Cascading Drain Calculation

Drain · https://mes100.com/docs/cascading-drain-calculation/

Objective:

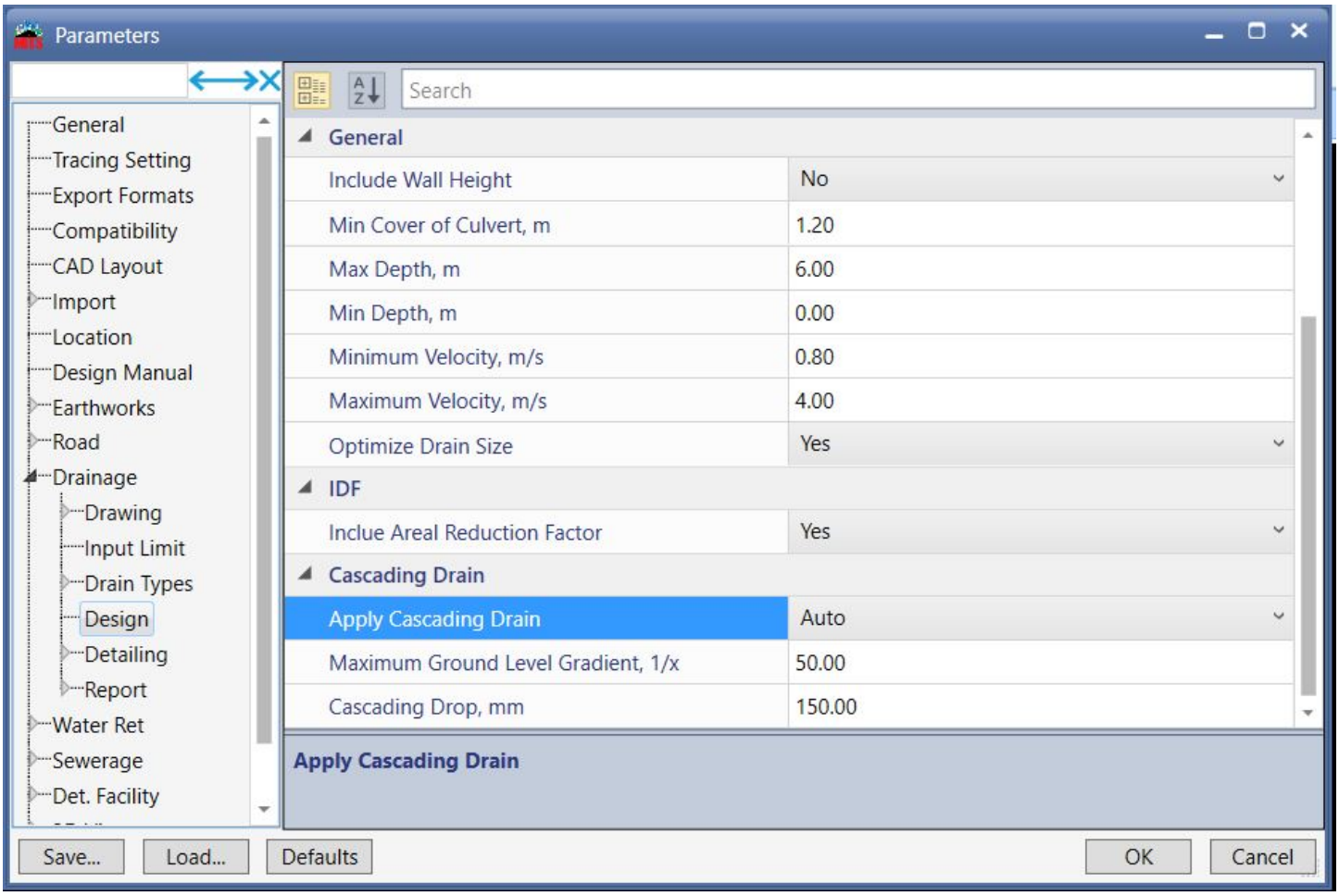
i . How to apply cascading drain

ii. How to determine number of cascading steps & length

iii. How to calculate IL for start node and end node

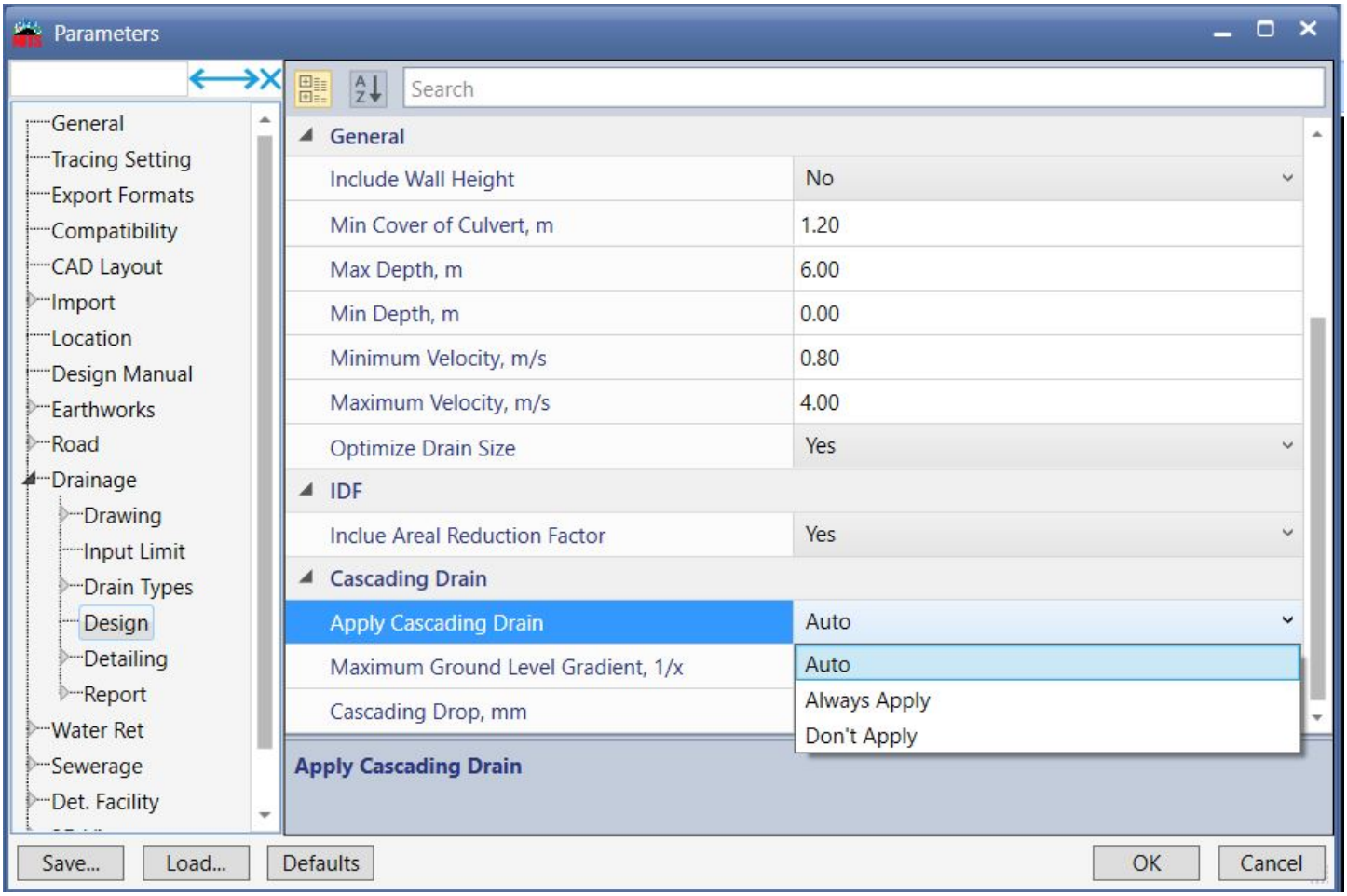
How to apply cascading drain

Go to Options > Project Parameters > Drainage > Design > Cascading Drain



Note:

1. User can set the 'Maximum Ground Level Gradient' and the 'Cascading Drop'
2. By default, the Maximum Ground Level Gradient is set to 1 to 50 while Cascading Drop is set to 150 mm.



Note:

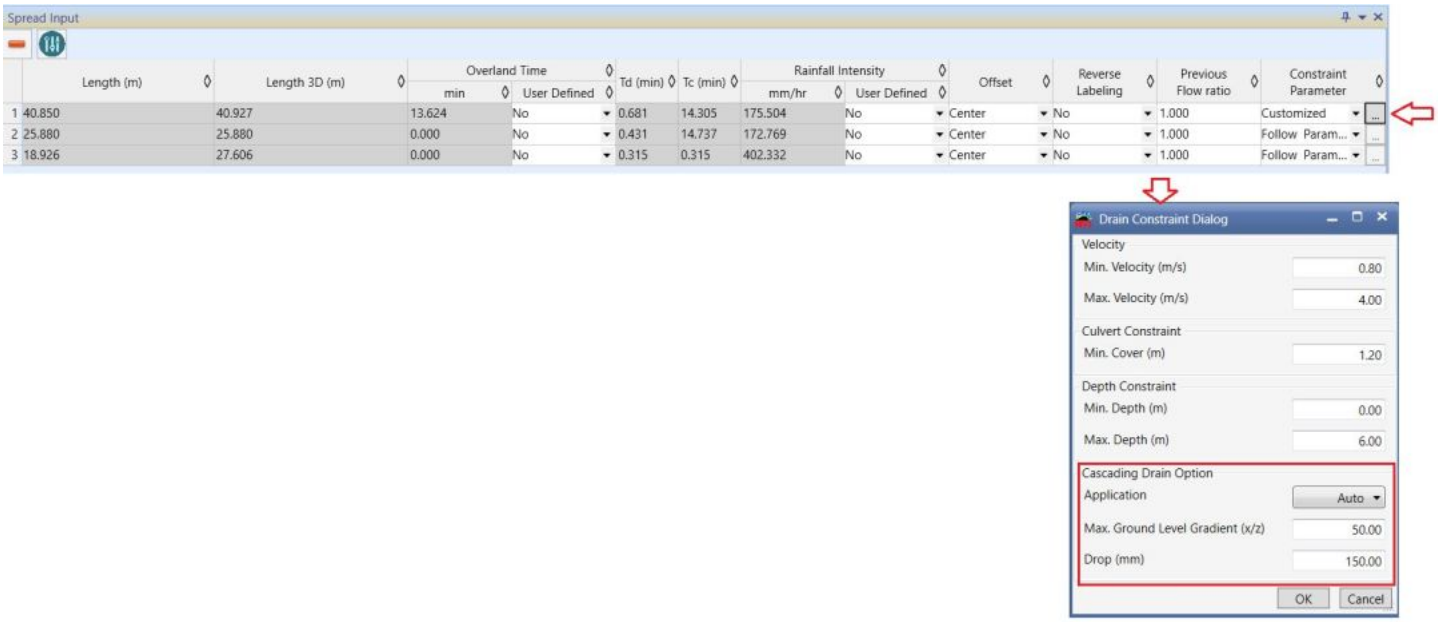
- Cascading drain can be assign by Auto, Always Apply or Don't Apply
  1. Auto - software will compare the gradient of GL between start node and end node. When the gradient exceeds maximum gradient allowed, then software will automatically apply cascading drain.
  2. Always Apply - cascading drain will 'always' be applied despite the GL gradient between start node and end node
  3. Don't Apply - cascading drain will not be applied

OR

User can also used the constraint parameter to apply cascading drain. This feature is very convenient for user to apply cascading drain to a specific drain.

Parameters such as the 'Maximum Gradient Ground Level' and 'Cascading Drop' can have different value from the value set in the general parameter.

Go to Drain > Spread Input > Constraint Parameter > Change from 'Follow Parameter' to 'Customized' > open Drain Constraint Dialog



Determine number of cascading steps and cascading length

For cascading drain calculation; you may follow formula given below;

1. Step number = (Start IL - endMaxIL - Distance*Gradient) / Cascading drop
2. Step Length = Distance / Step Number
3. Final IL = Start IL - [step number * [step length*(gradient + cascading drop)]

Note:

i. Distance is the drain length

ii. Gradient is the drain gradient

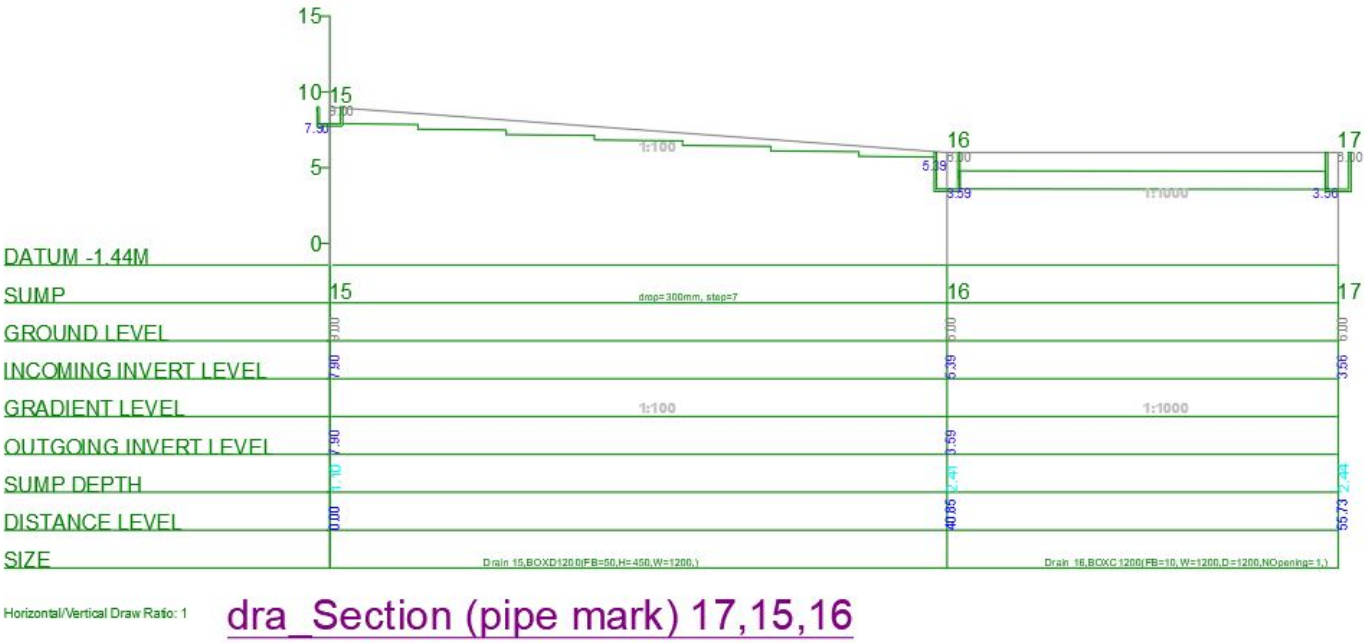
- *software will use the gentler gradient from the parameter or a fixed gradient set by user*
- *if the gradient is not admissible with the existing terrain and other constraints hence software will propose most gentle gradient that will satisfies all the constraints*
- *cascading drain gradient is the same as drain gradient selection, the selected gradient will be the most gentle provided all the constraints like velocity, drain capacity and terrain conditions are*

satisfied

- *as in this example, the most gentle gradient is 1:100*

iii. EndMaxIL = end node GL - design drain depth

How to calculate IL for start node and end node



	START	END
NODE	15	16
GL (m)	9.00	6.00
IL (m)	7.90	EndMaxIL = 5.55

1. Step number

= [(Start IL - endMaxIL - (Distance*Gradient)] / Cascading drop

= [7.9m - 5.55m - (40.85*1/100) / 0.3m]

= 6.47 steps ; take **7 steps**

2. Step length

= Distance / Step Number

= 40.85m / 7

= 5.83m

3. Final IL at **NODE 16**

	Step No.	IL (m)	Drop (m)	Step Length (m)	Fall 1:100 (m)
Start IL		7.90	0.3	5.83	0.0583
	1	7.54	0.3	5.83	0.0583
	2	7.18	0.3	5.83	0.0583
	3	6.82	0.3	5.83	0.0583
	4	6.46	0.3	5.83	0.0583
	5	6.10	0.3	5.83	0.0583
	6	5.74	0.3	5.83	0.0583
End IL	7	**5.38**	0.3		

Related



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I'm the Benevolent Dictator for Life for MiTS Software cum Editor of this website. Read more here.

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