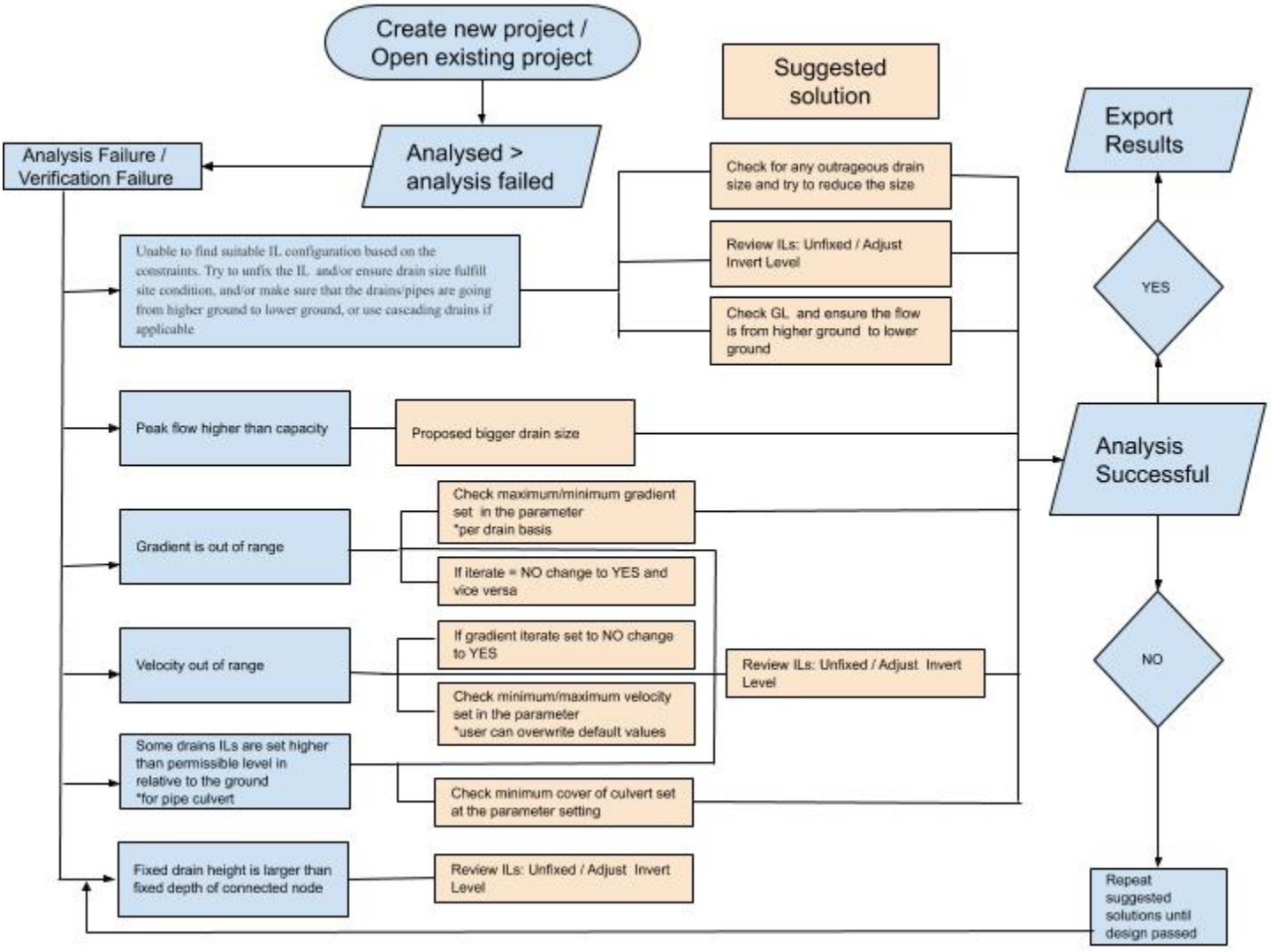
Drainage Analysis Failed Troubleshooting Guideline

Drain · https://mes100.com/docs/drainage-analysis-failed-troubleshooting-guideline/

When a project is analyzed and failed, users usually get confused and have no idea on how to troubleshoot the error behind the warning/error messages.

Therefore, this guideline will help users to have better understanding on why the analysis failed and how to correct it to ensure a successful analysis to meet the satisfactory design.

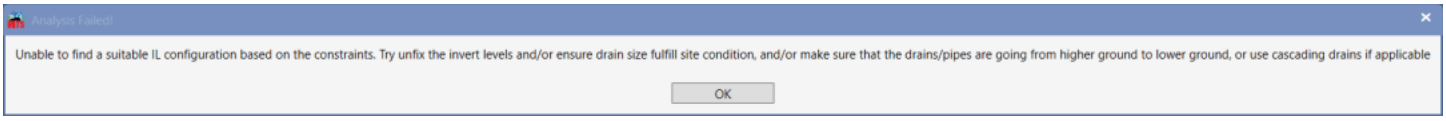
Flowchart below can be use as reference when the design analysis failed:



Troubleshooting Analysis Failure

Unable to find suitable IL configuration based on the constraints

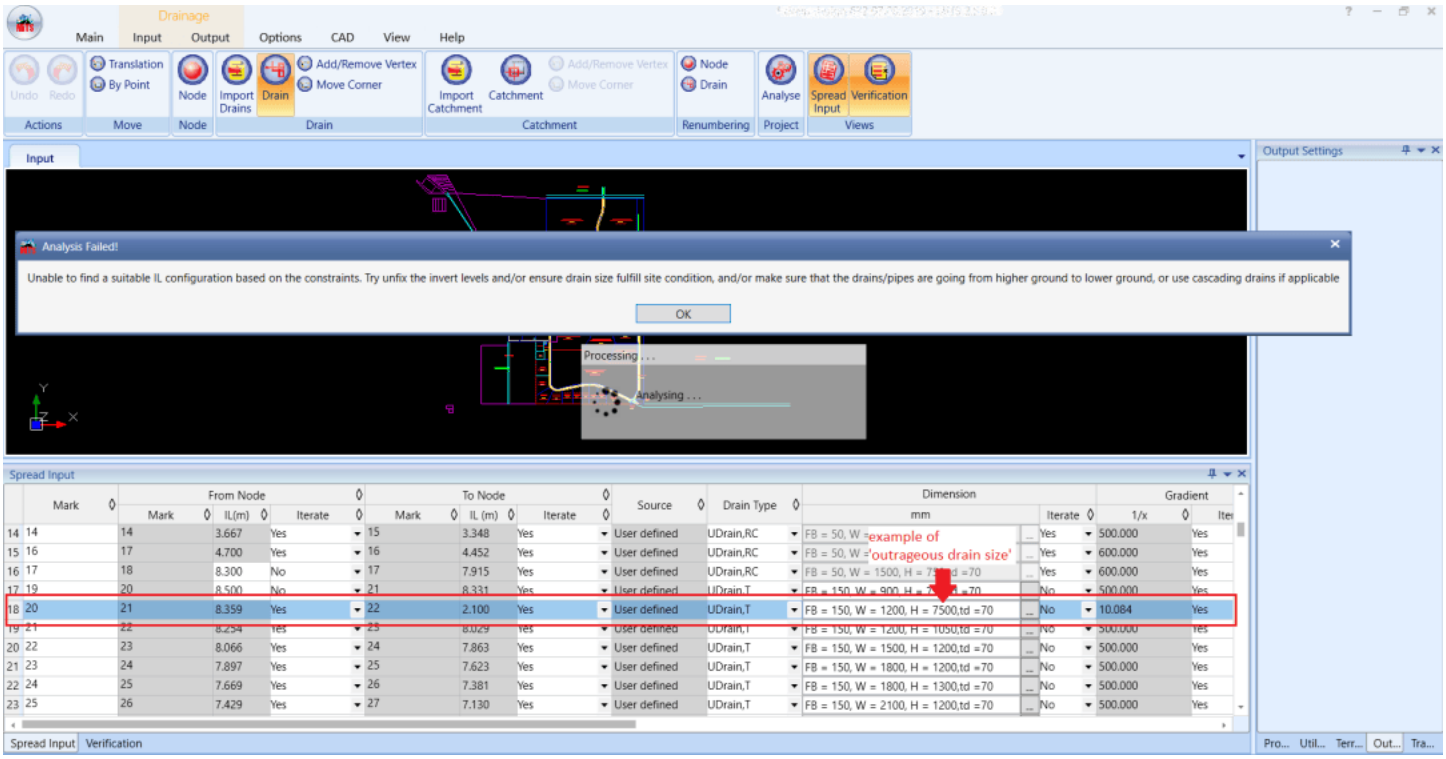
Try to unfix the IL and/or ensure drain size fulfill site condition, and/or make sure that the drains/pipes are going from higher ground to lower ground, or use cascading drains if applicable



Suggested Solutions for Issue 1

i. Check for any outrageous drain size

ii. Review ILs; unfixed/adjust invert level



Steps to applied:

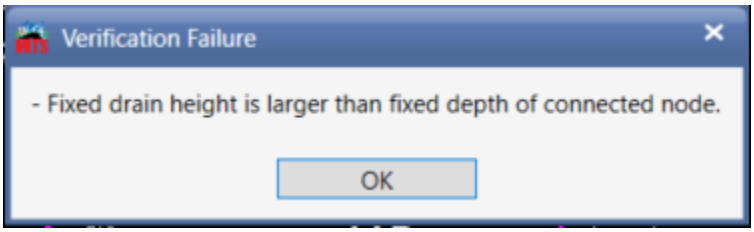
- Go to Drain > Spread Input > Dimension > Change drain size

- Analyse > analysis successful > OK
- Review outputs > Export results (if require)

Other alternative is to change the maximum depth in Parameter Settings

- Go to Options > Project Parameters > Drainage
- Design > General > Max Depth (you probably need to increase the value, given all the constraints)

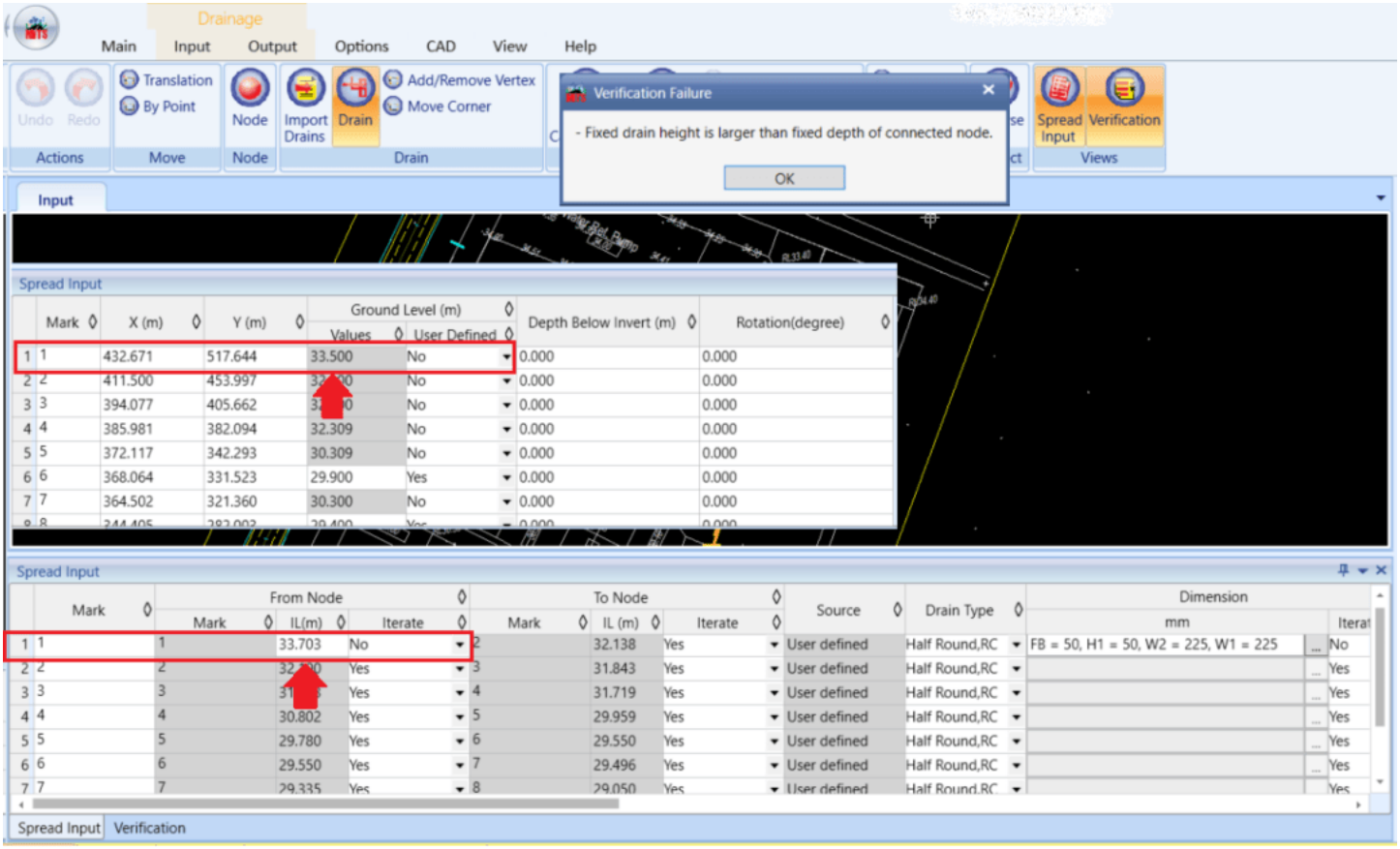
Fixed drain height is larger than fixed depth of connected node



Suggested Solutions for Issue 2

i. Review ILs; unfixed/adjust invert level

ii. Proposed smaller drain size and/or do not fix drain size



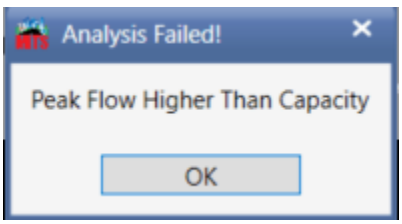
Steps to applied:

- Go to Drain > Spread Input > Invert Level, change iterate ‘NO’ to ‘YES’
- Analyse > analysis successful > OK > export results

OR

- Go to Drain > Spread Input > Dimension > use smaller drain size and/or do not fix the drain size
- Analyse > analysis successful > OK > export results

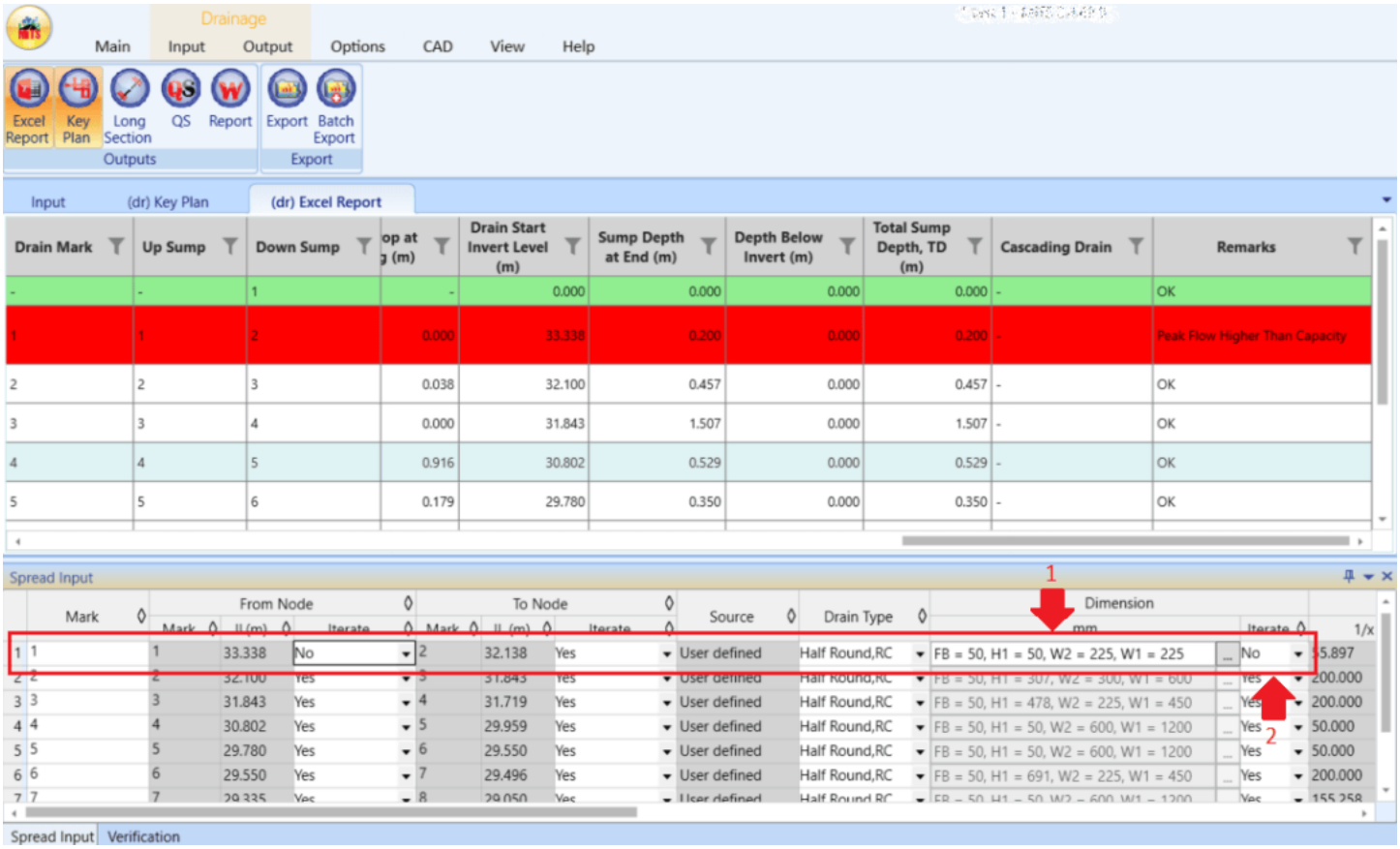
Peak Flow Higher Than Capacity



Suggested Solutions for Issue 3

i. Review fixed drain size and enlarge dimension

ii. Set iterate drain dimension from ‘NO’ to ‘YES’



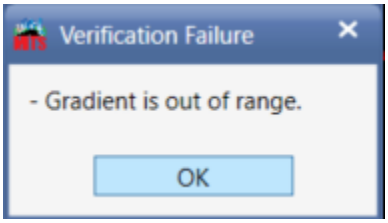
Steps to applied:

- Go to output > excel report > check remark and identify which drain have less capacity than peak flow
- Go to input > drain > spread input > ***dimension > enlarge drain dimension***
- Analyse > analysis successful > OK > export results

OR

- Go to output > excel report > check remark and identify which drain have less capacity than peak flow
- Go to input > drain > spread input > ***dimension > iterate from ‘NO’ to ‘YES’***
- Analyse > analysis successful > OK > export results

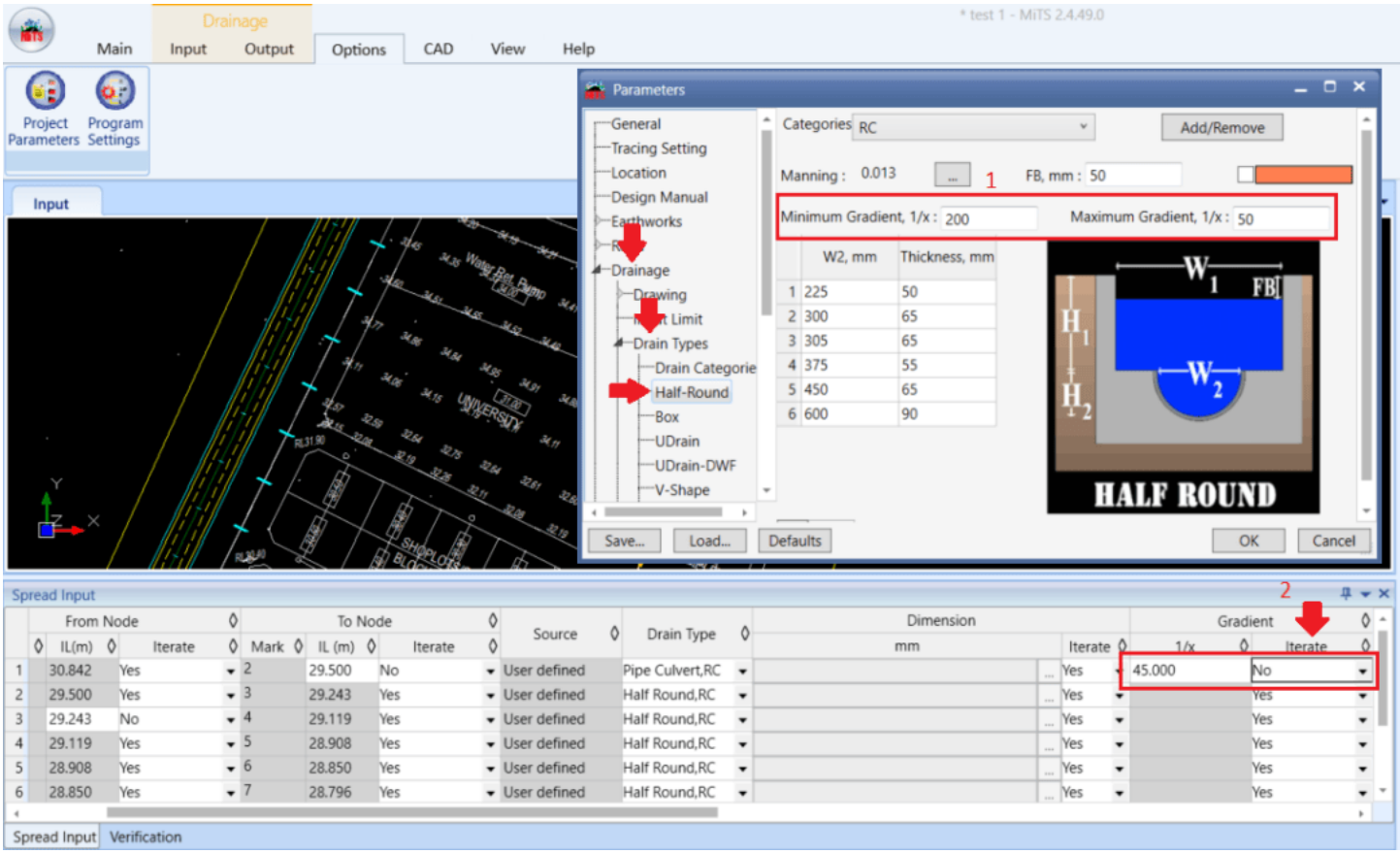
Gradient is out of range



Suggested Solutions for Issue 4

i. Check gradient iteration

ii. Check minimum/maximum gradient set in parameter (drain type basis)



Steps to applied:

- Go to drain > spread input > gradient > change iterate ‘NO’ to ‘YES”
- Analyse > Analysis successful > Review Outputs > export results

OR

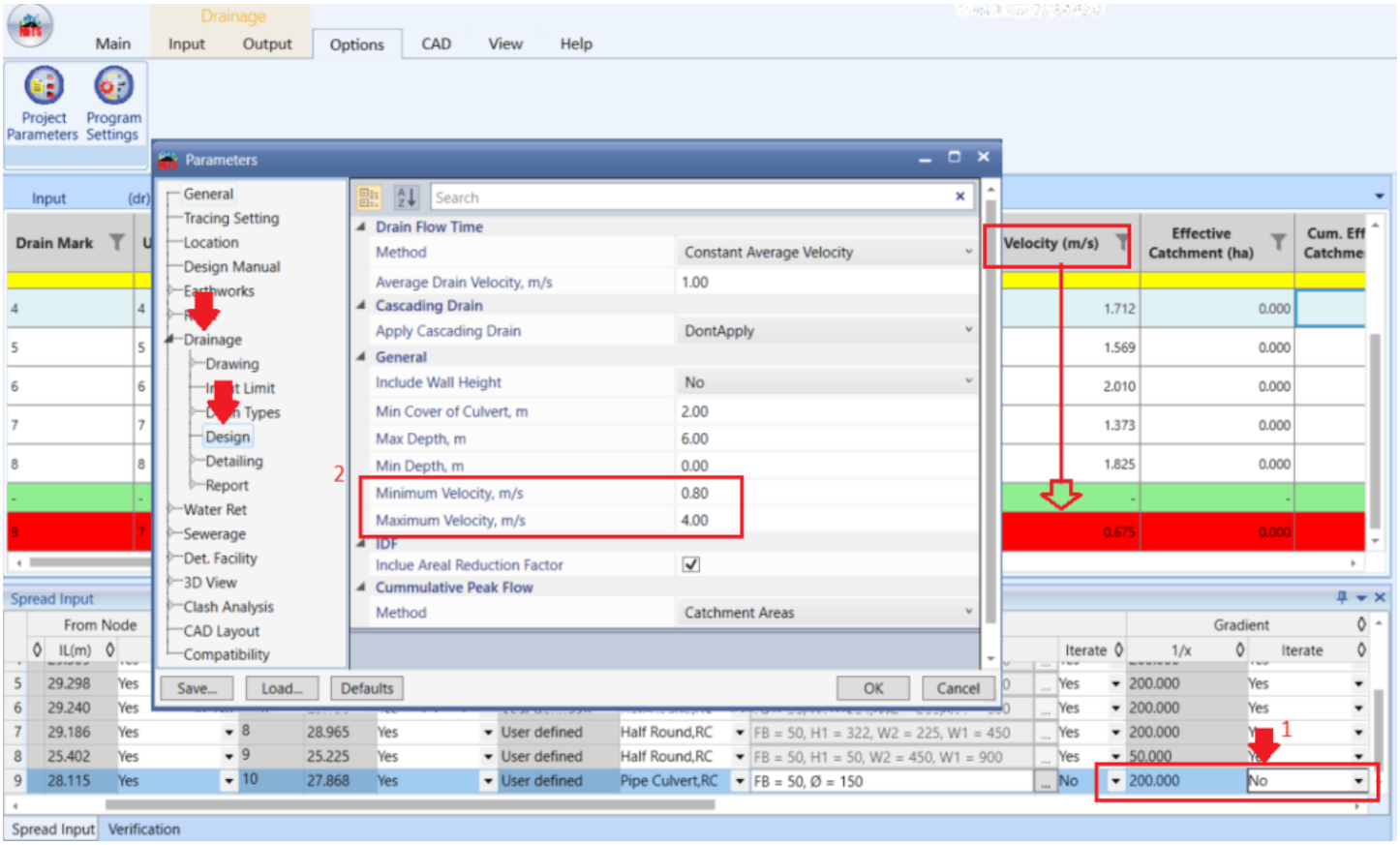
- Go to ‘Project Parameters’ > Drainage > Drain types > change minimum and maximum gradient (change per drain type basis)
- Analyse > Analysis successful > Review Outputs > export results

Velocity out of range

Suggested Solutions for Issue 5

i. Check gradient iteration

ii. Check minimum and maximum velocity in parameter



Steps to applied:

- Go to drain > spread input > gradient > proposed a suitable gradient value or change iterate from ‘NO’ to ‘YES’
- Analyse > Analysis successful > Review Outputs > export results

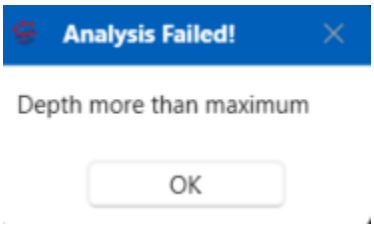
Note:

- This suggestion will depend on situation whether the velocity is less than the minimum velocity or more than maximum velocity set in the parameter
- If the velocity is less than the allowable minimum velocity, user may propose a steeper gradient and/or propose a smaller drain size
- As for velocity more than the maximum allowable velocity, user may propose a gentle gradient and/or propose a bigger drain size
- By applying suggestion above, user will be required to analyse the project and see how the velocity changes and make appropriate changes to achieve satisfactory design

OR

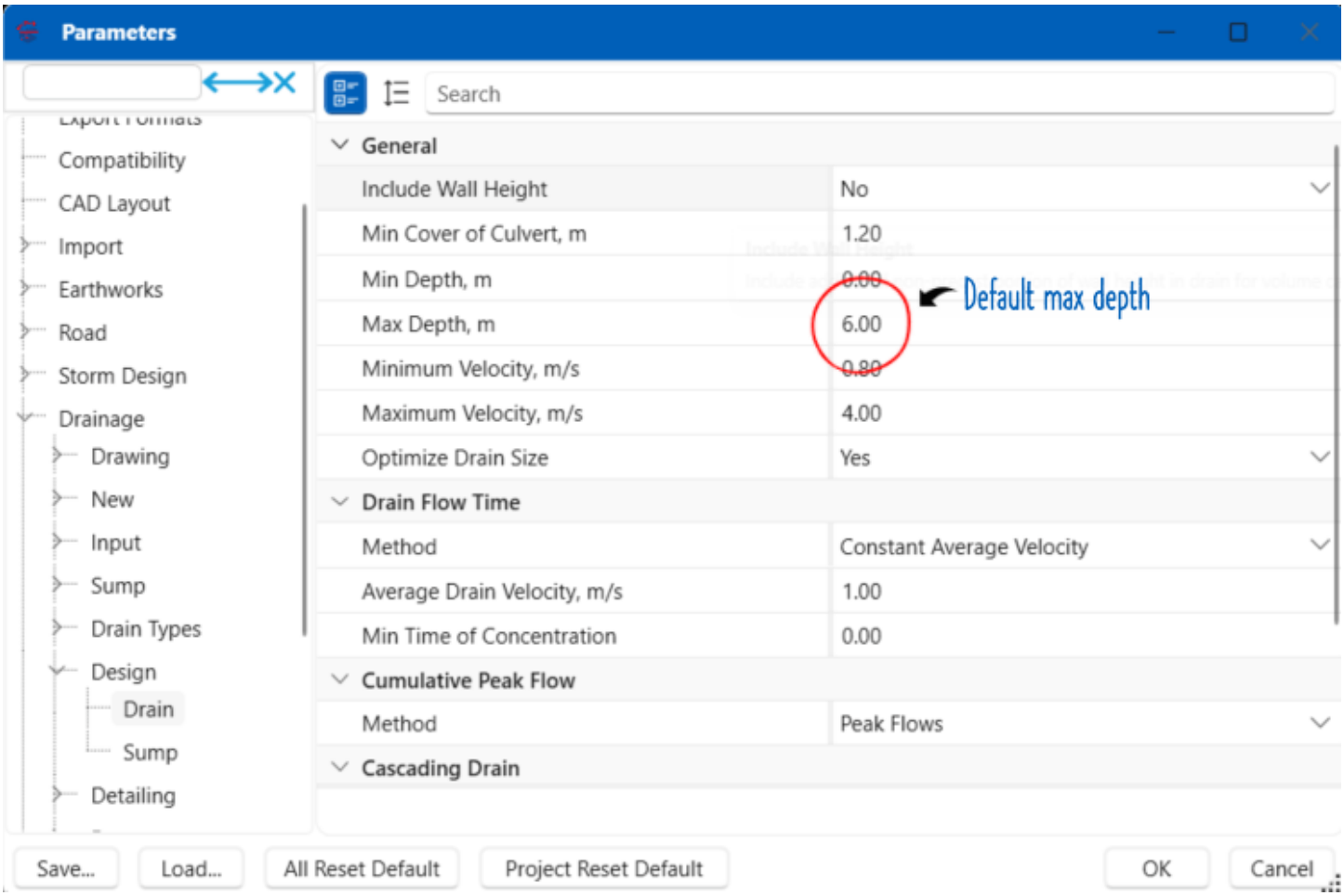
- Go to ‘Project Parameters’ > Drainage > Design > change minimum and maximum velocity to suit the project needs
- Analyse > Analysis successful > Review Outputs > export results

Depth more than maximum

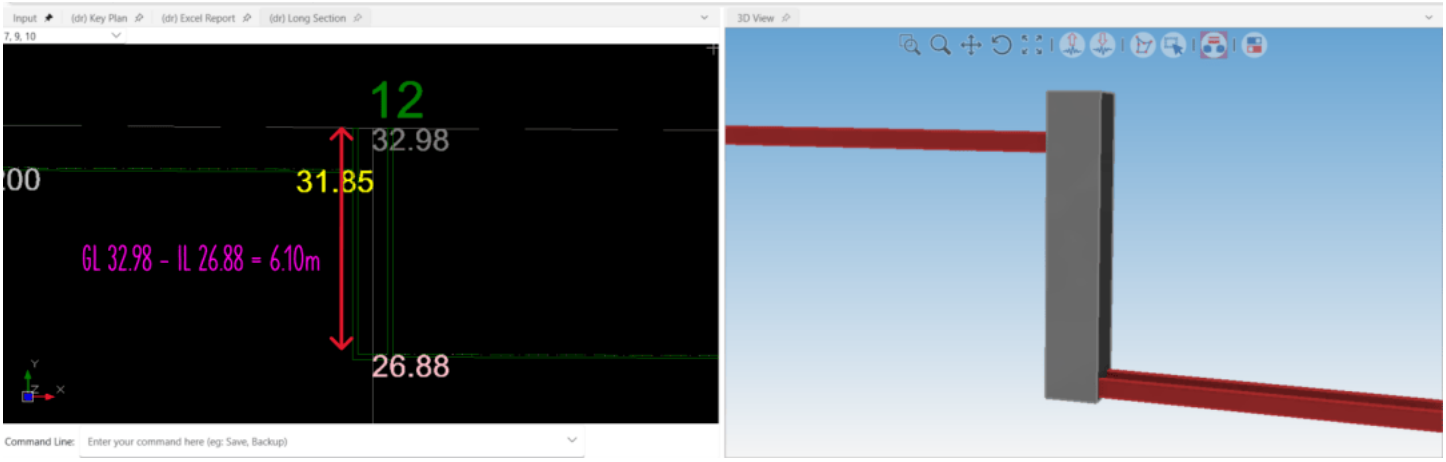


Reason:

The distance/depth from the surface level (Ground Level/Platform Level) to the drain invert level exceeds the default maximum depth.



Options > Project Settings > Drainage > Design > Drain



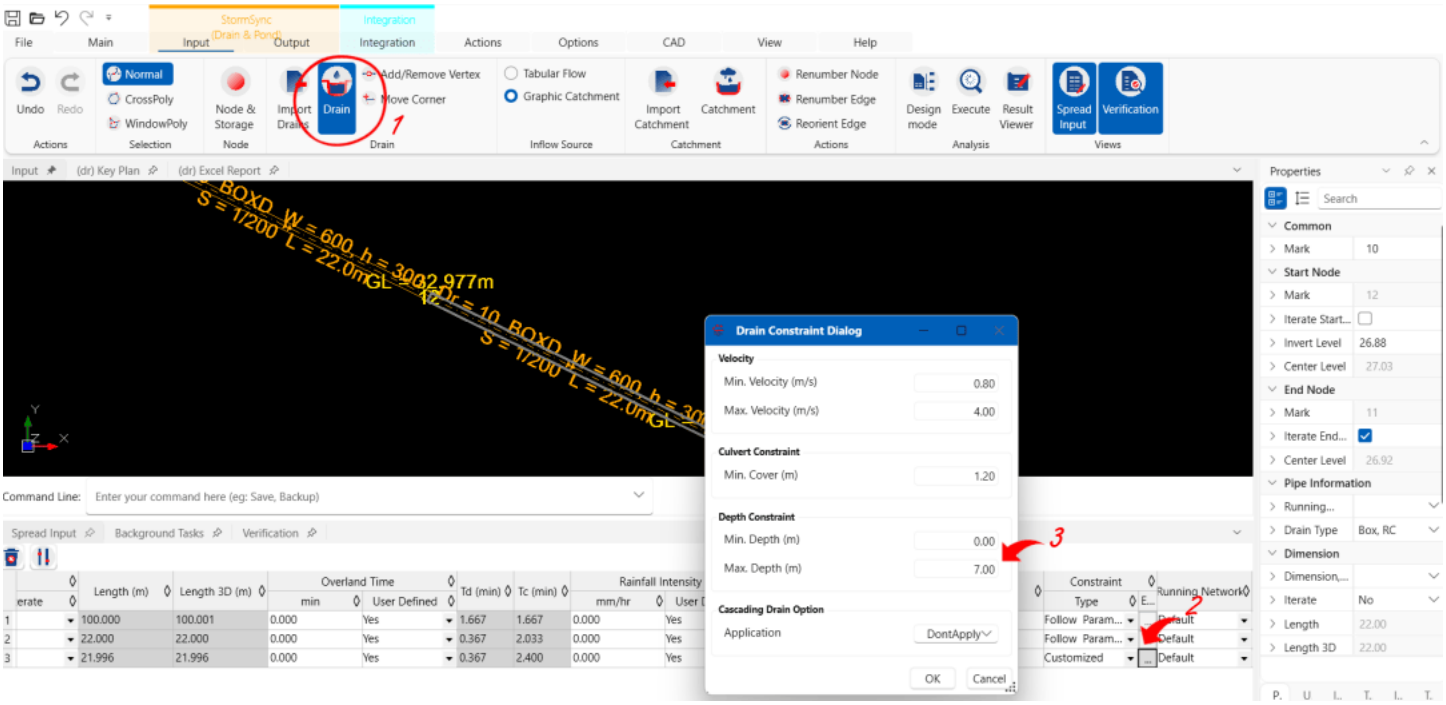
Left [Long Section] *Right [3D View]*

(GL) 32.98 - (IL) 26.88 = 6.10 m > 6.0m (Exceed default max depth)

Solution:

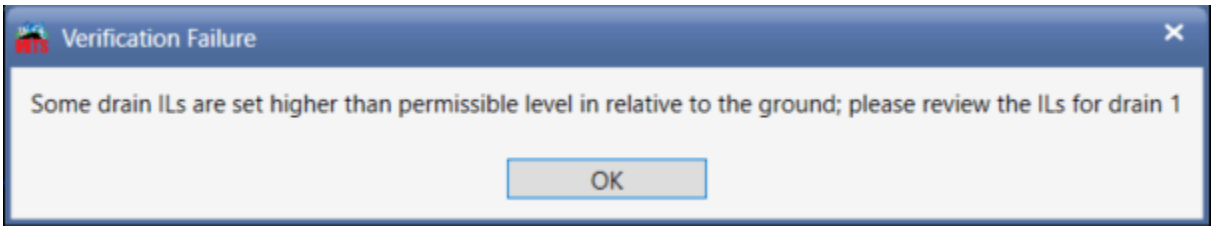
1. Check the drain Start/End IL and adjust them manually.

2. Use Customized Parameter and modify the constraint parameter accordingly (if needed). See image below.



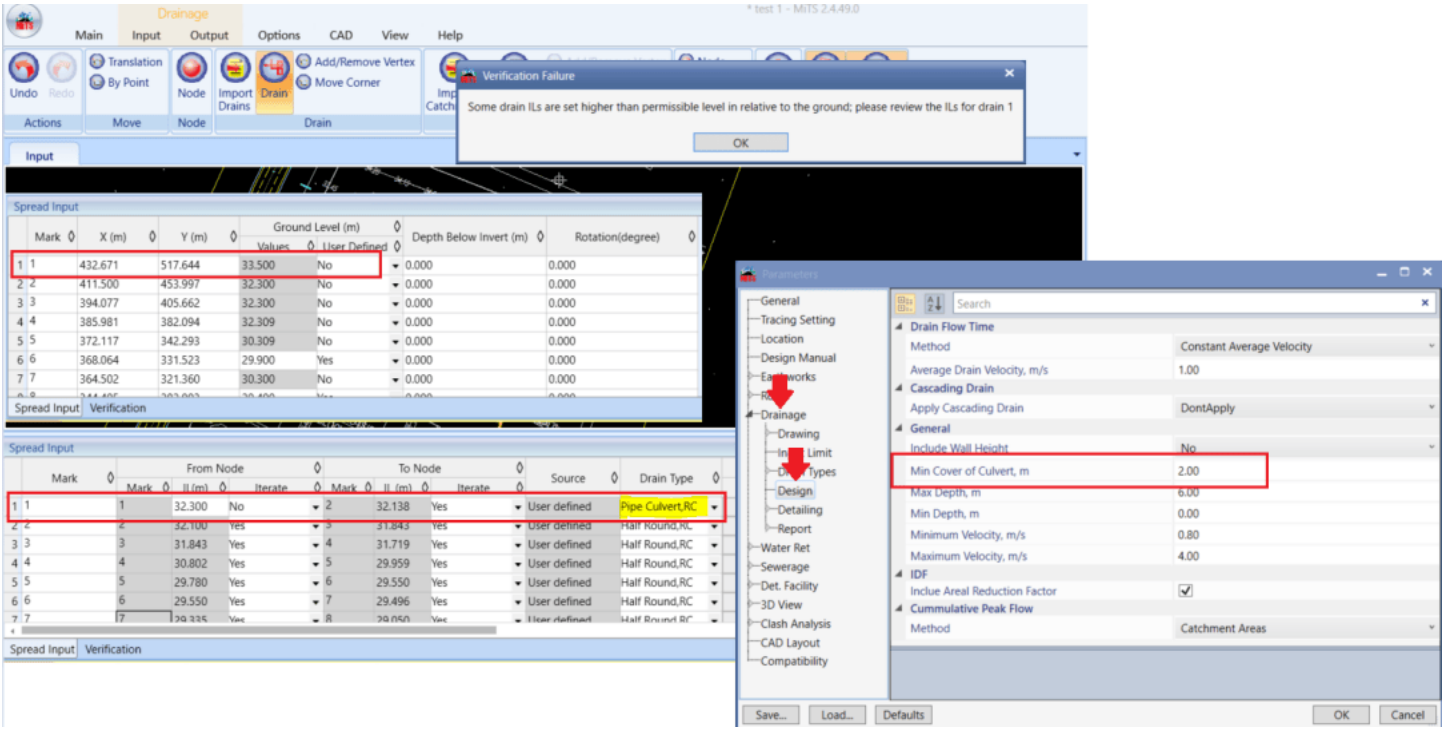
Adjust max depth in Customized constraint parameter

Some drains ILs are set higher than permissible level in relative to the ground



Suggested Solutions for Issue 6

i. Review ILs; unfixed/adjust invert level or change ‘Min Cover of Culvert,m’ at parameter setting



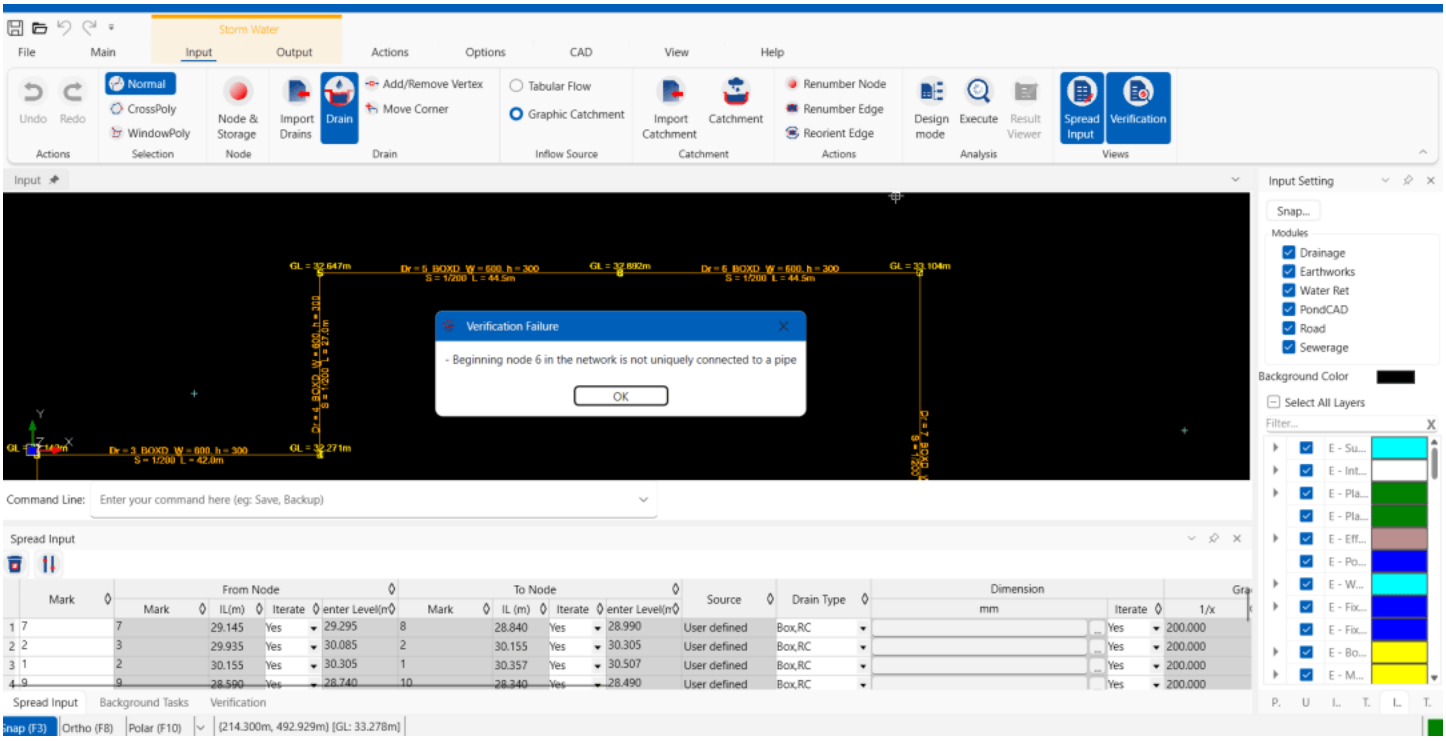
Steps applied:

- Go to drain > spread input > check fixed invert level > try to unfix; change iterate ‘NO’ to ‘YES’
- Analyse > analysis successful > review outputs > export results

OR

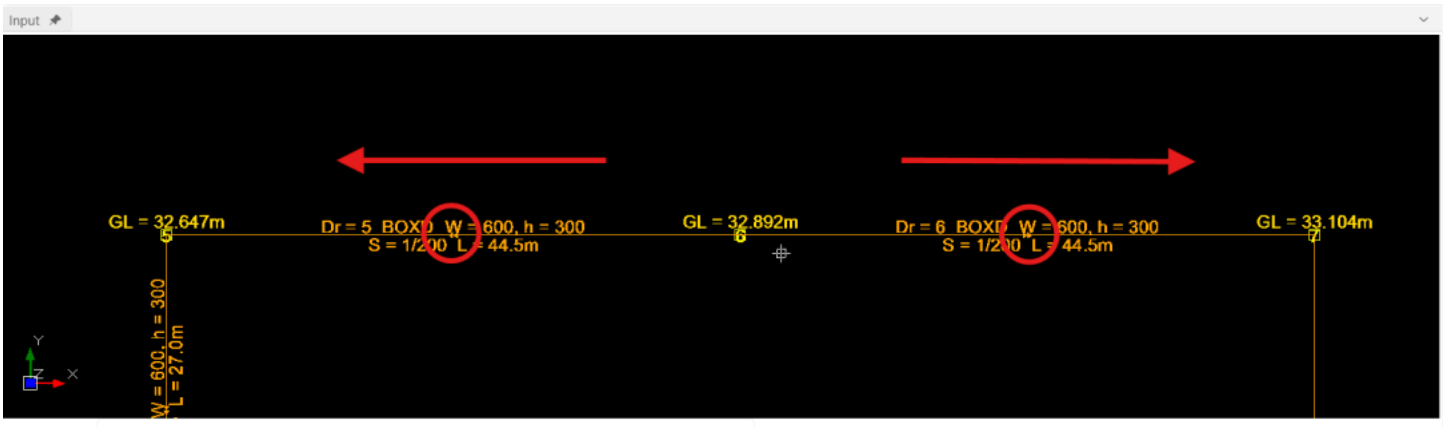
- Go to Project Parameters > Drainage > Design > change ‘Min Cover of Culvert,m’ (if necessary)

Beginning node in the network is not uniquely connected to a pipe



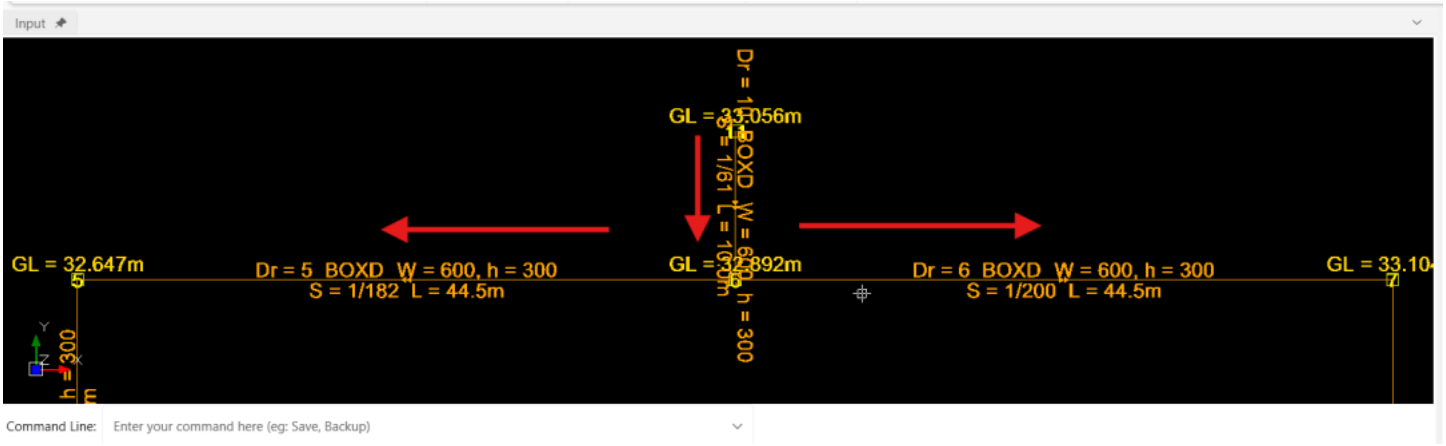
Verification failure: Beginning node in the network is not uniquely connected to a pipe

When you run your drain model in **Design Mode**, this error pops up because water flow in the drainage model branches into two directions (see the circle and the arrow)



Flow from node 6 directed to two separate routes.

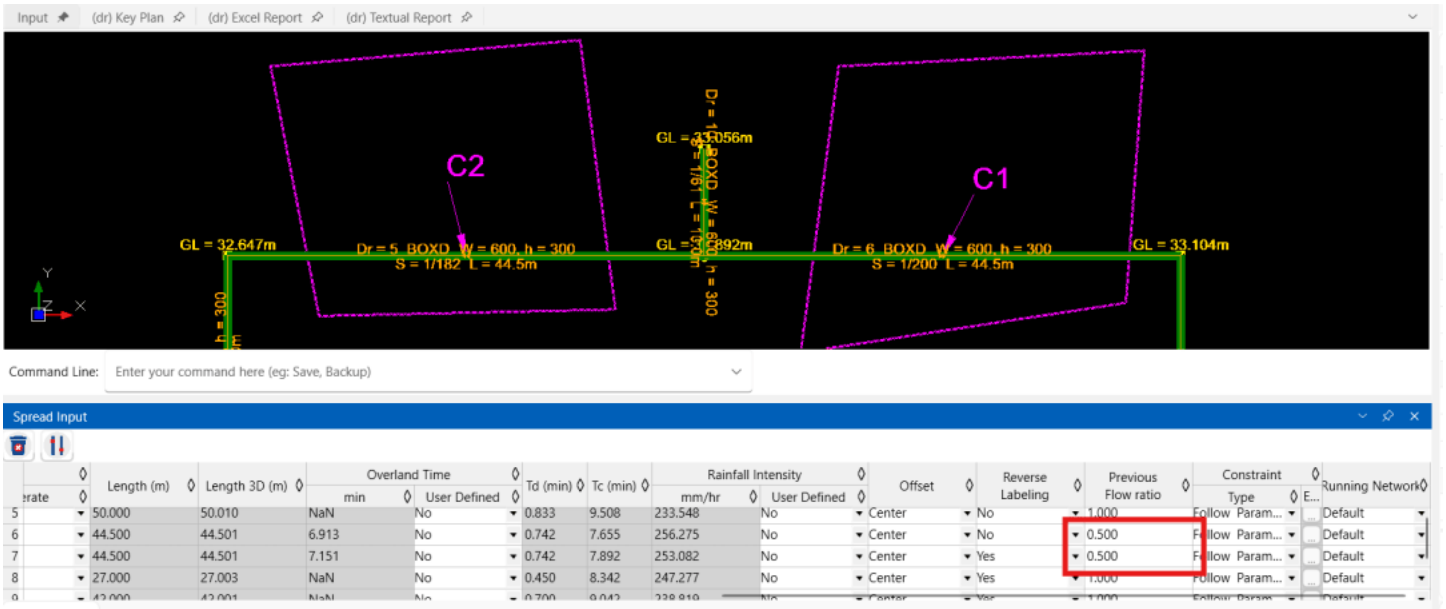
In MiTS, a single node is not allowed to have multiple flow directions. To resolve this error, create a **dummy drain** and connect it to the node where the flow direction splits. Ensure that the flow direction of the dummy drain is set towards the 'branched' drain. To change the flow direction, hover your cursor over the flow arrow until it changes to an upright arrow icon. Then, double-click the arrow to reverse its direction.



Ensure that the flow direction of dummy drain is flowing towards the main drain

By design, there will be **no flow (Q = 0 m³/s)** inside the dummy drain, as it is not meant to be physically constructed on site. Therefore, ensure that **no catchment** is assigned to this drain.

Since the flow direction will be split into two, each of the outlet drains connected to the sump will carry approximately half of the total flow from the sump, or any flow ratio that you deem acceptable. To know more on Flow Ratio in MiTS, you may refer here for further understanding.



The drain will take half of the total flow ratio from previous flow

What to do if you have no idea how to troubleshoot, there are just too many failures and errors!

1. Check the ground level, make sure that they are reasonable. You can also check the Long. section to detect the abnormality of the Ground Level. i.e: all nodes are 0, but the final node is 100m, this is definitely not reasonable
2. Set iterate dimension=NO for all drain/pipe dimensions, use your hand picked dimension first to analyze, and see what do you get from there
3. Try *not* to constraint the IL too much. Try to set only the starting node invert level and other very essential ILs, and let the computer figure out the rest.
4. If you really want to control how the drain/pipe flows, you can set the drain/pipe gradient to a fixed value, which is easier to set than individual drain/pipe start/end IL.

Related



Ngu Soon Hui

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

You can also contact me at soonhui@mes100.com