# LFH At-grade Treatment System

**This design worksheet was developed by Alberta Municipal Affairs and Alberta Onsite Wastewater Management Association**

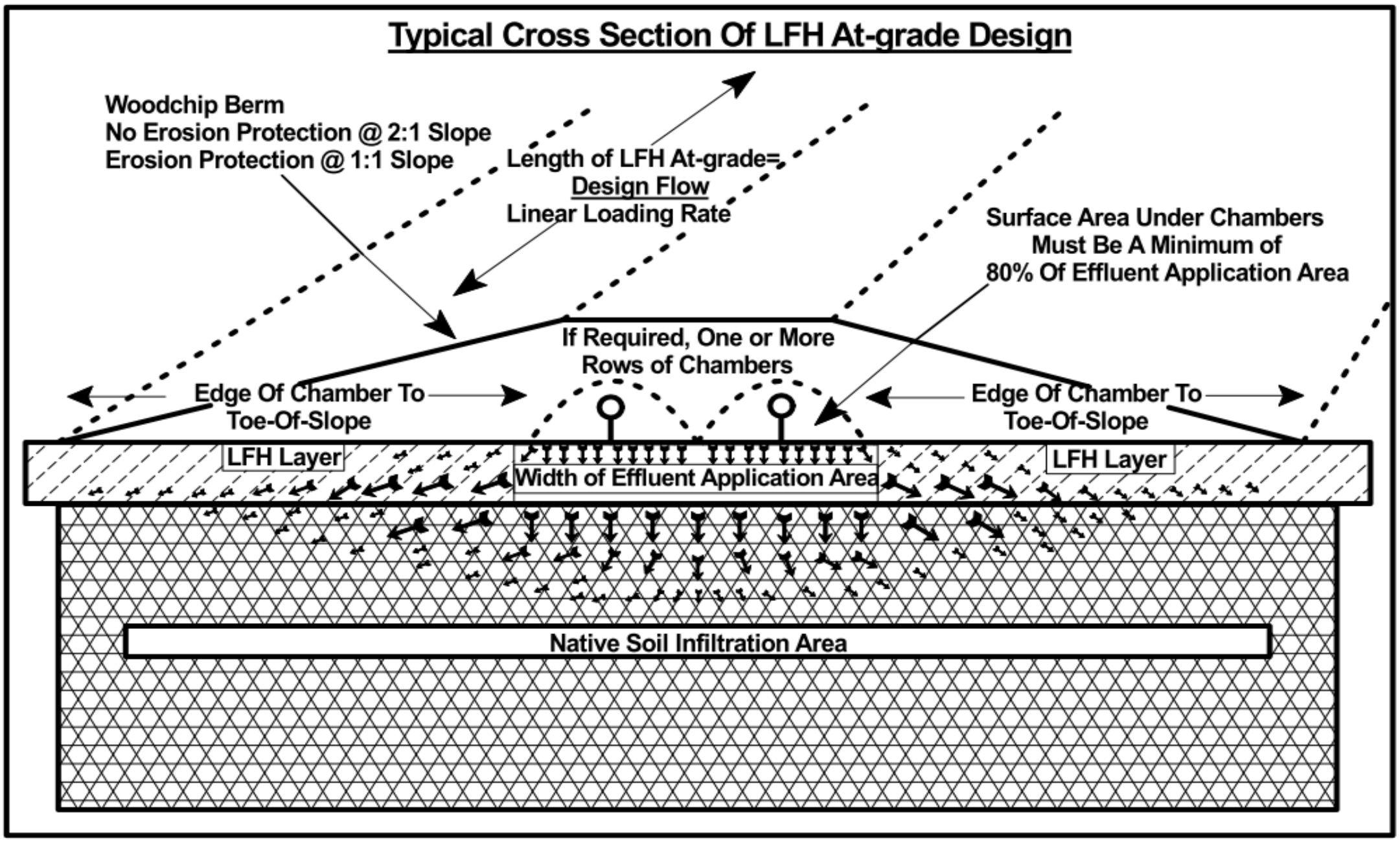
**The complete system is to comply with the Alberta Private Sewage Systems Standard of Practice 2021 (SOP 2021)**

**This worksheet may NOT consider ALL of the requirements of the mandatory SOP**

**Use only Imperial units of measurements throughout this worksheet (feet, inches, Imperial gallons, etc.)**

**Use the following Worksheet to determine the Minimum required dimensions for an LFH At-grade and fill in the blanks on the appropriate diagram below for a level site or a sloping site of over 1% slope**

**THE TERMS USED IN THIS DRAWING DESCRIBE SPECIFIC AREAS OF THE LFH AT-GRADE AND ARE USED IN THE FOLLOWING WORKSHEET**

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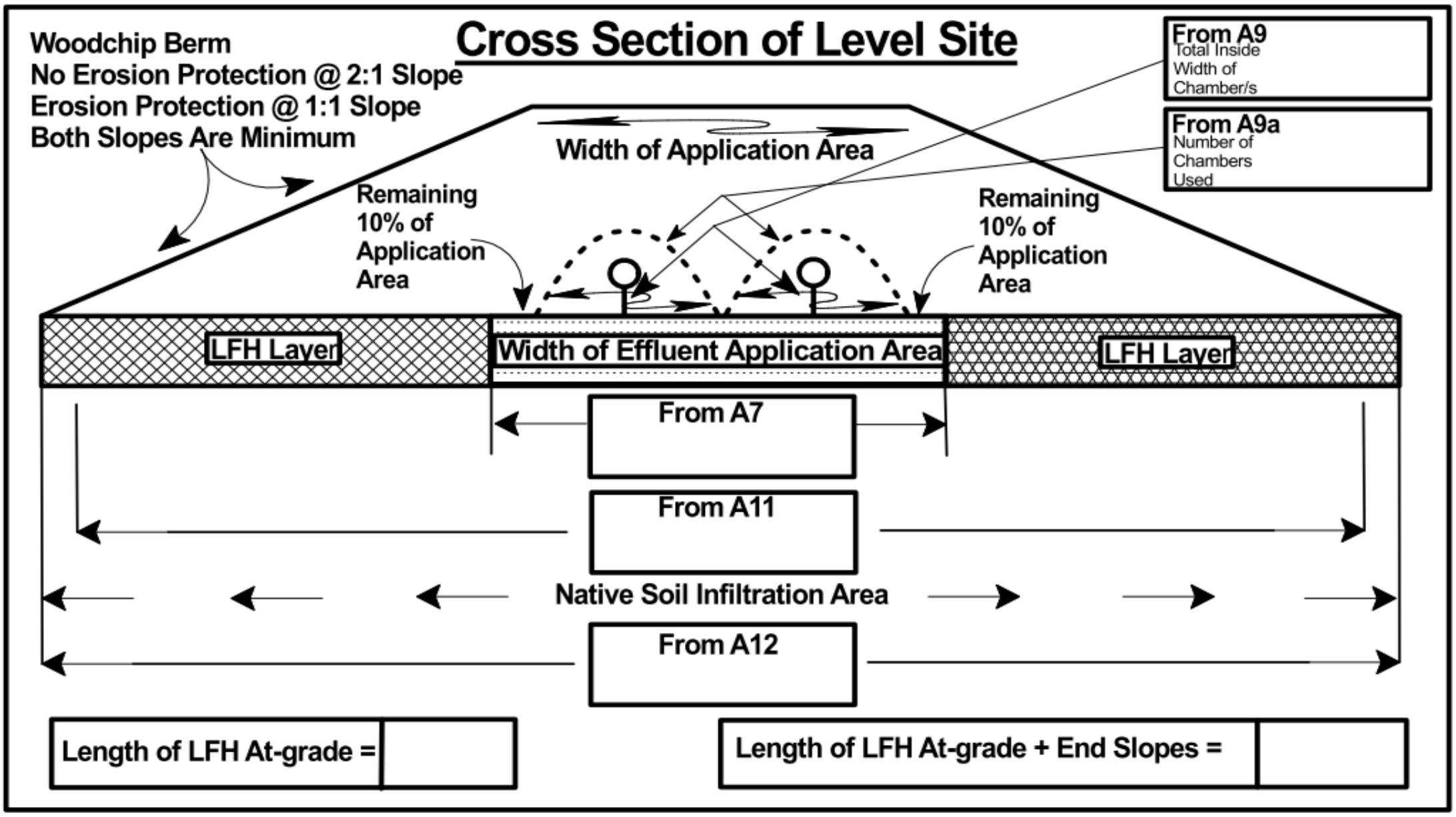
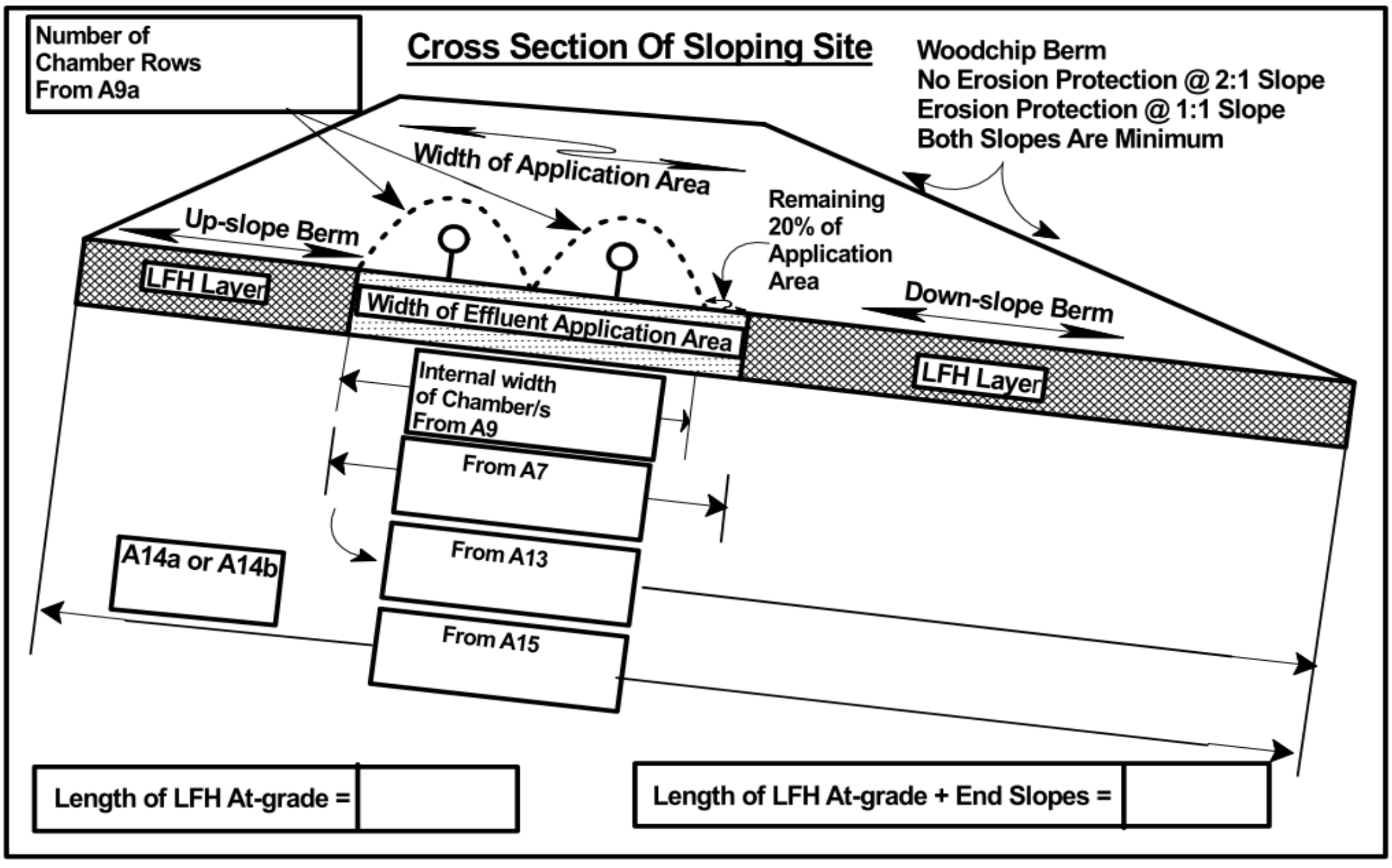
## Cross Section of Level Site




## Cross Section Of Sloping Site



## Step 1) Determine the expected peak volume of sewage per day:

**Note:** Use **Table 2.2.2.2.A or B** to determine expected peak volume of sewage per day. Provide any required allowance for additional load factors as detailed in **Article 2.2.2.3 Pages 26-28 - 2021 SOP**

**Confirm sewage strength does not exceed the requirements in Article 2.2.2.1 Page 24 2021 SOP**

**Expected Peak Volume of Sewage per Day**

**A1**

**Gals. per day**

## Step 2) Determine the slope criteria of the installation site:

**Note:** If the slope of the installation site exceeds 1% use the drawing "sloped site". If there is no slope, use the drawing "level site" 1% or less.

**Slope of Installation Site**

**%** **A2**

## Step 3) Determine Effluent Hydraulic Loading Rate on Native Soil:

From site evaluation information the following is needed to be determined: 1) Soil Texture, 2) Soil Structure, 3) Grade. Based on those soil characteristics, determine the hydraulic effluent loading on the native soil. **Article 8.1.1.10 Pg 87 2021 (metric) or Table A.1.E.1. Pg 141 (Imperial)**

**Use the hydraulic effluent loading rates for effluent quality of <30 mg/L BOD as required in 5.1.1.1. 1) Pg 51 2021SOP**

**Hydraulic Effluent Loading Rate on Native Soil**

**A3**

**Gal./ day/ft²**

## Step 4) Determine the Hydraulic Linear Loading Rate on Native Soil:

From site evaluation information the following needs to be determined: 1) Soil Texture, 2) Soil Structure, 3) Grade of structure, 4) Depth of infiltration distance. Use that criteria to determine the allowed Hydraulic Linear Loading Rate. **Article 8.1.1.10. Page 87 2021 SOP (metric) or Table A.1.E.1. Pg 141 (Imperial)**

**Hydraulic Linear Loading Rate**

**A4**

**Gal./day/ft**

## Step 5) Determine Length of LFH At-grade:

| Expected Peak Volume of Sewage Per Day | | Hydraulic Linear Loading Rate | | Minimum Length of LFH At-grade |
|---|---|---|---|---|
| | ÷ | | Equals | **A5** |
| From A1 | | From A4 | | Lineal Feet |

## Step 6) Calculate Effluent Application Surface Area Required

| Expected Peak Volume of Sewage Per Day | | Typical Loading Rate May be ≤ 0.83 gal/sq.ft./day | | Total Minimum Effluent Application Area |
|---|---|---|---|---|
| | ÷ | | Equals | **A6** |
| From A1 | | 0.83 gal/sq. ft./day except as limited by 8.1.2.2. 2) Pg 89 2021 SOP | | Sq. Ft. |

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## Step 7) Determine Minimum Width of Effluent Application Area:

| Effluent Application Area | | Minimum Lenth of At-grade from Box A5 | | Equals | Minimum Width of Effluent Application Area | |
|---|---|---|---|---|---|---|
| | ÷ | | A7a | | | A7 |
| Sq. Ft From A6 | | A length exceeding A5 can be selected to result in narrower width required under chambers | | | Ft. | |

## Step 8) Determine Minimum Internal Open Width of Chambers:
**(the internal width covered by a chamber or # of chambers)**

| Minimum Effluent Application Width | | Apply Allowed Reduction factor. Actual open area of chambers must cover 80% of total Application area | | Minimum Actual Internal Open Width Provided by Chamber(s) | |
|---|---|---|---|---|---|
| | X | 0.8 | Equals | | A8 |
| Ft. From A7 | | | | Ft. | |

## Step 9) Select the Chamber(s) to be Used and Number of Rows of Chambers Required:

| Width of selected chamber in FEET - enter actual internal effective width (not manufacturer's oustside dimensions) | | Number of chamber row(s) selected | | Actual width of open area provided by chambers for effluent application area | |
|---|---|---|---|---|---|
| | X | | A9a = | | A9 |
| Example: 19 inches divided by 12 inches = 1.6 feet 31 inches divided by 12 inches = 2.6 feet | | | | Ft. This amount cannot be less than A8 | |

## Step 10) Calculate minimum Native Soil Infiltration Surface Area: [this is the area to be covered by the woodchip cover and includes the area under the chamber(s)]

| Expected Peak Volume of Sewage Per Day | | Hydraulic Effluent Loading Rate | | Minimum Required Native Soil Infiltration Area | |
|---|---|---|---|---|---|
| | ÷ | | = | | A10 |
| From A1 | | From A3 | | Sq. Ft. | |

## Step 11) Determine Minimum Width of Native Soil Infiltration Area:

| Native Soil Infiltration Area | | Length of At-grade Selected | | Minimum Width of Native Soil Infiltration Area | |
|---|---|---|---|---|---|
| | ÷ | | = | | A11 |
| From A10 | | From A7a | | Feet | |

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## Step 12) Cover Material Width of LFH At-grade; Site Slope 1% or Less.

**Choose side slope of LFH At-grade cover material.**

**Toe to toe width based on 1:1 cover material slope**

**A7 + (2 X distance at 0% slope) from slope chart.**

**NOTE* 1:1 slopes are NOT Typical***

**OR**

**Toe to toe width based on 2:1 cover material slope**

**A7 + (2 X distance at 0% slope) value from slope chart.**

**BUT NOT LESS THAN**

**Minimum Width of Required Native Soil Infiltration Area from A11**

**Minimum Width of At-grade Cover Material**

**A12**

**The Greater Value of the Width Based on Chosen Cover Material Slope or Box A11**

## Step 13) Minimum Width of Cover Material; Up-Slope Edge of Chambers to Downslope Toe of Cover Material - Site slope greater than 1%;

**Choose Side Slope of LFH At-grade Cover Material;**

**1:1 Downslope Berm Distance (from slope chart)**

**+**

**Effluent Application Width From A7**

**=**

**A13a**

**NOTE* 1:1 slopes are NOT Typical***

**2:1 Downslope Berm Distance (from slope chart)**

**+**

**Effluent Application Width From A7**

**=**

**A13b**

**Minimum Native Soil Infiltration Width From A11**

**Enter the Greater Width of: A13a, A13b, or A11**

**A13**

**Width of Cover Material From Up-slope Edge of Chambers to Downslope Toe of Cover Material**

## Step 14) Determine Width of Upslope Berm

**1:1 Slope**

**A14a**

**From Slope chart**

**Or**

**2:1 Slope**

**A14b**

**From Slope chart**

## Step 15) Determine Toe to Toe Width of LFH At-Grade on Site Slope Greater Than 1%

**Downslope Width**

**From A13**

**+**

**Upslope Width**

**From A14a or A14b**

**=**

**A15**

**Toe to Toe Width on Sites with Slope Greater Than 1 %**

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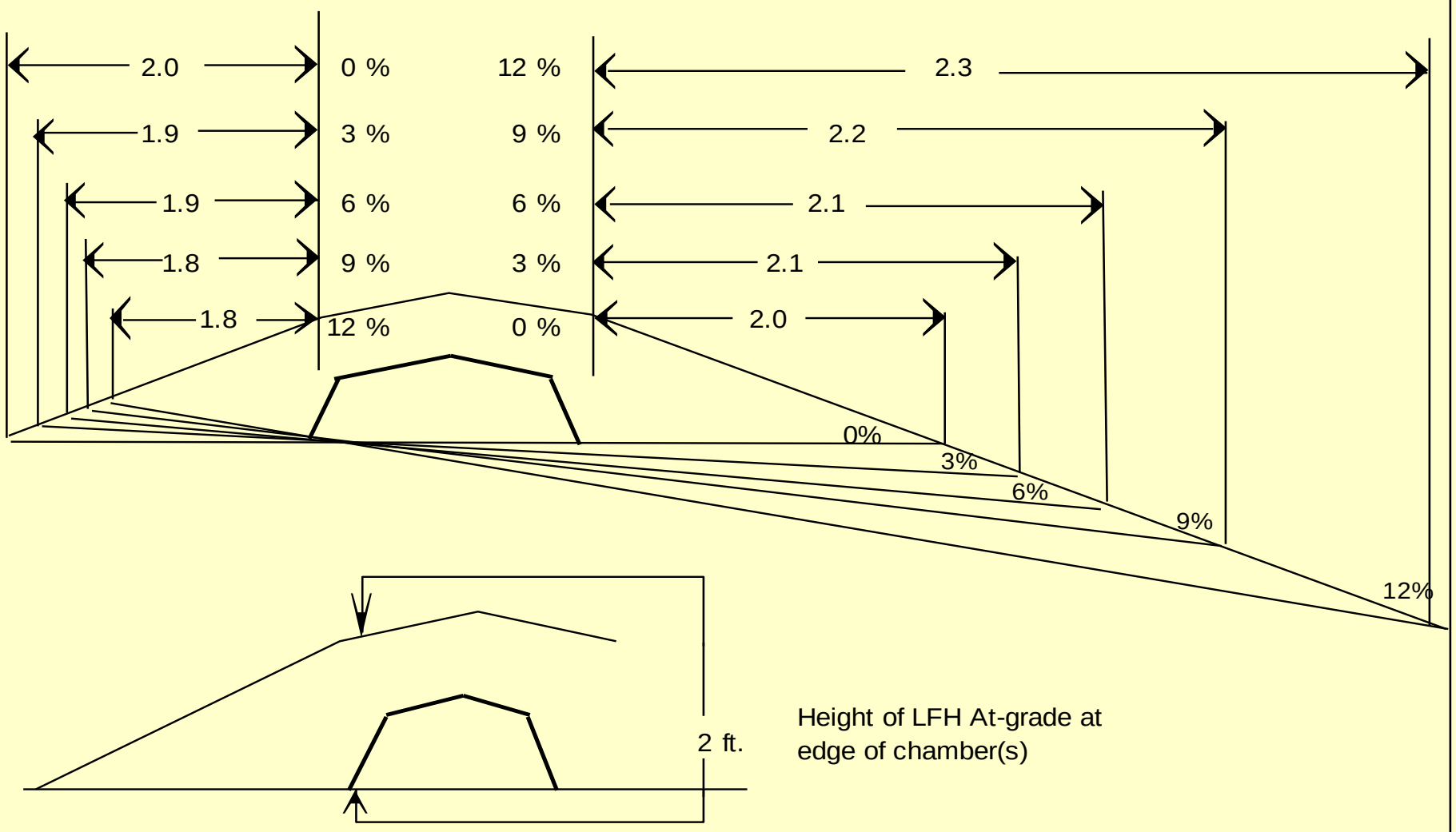
# LFH At-grade Cover Material Width on 0% to 12% Sloped Sites

## LFH At-grade Cover Material Slope Distance in Feet @ 1 :1 Berm slope

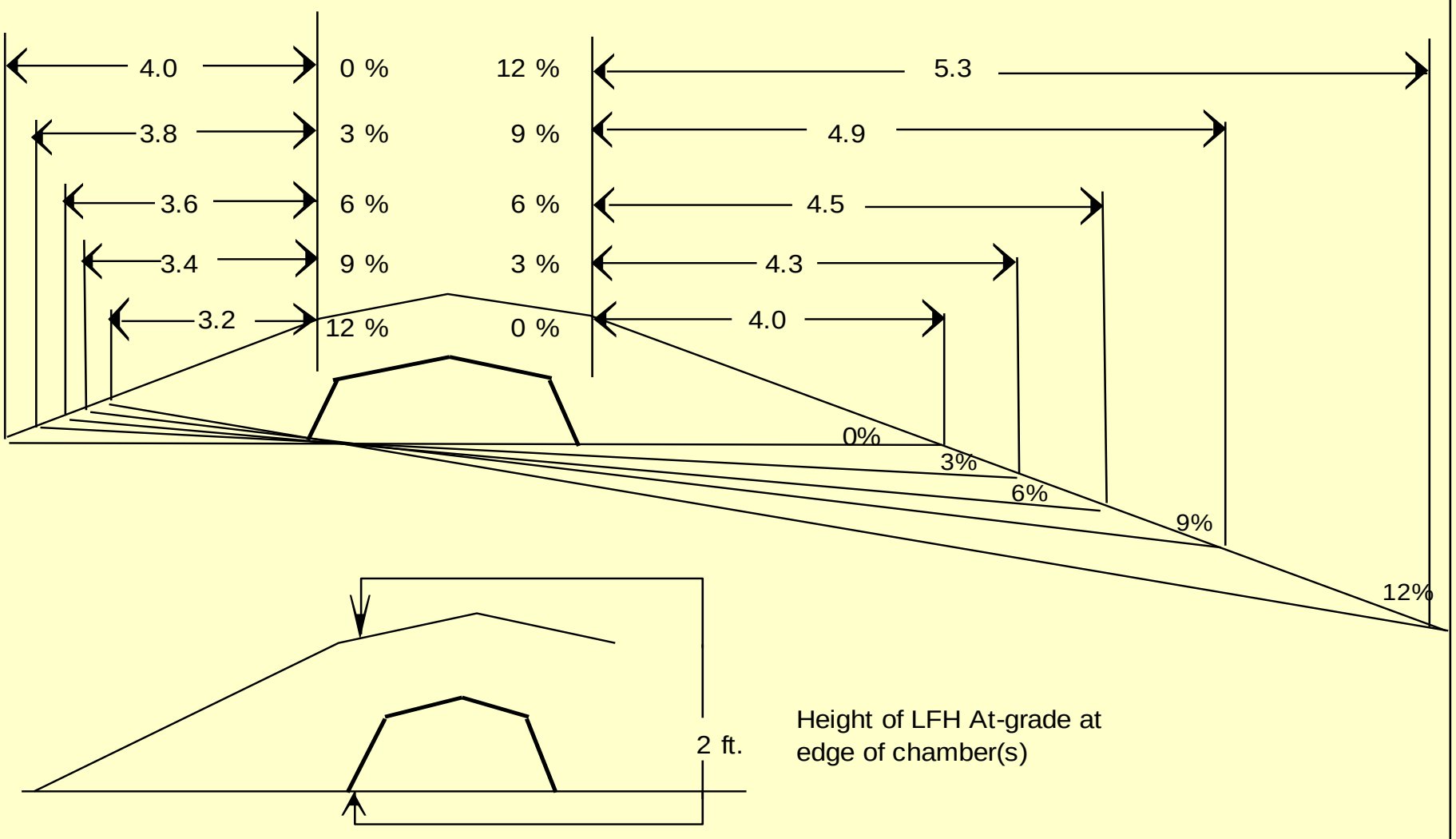



Height of LFH At-grade at edge of chamber(s)

**Upslope Cover Material distance =** Height of LFH At-grade at edge of chamber / ( 1.0 + [ slope% / 100 ] )

**Downslope Cover Material Distance =** Height of LFH At-grade at edge of chamber / ( 1.0 - [ slope% / 100 ] )

## LFH At-grade Cover Material Slope Distance in Feet @ 2 :1 Berm slope




Height of LFH At-grade at edge of chamber(s)

**Upslope Cover Material distance =** Height of LFH At-grade at edge of chamber / ( 0.5 + [ slope% / 100 ] )

**Downslope Cover Material Distance =** Height of LFH At-grade at edge of chamber / ( 0.5 - [ slope% / 100 ] )

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