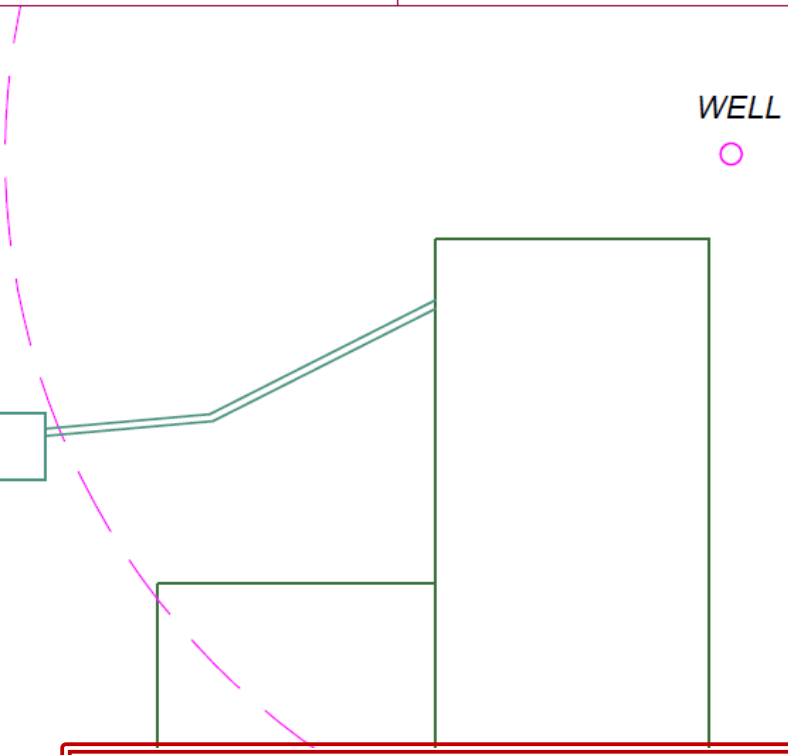


MLSS IS BASED ON RECEIVING SOIL DEPTH OF (48" + 18") / 2 = 33"

- 18” of natural occurring soil
- Max credit of 24” can be given for select fill to top of system
- RS Depth = 33”

TEST PIT A	TEST PIT B	TEST PIT C	TEST PIT D
0-6 TOPSOIL	0-6 TOPSOIL	0-8 TOPSOIL	0-8 TOPSOIL
6-28 RED BRN F.S. LOAM	6-28 RED BRN F.S. LOAM	8-24 RED BRN F.S. LOAM	8-24 RED BRN F.S. LOAM
LEDGE 28	LEDGE 28	LEDGE 24	LEDGE 24
REDOX N/O	REDOX N/O	REDOX N/O	REDOX N/O
GW N/O	GW N/O	GW N/O	GW N/O



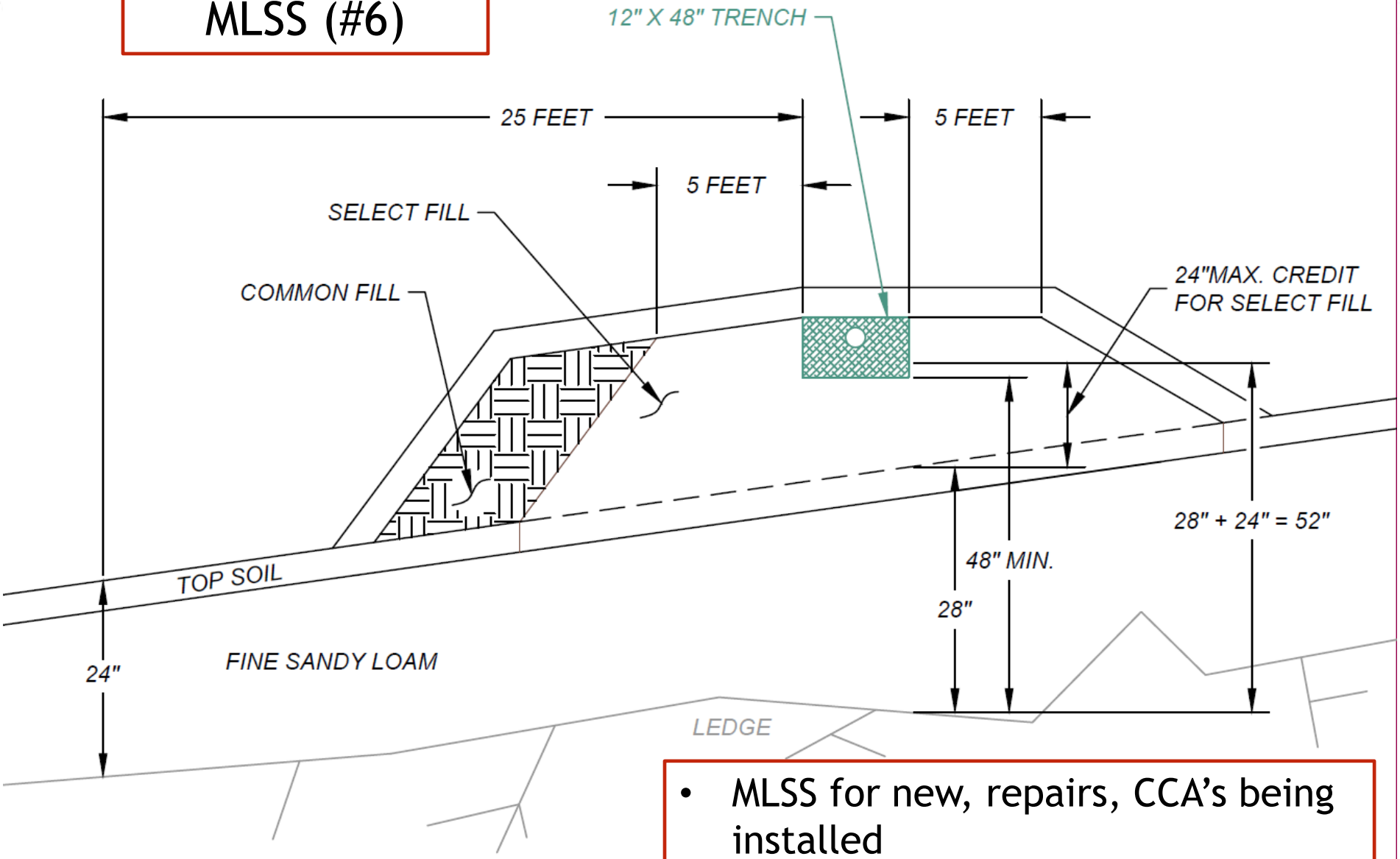


MLSS (#6)

New systems, repairs, CCA systems being installed

DRAWING 8 J.M.LAUDANO FEB 2016

MLSS (#6)

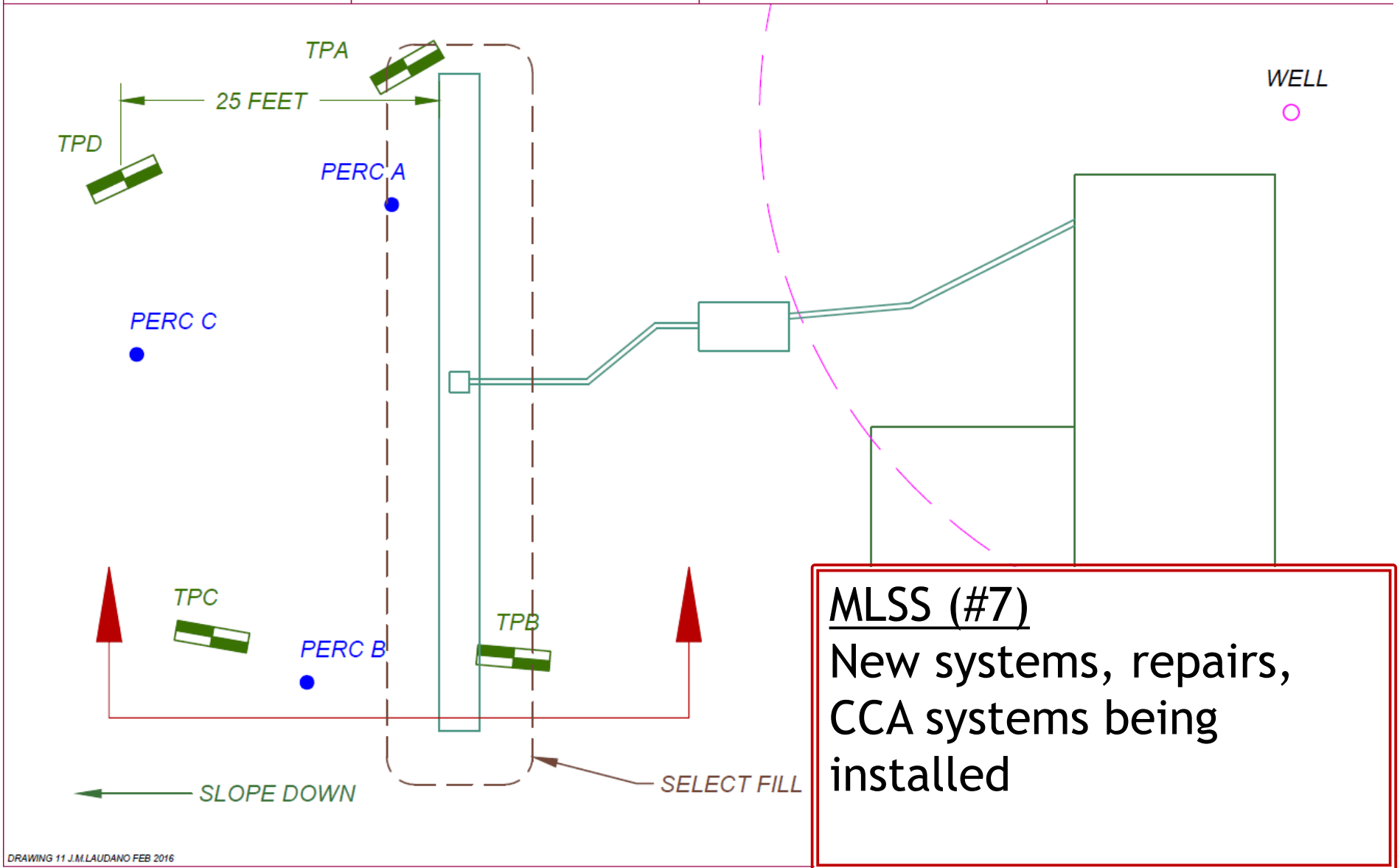


MLSS IS BASED ON RECEIVING SOIL DEPTH OF (52" + 24") / 2 = 38"

- MLSS for new, repairs, CCA's being installed
- Maximum of 24" additional credit can be given for select fill
- RS Depth = 38"

DRAWING 8A J.M.LAUDANO FEB 2016

TEST PIT A	TEST PIT B	TEST PIT C	TEST PIT D
0-2 TOPSOIL	0-5 TOPSOIL	0-4 TOPSOIL	0-6 TOPSOIL
2-36 RED BRN HTM (FILL)	5-39 RED BRN HTM (FILL)	4-41 RED BRN HTM (FILL)	6-40 RED BRN HTM (FILL)
36-44 ORIG. TS	39-40 ORIG. TS	41-44 ORIG. TS	40-44 ORIG. TS
44-70 RED SANDY LOAM	40-73 RED SANDY LOAM	44-59 RED SANDY LOAM	44-58 RED SANDY LOAM
REDOX N/O	REDOX N/O	REDOX N/O	REDOX N/O
LEDGE 70	LEDGE 73	GW N/O	LEDGE 58

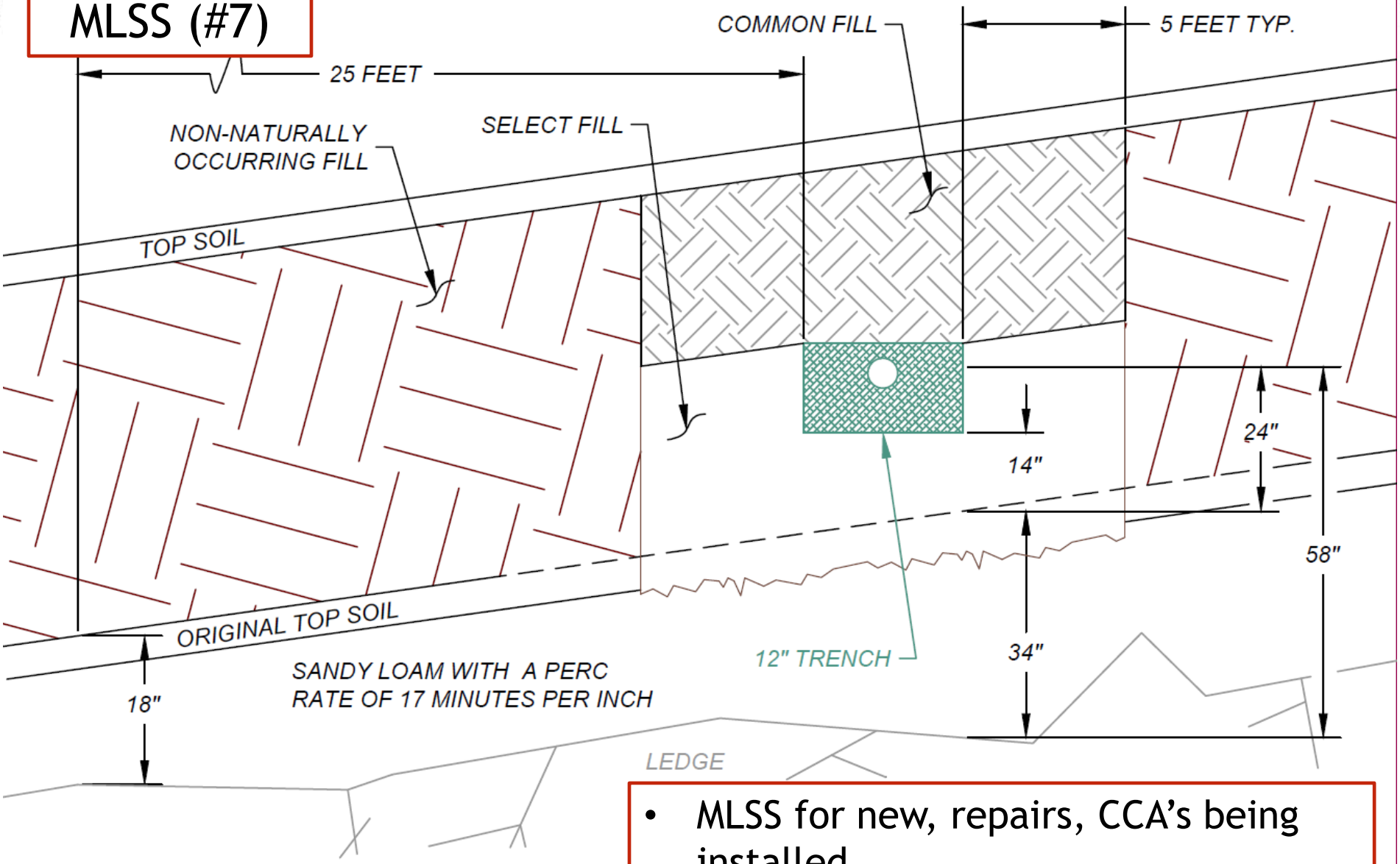


MLSS (#7)

New systems, repairs, CCA systems being installed

DRAWING 11 J.M.LAUDANO FEB 2016

MLSS (#7)



- MLSS for new, repairs, CCA's being installed
- Max of 24" additional credit can be given for select fill to top of system
- RS Depth = 38"

MLSS IS BASED ON RECEIVING SOIL DEPTH OF (58" + 18") / 2 = 38"

DRAWING 11A J.M.LAUDANO FEB 2016

*Use of MLSS Formula

*Created 3 categories for the use of MLSS (#1 and #2 are MLSS compliant):

1) New SSDS, code-complying areas and conceptual SSDS for new lots
2) Leaching system repairs and B100a potential repair area
3) **Non-compliant (NCR) MLSS repairs**

*NCR MLSS

*Repairs and Potential Repair Areas that cannot provide the MLSS require an exception from the local DOH.

*An assessment called a NCR MLSS is necessary

*NCR MLSS

*NCR MLSS assessment required when <18"of naturally occurring RS depth or MLSS cannot be achieved.

*PE plan required if less than 25% compliance with required NCR MLSS. (previously 50%)

*NCR MLSS

*Permit to Discharge shall note that system is non-compliant relative to MLSS, and that an exception has been granted.

*Permitted flow shall be based on most limited percentage of ELA or NCR MLSS provided

*NCR MLSS

PERMIT TO DISCHARGE

Approval is hereby given to John L. Smith (Property Owner), in accordance with Public Health Code Section 19-13-B103e (h) to discharge to a subsurface sewage disposal system located at 123 East Main Street (Street Address) in the town of Hartford, CT that will receive domestic sewage from a:

Residential building containing 3 bedrooms. Single family (Y/N): Y.
Restaurant containing _____ seats.
Commercial/Office building providing _____ square feet.
Other structure as described: _____.

Design Flow = 450 **gallons per day. Permitted Flow =** 315 **gallons per day.**
The design flow shall equal the permitted flow, except for non-compliant repairs (See Section IV D).

In order to provide a sufficient factor of safety it is recommended that the average daily discharge not exceed 2/3 of the permitted flow or 210 gallons per day.

Operation and Maintenance: Septic tank shall be inspected regularly and pumped as needed but not less frequently than every five years. The septic tank has an effluent filter (Y/N) Y. Effluent filters require periodic cleaning. Failure to clean filters can result in sewage backup into the building or effluent breakout. Restaurants serviced by external grease interceptor tank(s) require quarterly inspections and cleaning as necessary. Tank pump-outs tracked by local health department (Y/N) Y. If yes, stipulate pump-out requirements: Every 5 years.

Special Requirements and Restrictions: 1.System malfunction or failure shall be addressed.

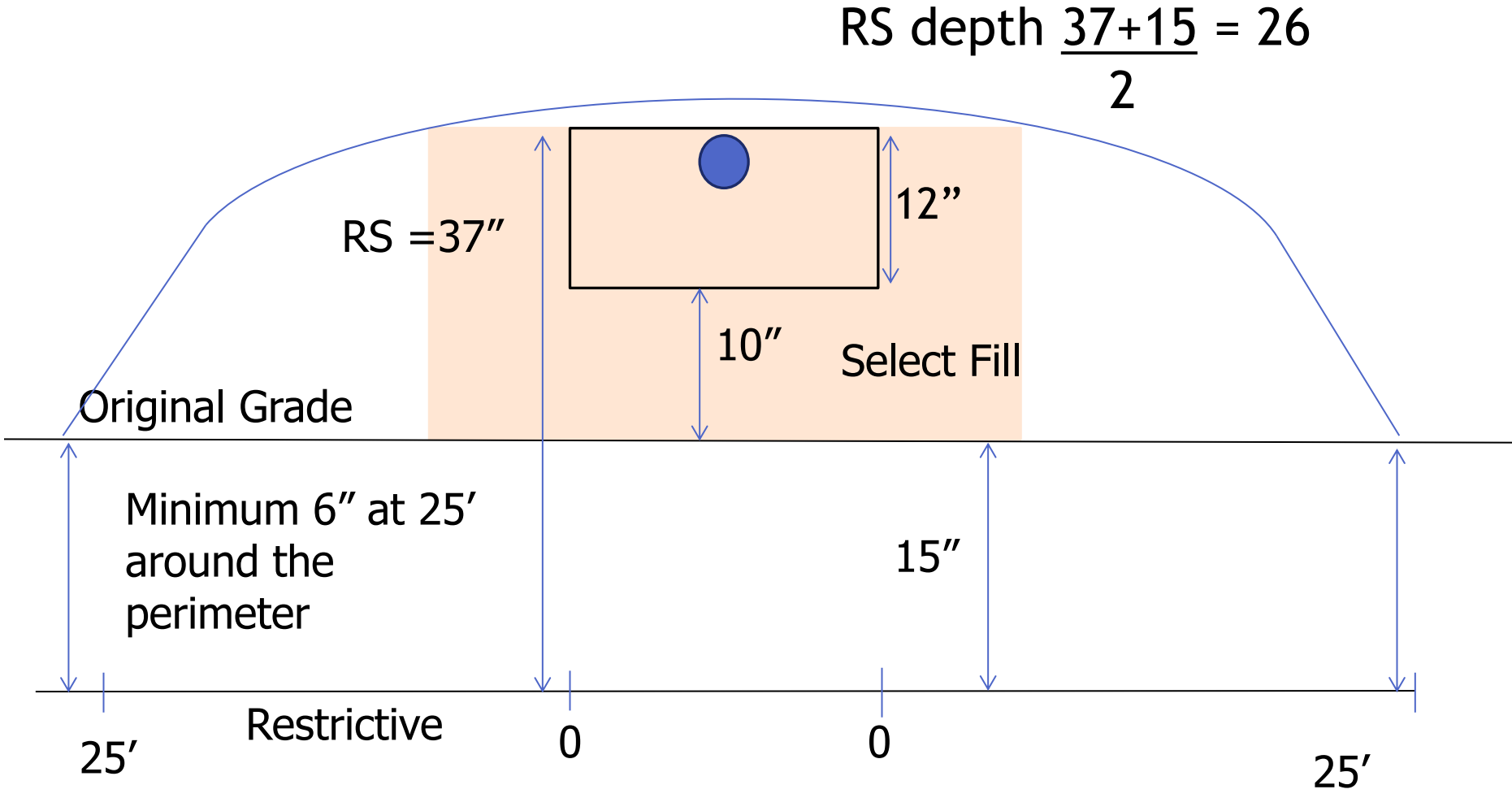
Exceptions (Repairs Only): Leaching system is non-compliant relative to MLSS requirements. 70 % of the NCR MLSS has been provided. Refer to approved plan dated 3/7/14 on file for additional information.

*NCR MLSS

- *Receiving soil in the leaching system area shall be measured from the top of the leaching system to the restrictive layer.
- *Existing receiving soil fill must perc faster than 30 min/inch.

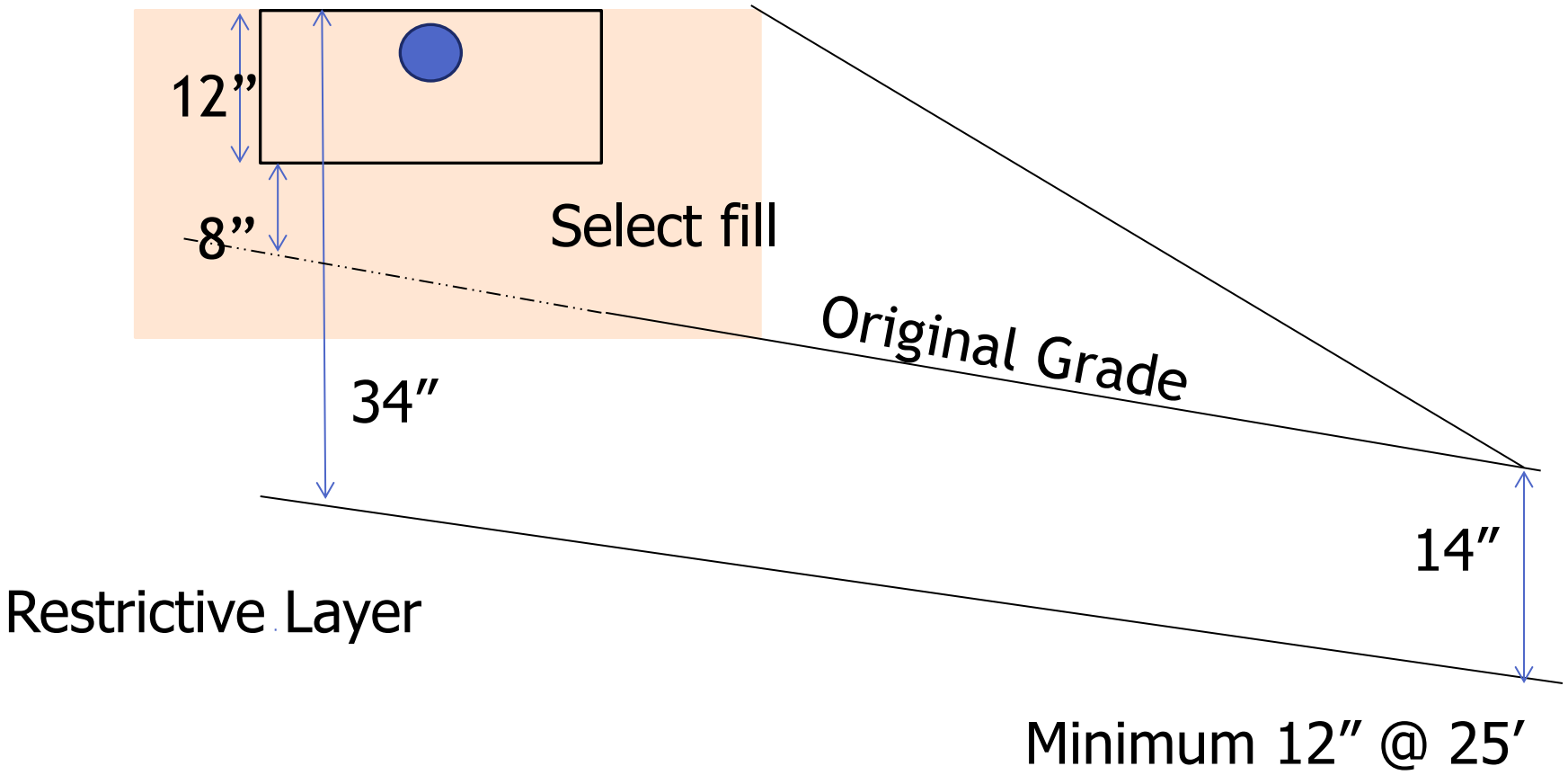
NCR MLSS: Flat lots

Average depth within the system area and 25′ around the perimeter.



NCR MLSS: All other lots

Average depth of the receiving soil in the system area and within 25’ downgradient

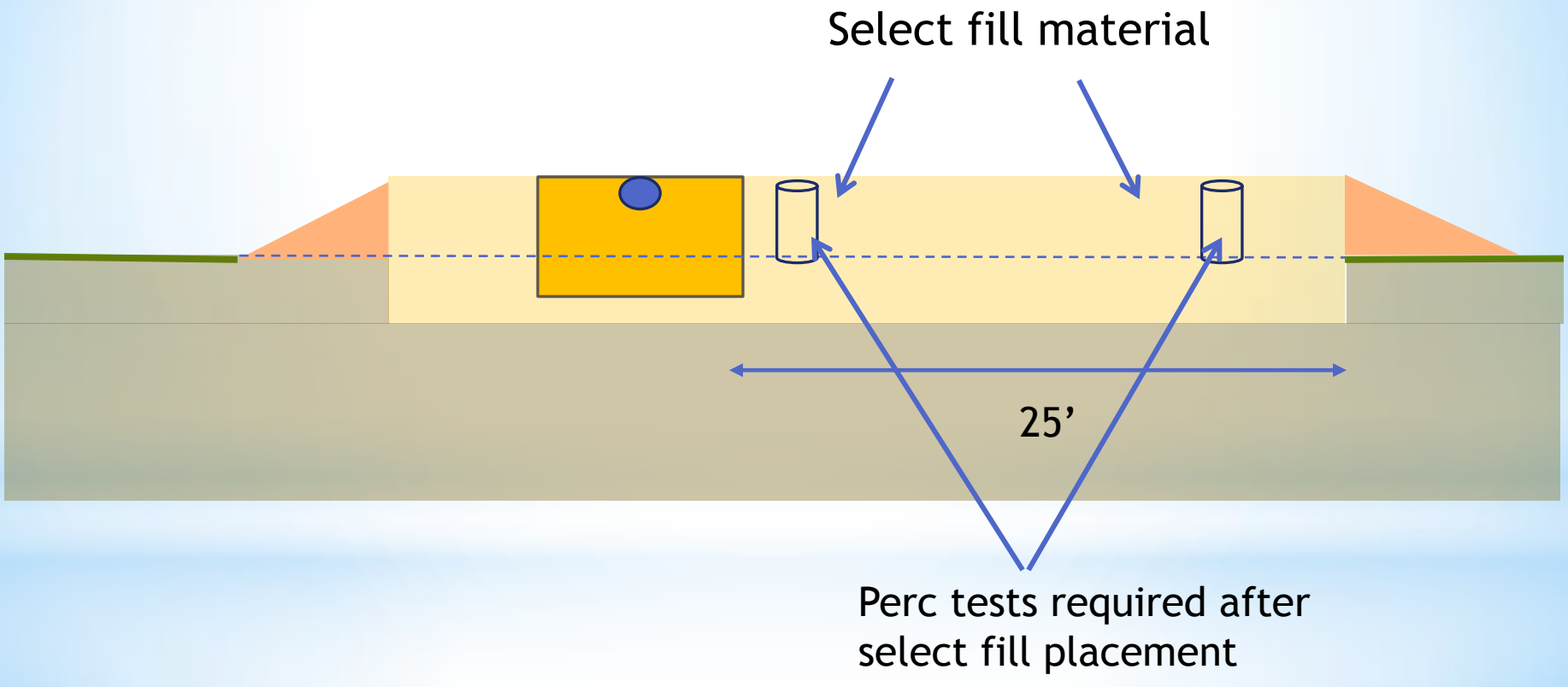


RS Depth = $\frac{34 + 14}{2}$ = 24”

*NCR MLSS

- *Percolation rate of select fill can be used for NCR MLSS calculations when receiving soil is entirely select fill.
- *Select fill used as receiving soil must be perc tested to confirm basis of design.

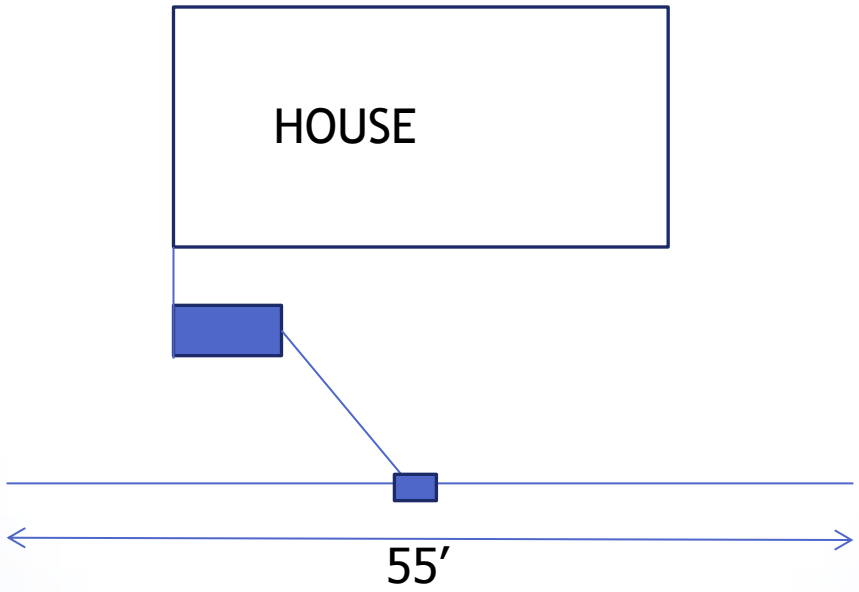
*Select Fill as Receiving Soil



*NCR MLSS

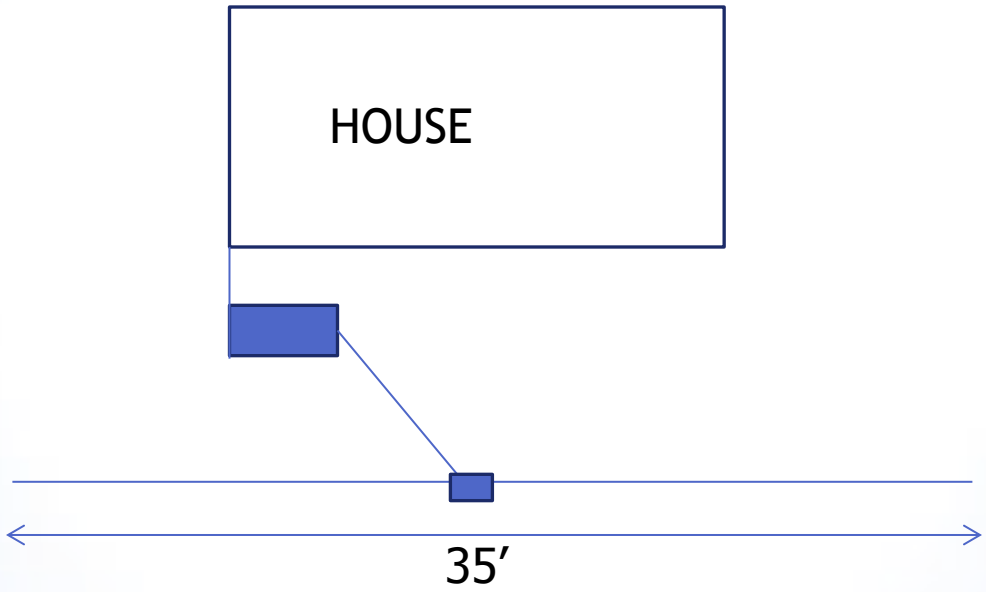
*The leaching system spread must be the maximum percent possible of the NCR MLSS based on RS depth of 18-22 inches, or based on the depth of the existing receiving soil if greater.

*NCR Maximizing Spread



If NCR MLSS based on 18” = 55 feet, then each row must be at least 55 feet in length if it can be installed on the property.

*NCR Maximizing Spread



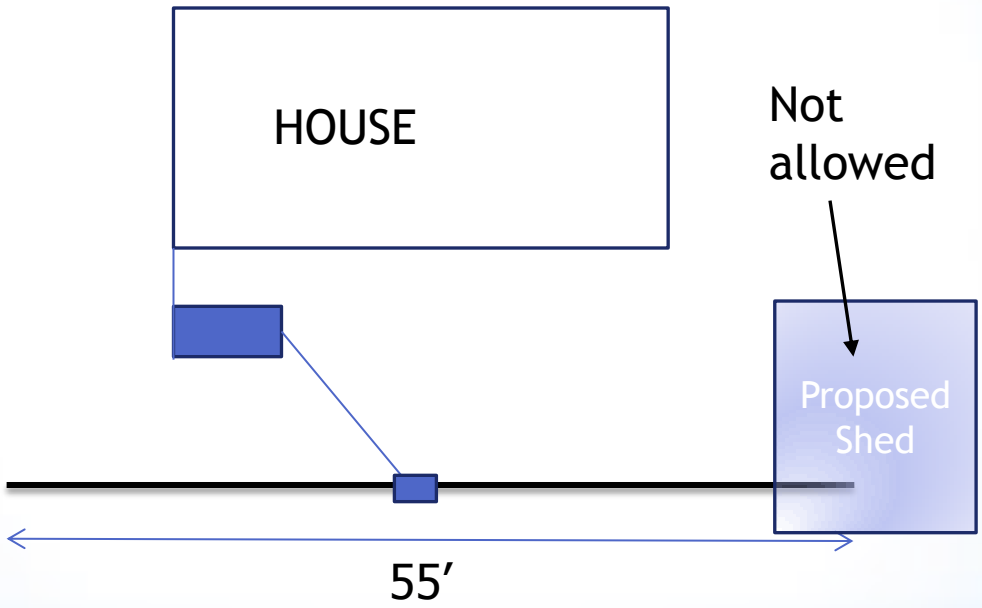
If NCR MLSS based on 18” = 55 feet, but only 35 feet can be installed on the property, then each row must be at least 35 feet in length.

Additional fill can be used to reduce NCR MLSS to no less than 35 feet.

*NCR MLSS

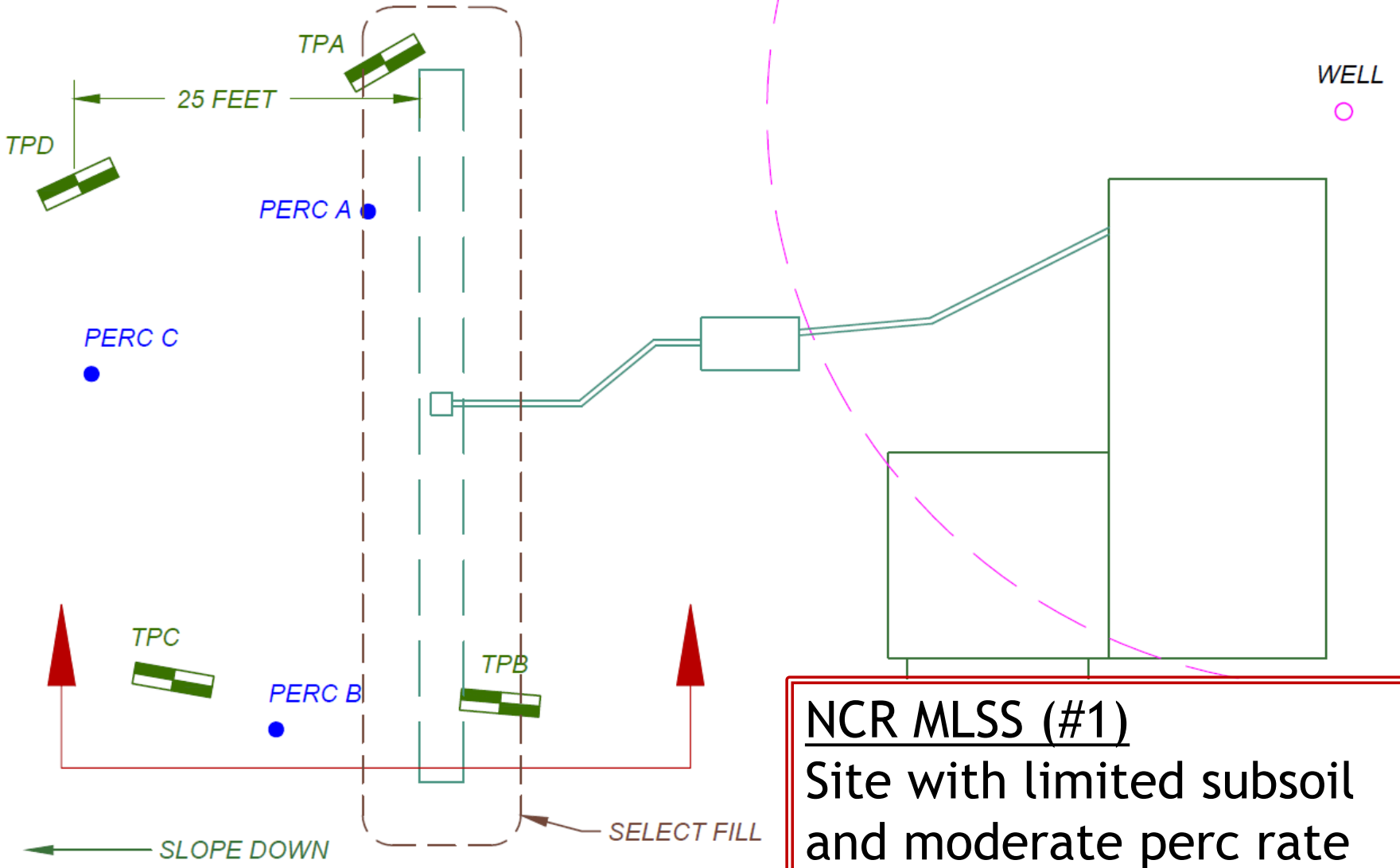
- B100a NCR MLSS used for building additions, pools and accessory structurers.
- **Cannot reduce potential repair area!**

* NCR Maximizing Spread (B100a)



If NCR MLSS based on 18” = 55 feet, then each row must be at least 55 feet in length if it can be installed on the property. Additional fill cannot be used to reduce the NCR MLSS and to allow for shed!

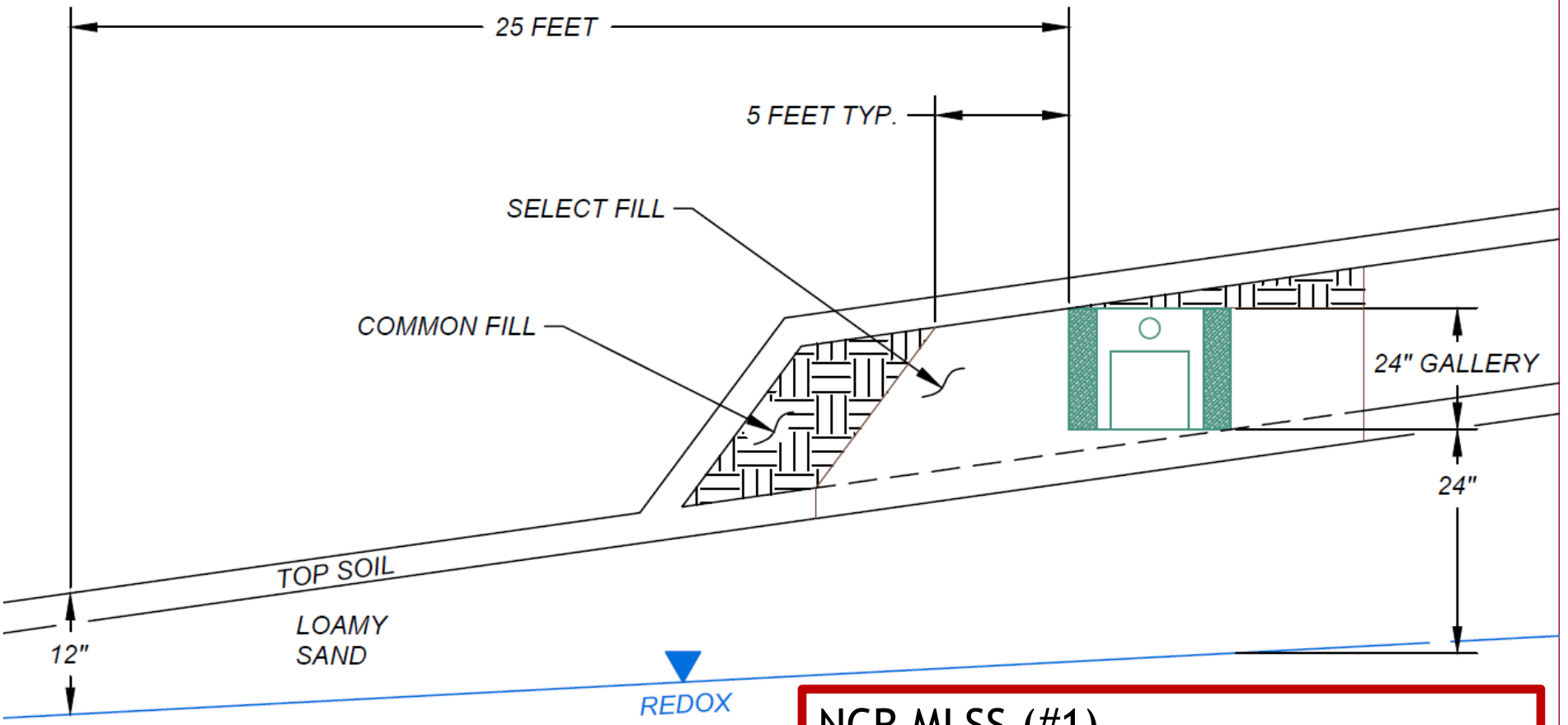
TEST PIT A	TEST PIT B	TEST PIT C	TEST PIT D
0-10 TOPSOIL	0-10 TOPSOIL	0-10 TOPSOIL	0-6 TOPSOIL
10-24 BRN LOAMY SAND	10 -24 BRN LOAMY SAND	10-12 BRN LOAMY SAND	10-12 BRN LOAMY SAND
24-61 GRY SILT LOAM	24-65 GRY SILT LOAM	12-42 GRY SILT LOAM	12-45 GRY SILT LOAM
REDOX AT 24	REDOX AT 24	REDOX AT 12	REDOX AT 12



NCR MLSS (#1)

Site with limited subsoil and moderate perc rate

DRAWING 5 J.M.LAUDANO FEB 2016



MLSS IS BASED ON RECEIVING SOIL DEPTH OF

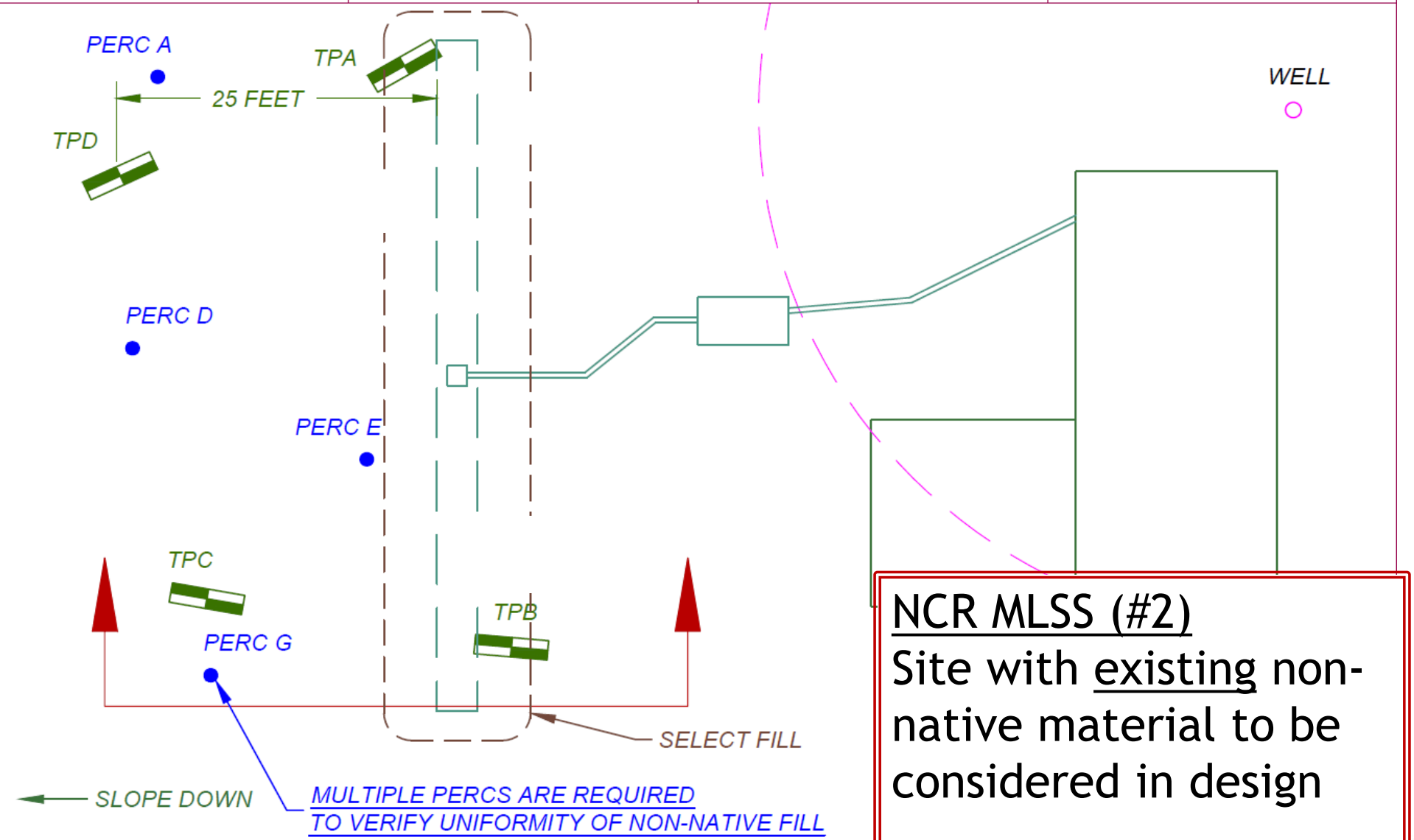
$$\frac{(48 + 12)}{2} = 30”$$

DRAWING 5A J.M.LAUDANO FEB 2016

NCR MLSS (#1)

- Increased soil available in leaching system area only.
- NCR MLSS designed on perc in natural soil.

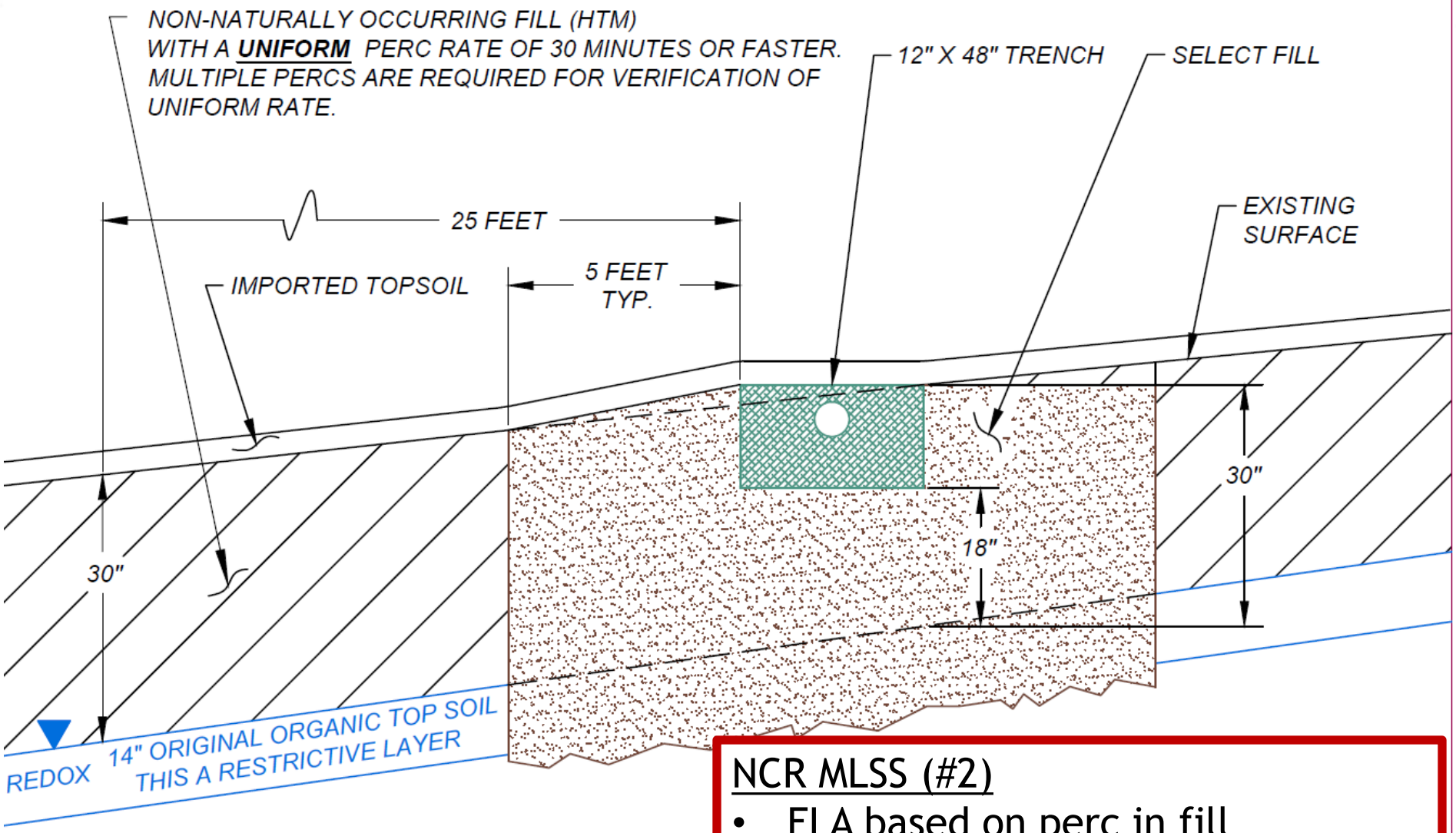
TEST PIT A	TEST PIT B	TEST PIT C	TEST PIT D
0-30 MISC. NON-NATIVE FILL	0-30 MISC. NON-NATIVE FILL	0-30 MISC. NON-NATIVE FILL	0-30 MISC. NON-NATIVE FILL
30-42 ORIG. ORGANIC TS	30-42 ORIG. ORGANIC TS	30-44 ORIG. ORGANIC TS	30-44 ORIG. ORGANIC TS
42-76 SILT LOAM	42-76 SILT LOAM	44-76 SILT LOAM	44-76 SILT LOAM
REDOX 30	REDOX 30	REDOX 30	REDOX 30
GW 45	GW 45	GW 45	GW 45



DRAWING 9 J.M.LAUDANO FEB 2016

NCR MLSS (#2)

Site with existing non-native material to be considered in design



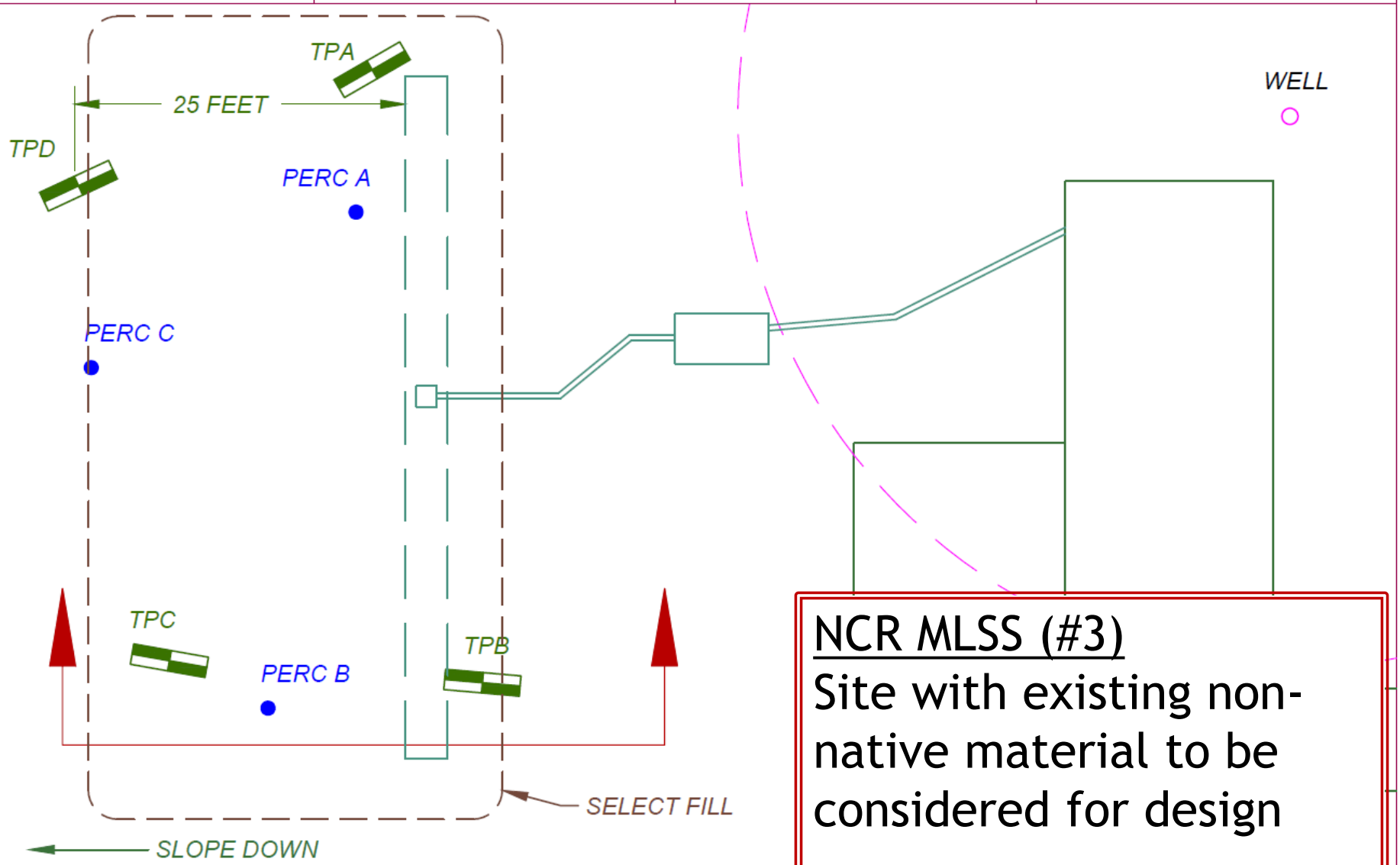
NCR MLSS IS BASED ON RECEIVING SOIL
DEPTH OF (30" + 30") / 2 = 30"

NCR MLSS (#2)

- ELA based on perc in fill
- NCR MLSS designed on perc in non-native material (must be faster than 30 m/i).

DRAWING 9A J.M.LAUDANO FEB 2016

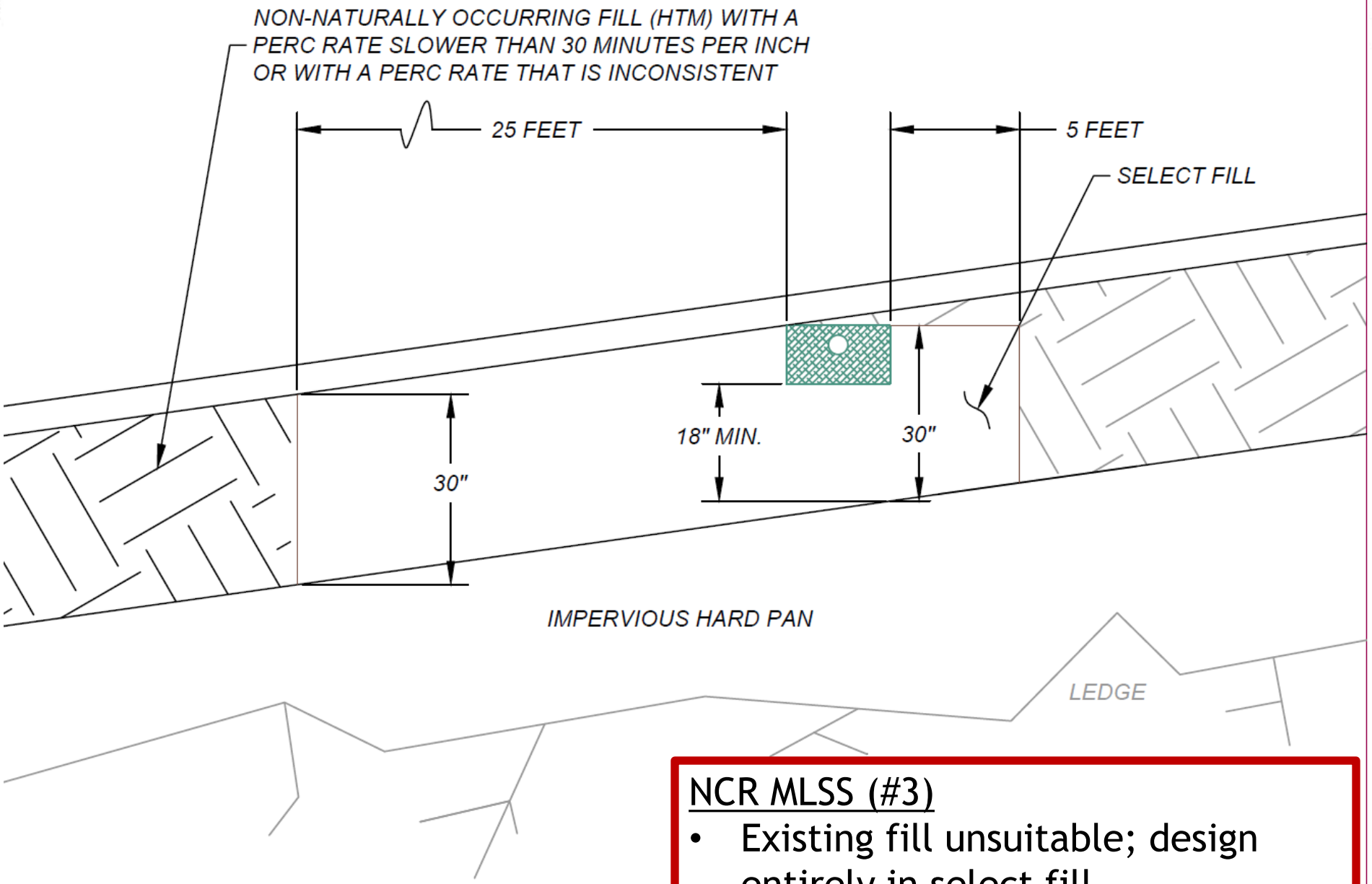
TEST PIT A	TEST PIT B	TEST PIT C	TEST PIT D
0-6 TOPSOIL	0-6TOPSOIL	0-5 TOPSOIL	0-6 TOPSOIL
6-36 RED BRN HTM (FILL)	6-36 RED BRN HTM (FILL)	5-36 RED BRN HTM (FILL)	6-36 RED BRN HTM (FILL)
36-70 BRN HARD PAN	36-67 BRN HARD PAN	36-69 BRN HARD PAN	36-66 BRN HARD PAN
REDOX 36	REDOX 36	REDOX 36	REDOX 36
LEDGE 70	LEDGE 67	LEDGE 69	LEDGE 66



NCR MLSS (#3)

Site with existing non-native material to be considered for design

DRAWING 10 J.M.LAUDANO FEB 2016



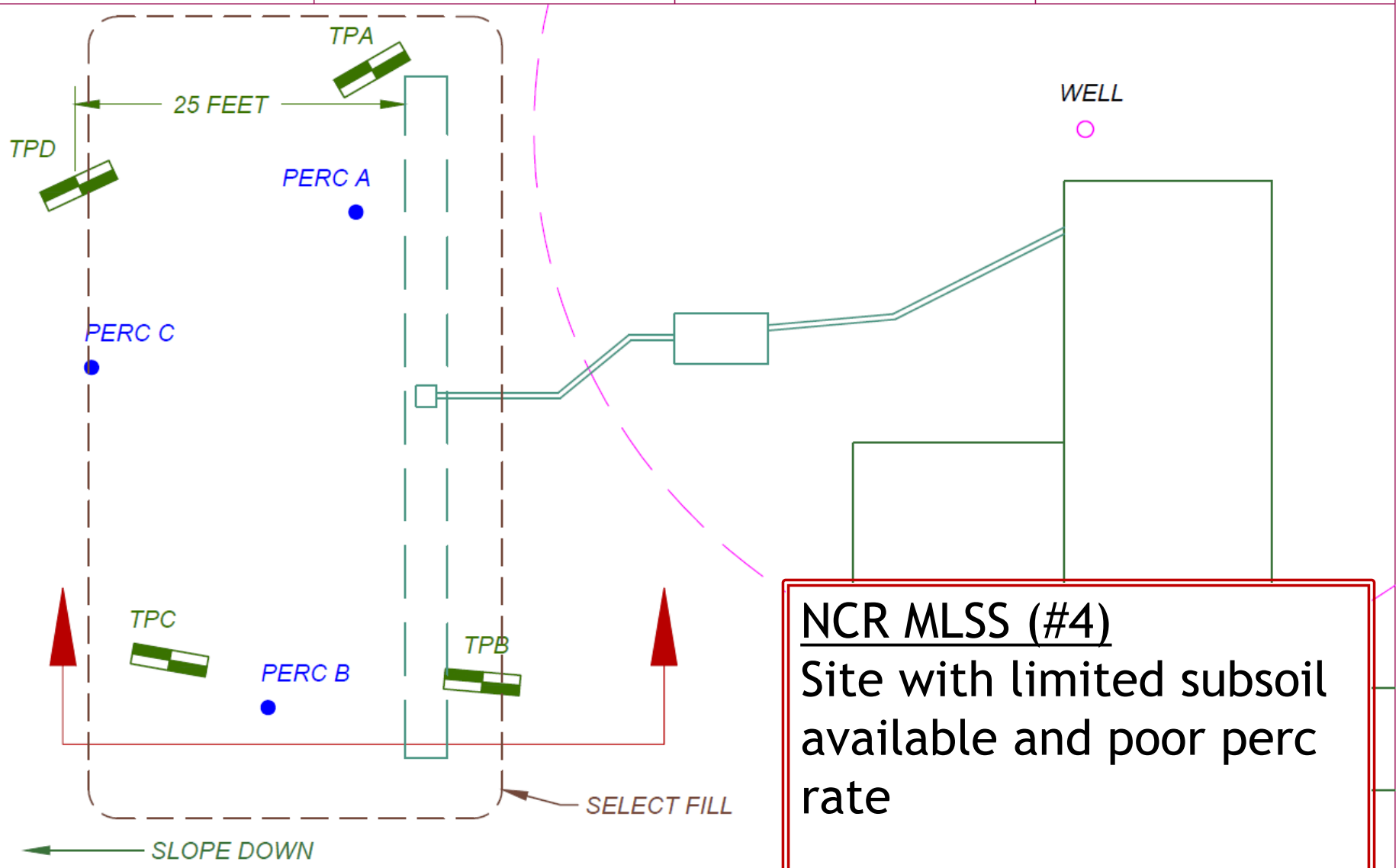
NCR MLSS IS BASED ON RECEIVING SOIL DEPTH OF (30" + 30") / 2 = 30"

NCR MLSS (#3)

- Existing fill unsuitable; design entirely in select fill
- ELA and NCR MLSS designed on perc in select fill material

DRAWING 10A J.M.LAUDANO FEB 2016

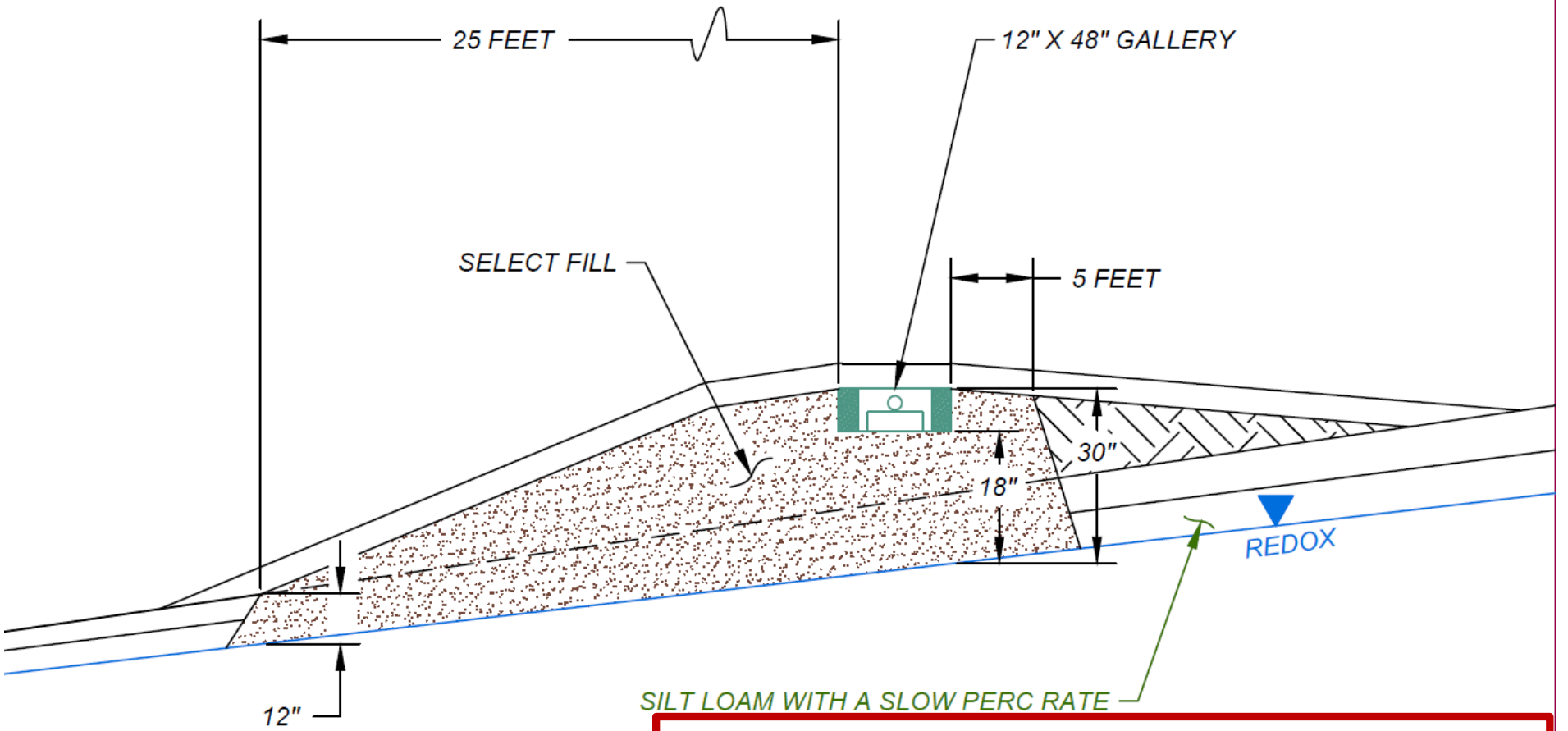
TEST PIT A	TEST PIT B	TEST PIT C	TEST PIT D
0-6 TOPSOIL	0-6 TOPSOIL	0-6 TOPSOIL	0-6 TOPSOIL
6-12 SILT LOAM	6-12 SILT LOAM	6-12 SILT LOAM	6-12 SILT LOAM
12-48 V. DENSE SILT LOAM	12-48 V. DENSE SILT LOAM	12-48 V. DENSE SILT LOAM	12-48 V. DENSE SILT LOAM
LEDGE N/O	LEDGE N/O	LEDGE N/O	LEDGE N/O
REDOX 12	REDOX 12	REDOX 12	REDOX 12
GW 28	GW 28	GW 18	GW 18



NCR MLSS (#4)

Site with limited subsoil available and poor perc rate

DRAWING 12 J.M.LAUDANO FEB 2016

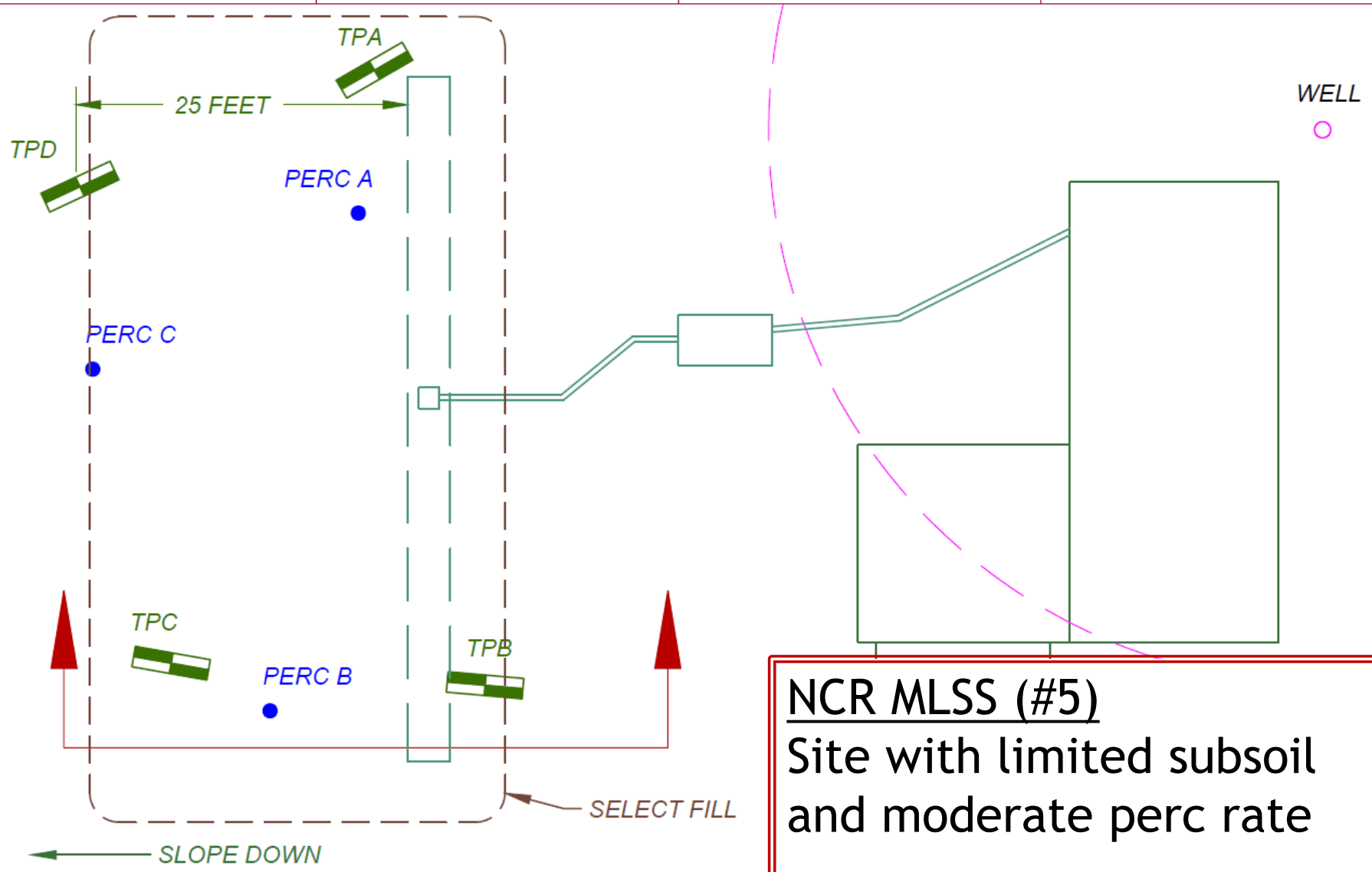


NCR MLSS IS BASED ON RECEIVING SOIL DEPTH OF (30" + 12") / 2 = 21"

NCR MLSS (#4)

- Select fill material may be used for entire system design
- Keep system 18" above redox
- ELA and NCR MLSS sized on perc in fill

TEST PIT A	TEST PIT B	TEST PIT C	TEST PIT D
0-2 TOPSOIL	0-2 TOPSOIL	0-2 TOPSOIL	0-2 TOPSOIL
2-12 ORN BRN SILT LOAM	2-12 ORN BRN SILT LOAM	2-12 ORN BRN SILT LOAM	2-12 ORN BRN SILT LOAM
12-48 V. DENSE SILT LOAM	12-48 V. DENSE SILT LOAM	12-48 V. DENSE SILT LOAM	12-48 V. DENSE SILT LOAM
REDOX 12	REDOX 12	REDOX 12	REDOX 12



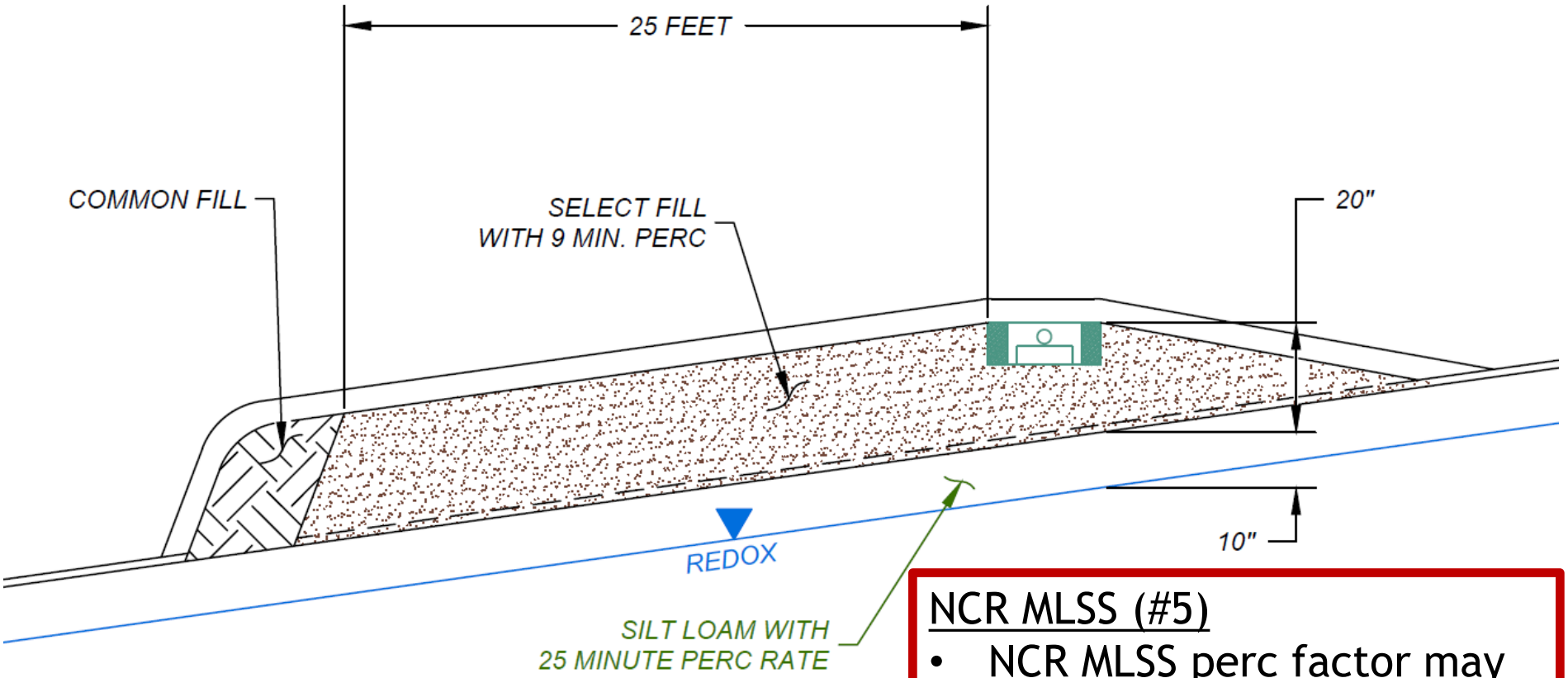
DRAWING 13 J.M.LAUDANO FEB 2016

NCR MLSS (#5)

Site with limited subsoil and moderate perc rate

PROPORTIONATE PERC RATE CALCULATION:

PERC FACTOR (PF) = (20/30) x 1.2 + (10/30) x 2.0 = .80 + .67 = 1.47

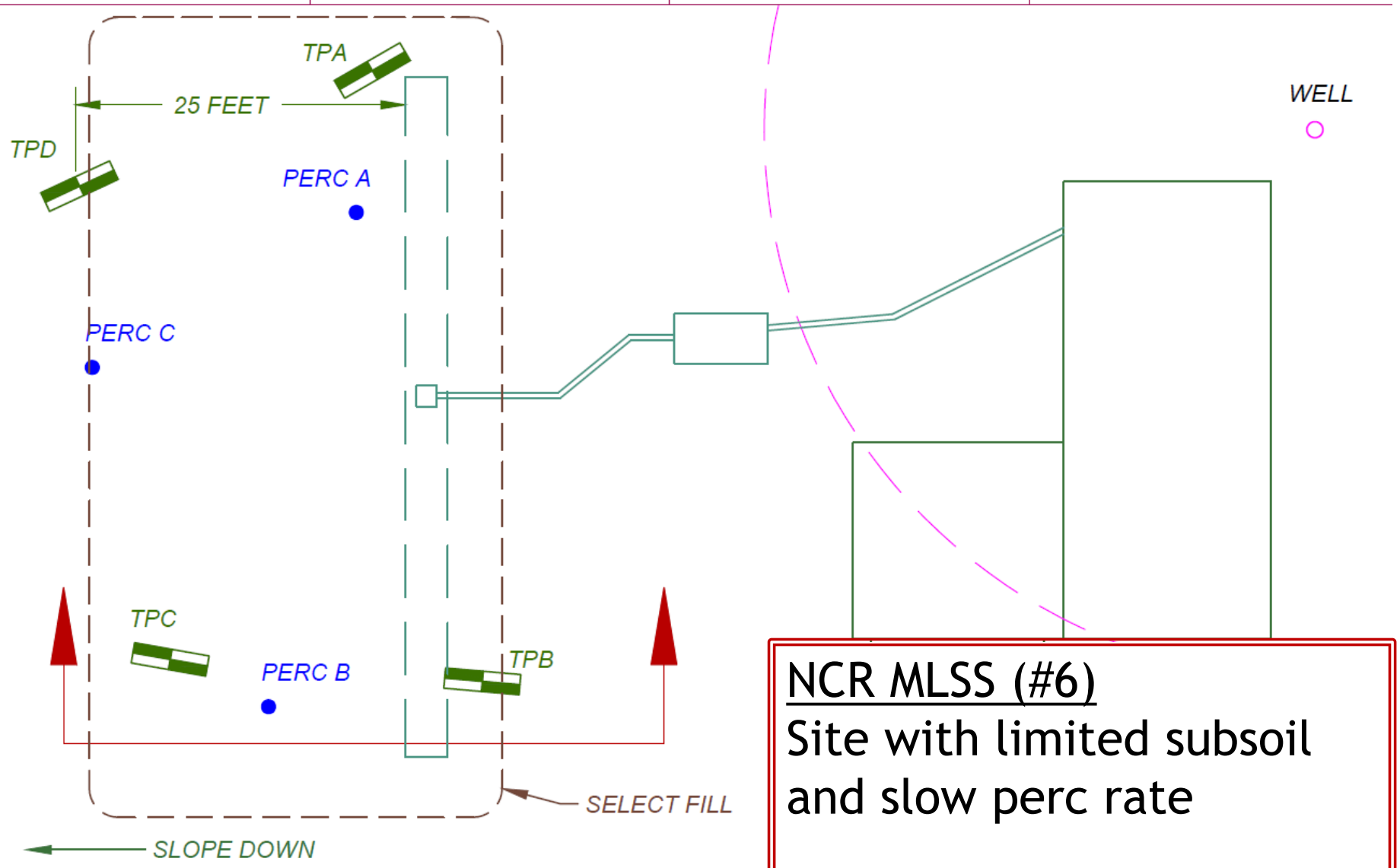


MLSS IS BASED ON RECEIVING SOIL DEPTH OF
(30" +30") / 2 = 30"

NCR MLSS (#5)

- NCR MLSS perc factor may be averaged on ratio of select fill and natural soil
- ELA sized on select fill perc

TEST PIT A	TEST PIT B	TEST PIT C	TEST PIT D
0-2 TOPSOIL	0-2 TOPSOIL	0-2 TOPSOIL	0-2 TOPSOIL
2-22 ORN BRN SILT LOAM	2-22 ORN BRN SILT LOAM	2-22 ORN BRN SILT LOAM	2-22 ORN BRN SILT LOAM
22-48 V. DENSE SILT LOAM	22-48 V. DENSE SILT LOAM	22-48 V. DENSE SILT LOAM	22-48 V. DENSE SILT LOAM
REDOX 22	REDOX 22	REDOX 22	REDOX 22



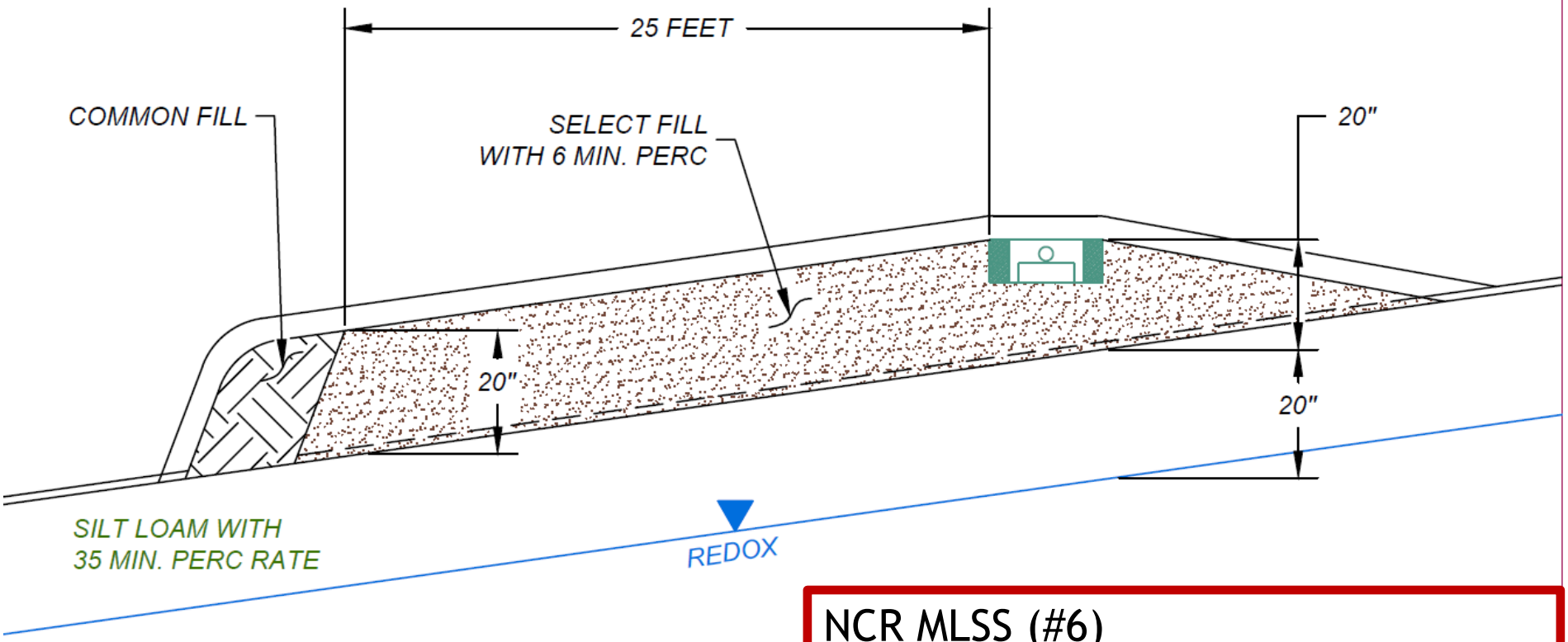
NCR MLSS (#6)

Site with limited subsoil and slow perc rate

DRAWING 14 J.M.LAUDANO FEB 2016

PROPORTIONATE PERC RATE CALCULATION:

PERC FACTOR (PF) = (20/40) x 1.2 + (20/40) x 3.0 = .60 + 1.50 = 2.10



MLSS IS BASED ON RECEIVING SOIL DEPTH OF
(40 + 40) / 2 = 40"

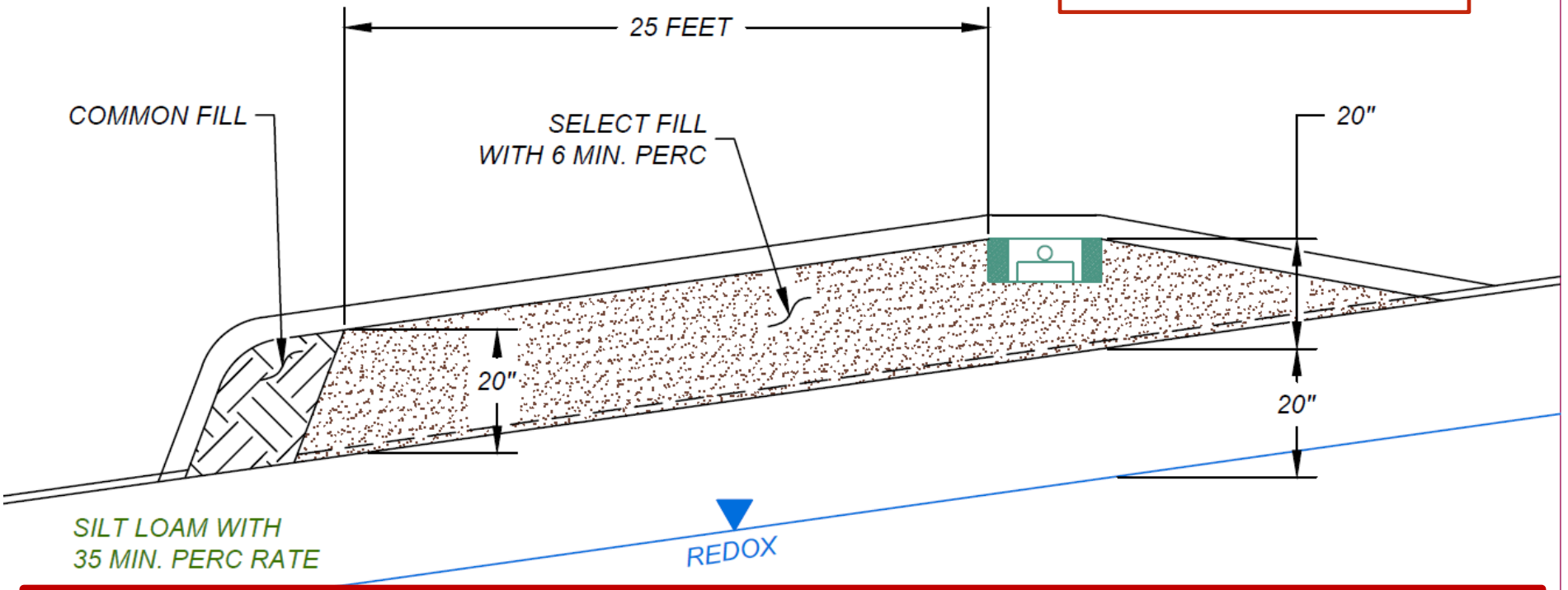
NCR MLSS (#6)

- NCR MLSS perc factor may be averaged on ratio of select fill and natural soil
- ELA sized on select fill perc

PROPORTIONATE PERC RATE CALCULATION:

PERC FACTOR (PF) = (20/40) x 1.2 + (20/40) x 3.0 = .60 + 1.50 = 2.10

NCR MLSS (#6) cont'd



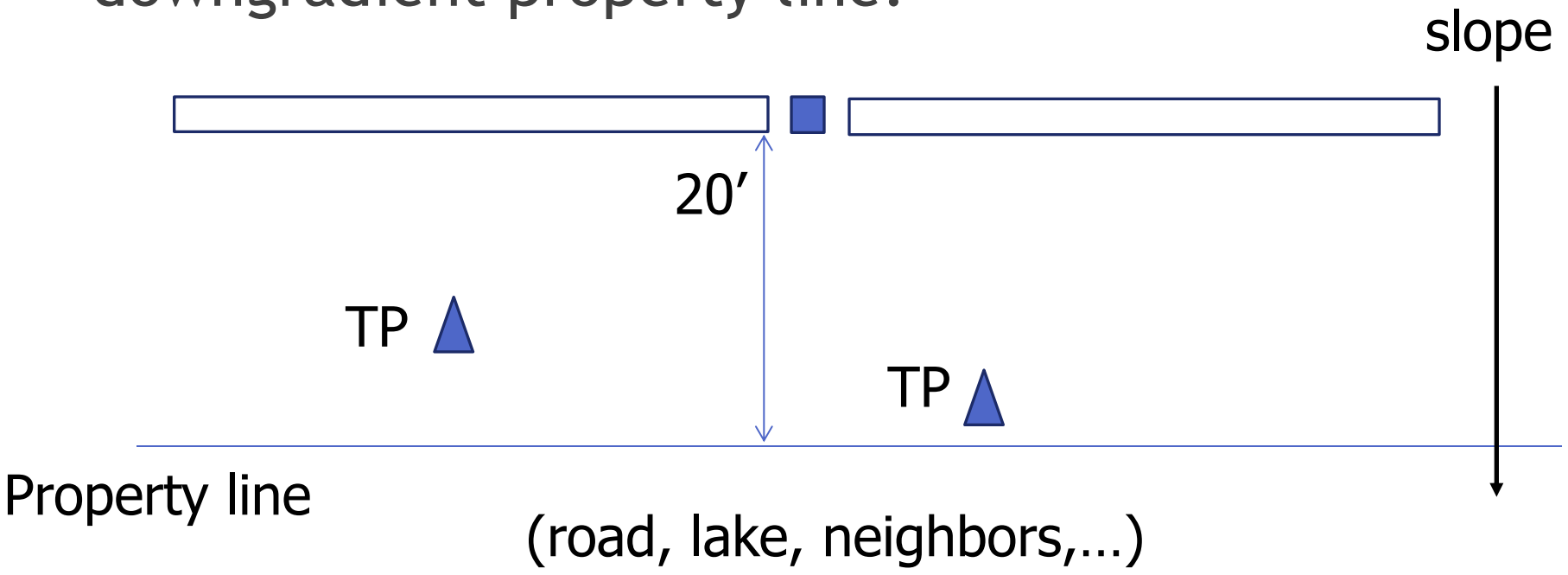
It may be beneficial to size NCR MLSS on perc rate and depth of select fill only.

NCR MLSS (assuming 3 BR, slope 8%)

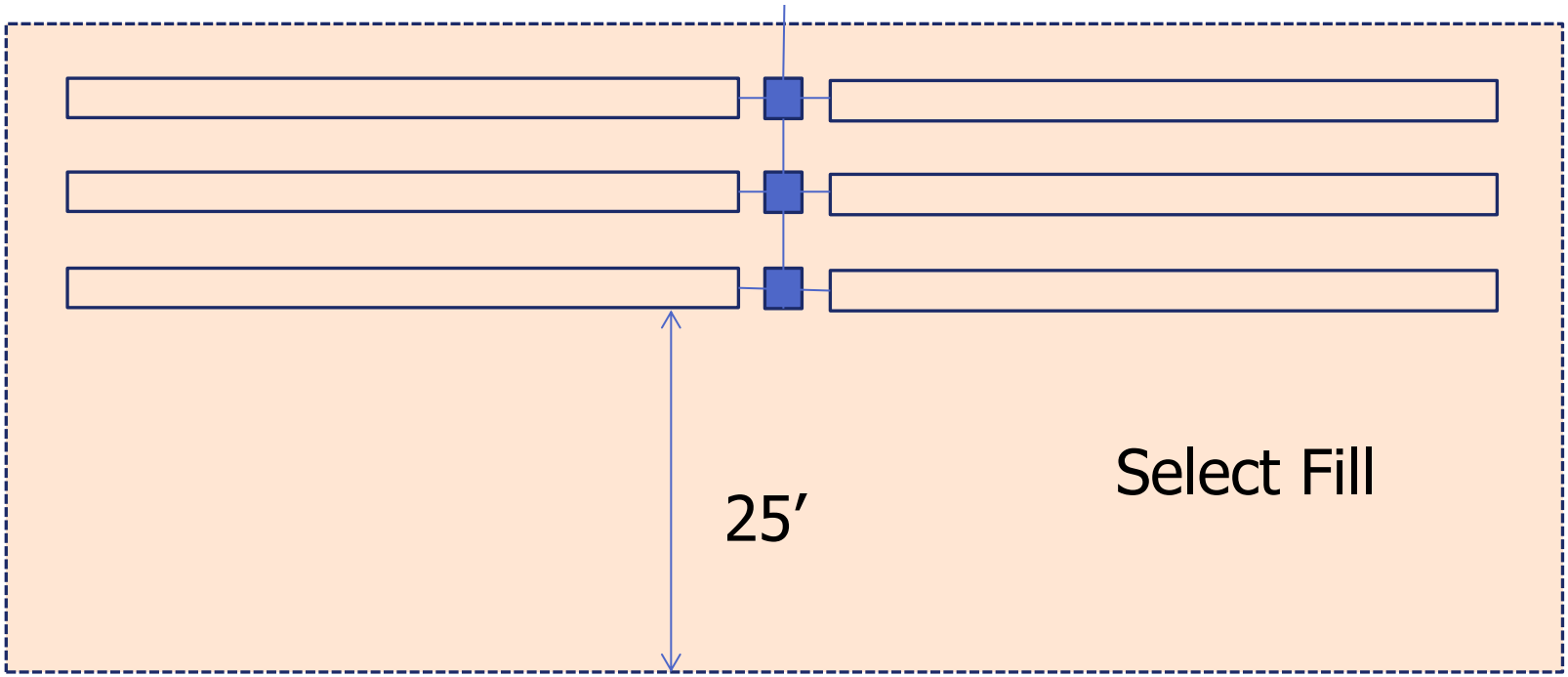
1. Natural soil only. HFxFFxPF = 34 x 1.5 x 3 = 153'
2. Natural and select fill. HFxFFxPF = 24 x 1.5 x 2.1 = 76'
3. Select fill only. HFxFFxPF = 34 x 1.5 x 1.2 = 62' ←Shortest spread!!

NCR MLSS: Sites with less than 25’ to Downgradient to Property Line

- NCR MLSS is an exception
- Do the best you can and use professional judgment. Exceptions may be needed to the downgradient property line.



*NCR MLSS Using Multiple Rows



Do the best you can and use professional judgment. Should 25’ always be required?