

Snail FAQ

General

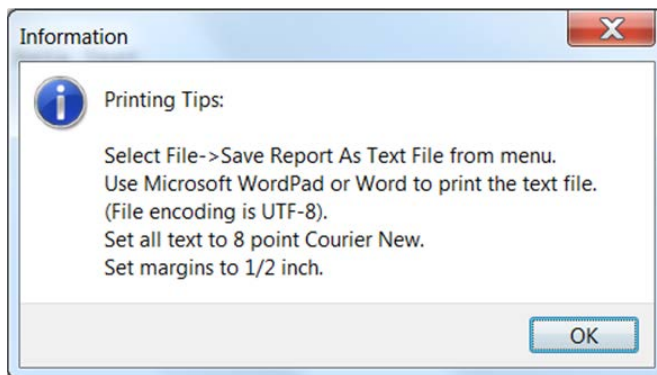
Q 1. Our company purchased four Snail licenses, and received four software security dongles. Are we restricted to install the software in only four computers in the office?

No, your company can download and install Snail in as many computers in the office as you want. To use Snail, simply attach the software security dongles to any of these computers. The software security dongle helps implement the clause in the license agreement, “*Each license permits Licensee to operate the Software at a given time on a single individual computer workstation.*”

Q 2. I cannot print directly from Snail except just the cover sheet and even that only on my printer not on PDF.

It is very difficult to write the codes that provide a presentable print format that incorporates all conceivable soil nail wall design configurations, such as various number of soil nails and number of soil layers. We decided to only provide .txt file format. You may format the text files before printing.

For simple print task, please refer to the following printing tips.



Q 3. Does Snail allows for the face of the wall to be less than 45 degrees? I am currently working on some slope stabilization projects that require the slopes be laid back more than 45 degrees.

You can enter any batter angle of the wall face and analyze slope stabilization using soil nails. However, if you want to perform a global stability analysis, a slope stability analysis software, such as Slope/W or Slide, is recommended. Please refer to Snail User Guide for more information.

Soil Nail Related

Q 4. We ran cases with identical soil conditions on both Snail and SnailzWin, a much older software we have had for many years, and got varying Factors of Safety. Can you please explain the causes of the differences?

We highly recommend you to use Snail and retire SnailzWin, after your verification runs.

To properly run SnailzWin, you need to use “factored option” instead of “ultimate option”. If you use the “ultimate option” in SnailzWin, the bond strength and facing resistance are divided by calculated Factor of Safety. This is the reason why you have lower and varying Factor of Safety from SnailzWin than that from Snail.

Q 5. How to calculate T_{max} in Snail?

In the Snail output, find the maximum stress among the soil nails for the most critical search surface. Multiply the value by the cross sectional area of the soil nail bar to obtain T_{max}

Q 6. Are the Maximum Stresses shown on the Snail output the allowable stress?

Yes, they are allowable stress (ASD), or factored stress (LRFD).

Q 7. I am not sure about the “Calculated Service Load at Soil Nail Head (Empirical), T_0 ” value presented on summary pop out at the completion of each Snail run. I understand that the manual says that this value should not be used for structural facing design. But the value does seem to have some control over the design. Can this value be used in any way in the design of the facing?

The “Calculated Service Load at Soil Nail Head (Empirical), T_0 ” value presented on summary pop out is an automatic geotechnical check of user-entered allowable facing resistance against the calculated T_0 , which is based on the empirical association of T_0 with T_{max} – the maximum tensile force among all the soil nails intersected by the most critical search surface.

From our opinion, this empirical association is very weak and can lead to some unexpected consequences, such as $T_0 = “0”$, if there is no soil nails / most critical search surface intersects. But, so far this is the only value to check against the user-entered allowable facing resistance.

Because user-entered allowable facing resistance is always greater than or equal to T_0 , structural facing analysis and design should base on the allowable facing

resistance used for geotechnical stability analysis. Using any values less than allowable facing resistance used for geotechnical stability analysis will compromise geotechnical design of the soil nail wall.

Q 8. I am using Snail for the design of Hollow Bar Soil Nails. Under “Dimensions and Properties” there is no input for the bar area, just bar diameter. I would assume Snail uses the bar diameter to calculate the bar area. Because hollow bar soil nails have a hole in the middle of the bar, I would calculate an equivalent diameter (not the actual diameter) based on the hollow bar soil nail area and entered the equivalent diameter in Snail. Is this a correct approach in using Snail for hollow bar soil nails?

Snail is not for the design of hollow bar soil nails. However, your understanding that the bar area is calculated based on the entered bar diameter is correct.

Q 9. I have a wall that has a slope above the wall that extends for a very long distance before leveling out. I noticed that the extent of the search limits has a dramatic role on the demand to capacity ratio, even if I have the “Mobilized Friction Angle” selected. Is it acceptable to use the failure wedge based on the friction angle to figure out the reasonable extent of search limit? If not, can you provide an alternative to the extents of the search limit?

As a rule of thumb, you may limit your search horizontally to about 3 times wall height. Otherwise, you will be getting a lower Factor of Safety as you extend the search limit. Please refer to FHWA-SA-96-069R “Manual for Design and Construction Monitoring of Soil Nail Walls”.

Q 10. I have a question regarding how to best use the Below Toe Search (BTS) option under the Search Options, and when it is applicable. It appears to me, this option is really for evaluating Basal Heave (5.6.6 of FHWA Geotechnical Circular No. 7) potential.

As explained in the User Guide, BTS can be used for soft material below the toe of the wall. However, due to the limitation in the passive resistance calculation in Snail, we recommend to use general slope stability analysis software to check global/deep seat stability.

Q 11. Snail output does not report all of the input values. We have discovered that Snail output does not include the size of the drilled-hole diameter used for soil nail installation; the size of this hole is a required – but variable – input value that can affect the calculated factor of safety and primary/likely failure mode.

The drilled-hole diameter and soil/grout bond strength are omitted in the Snail output. The reason is that Caltrans construction specifications implement performance-based approach, and leave the drilled-hole diameter and soil/grout bond strength to be determined by the contractor. Therefore, only the nominal pullout resistance, the combined factor of the drilled-hole diameter and the nominal bond strength, is presented in the Snail output and consequently in the contract package to be verified by verification tests and proof tests.

Q 12. I have to show design test load for testing on the plan set. Which value from the Snail output can I refer to, or should I have it tested to the entered maximum bar stress of 41.3 ksi (pullout)?

You should refer to the nominal pullout resistance for each soil layer presented in the Snail output as the soil nail test loads for testing on the plan set. The test load is to verify the nominal pullout resistance, the combined factor of drilled-hole diameter and nominal soil/grout bond strength you entered into Snail, not the maximum bar stress.

Q 13. When using Snail in the ASD mode, it appears that there may be a compounding of safety factors. If the bond strength has a factor of safety of 2 and the overall stability has a FS of 1.5, does the program regulate these FS separately? In other words, does the bond strength have a FS of $2 \times 1.5 = 3$ for overall stability calculations?

The entered Factor of Safety on the bond strength is to account for the uncertainty of soil/grout bond strength; while the calculated overall Factor of Safety of 1.5 is applied to the soil strengths. The calculated overall Factor of Safety does not apply to the soil/grout bond strength. Please refer to User Guide Section 3 Theory.

Q 14. We have question about how to properly interpret analyses results. Specifically we are wondering about the difference between temporary and permanent conditions.

The difference between temporary and permanent conditions is the difference of required Factor of Safety. Temporary condition can have a lower Factor of Safety than permanent condition does.

Facing Related

Q 15. How does Snail perform the calculation of the bearing plate? I remember that Snail has an option to include or exclude this calculation. Also, Snail User Guide does not have instruction on this.

The bearing plate check is for the plate bending moment capacity. The design parameters of the bearing plate, such as the drill-hole diameter and the bolt diameter, are determined and designed by the contractor, not by the designer, and typically unknown during design. Therefore, the bearing plate check is provided as an option. As a rule of thumb, the bearing plate check does not affect the facing design.

Q 16. Is there any reason that there is a minimum reinforcement area/unit length for the facing calculations? I was trying to check the software's calculations using the example provided in the FHA manual, but the software won't let me enter a reinforcement area of less than 0.07 in²/ft. A Snail example file uses a value of 0.058.

Entered reinforcement area should be greater than the minimum reinforcement area for both temporary and permanent facing. The Snail example does not check this for temporary case.

Q 17. When calculating the flexure resistance, does Snail assume that the vertical waler bars are not continuous? I want to be able to take the extra reinforcement area provided by a continuous bar into account for the flexural resistance of the facing, but there does not seem to be an option to specify this. Is this correct?

The additional continuous waler bars can be calculated in the unit of in²/ft and added to vertical and/or horizontal reinforcement area. In Snail, the waler bars are considered as additional discrete reinforcements placed at each bearing plate location. Please refer to FHWA GEC No.7 for more information.

Q 18. I have a question about the facing analysis feature in Snail. I keep getting an error on minimum reinforcement for permanent wall. Is the area of the waler steel being counted for? If I input the area/lf of the mesh and waler number and bar area individually I get an error. However, if I put the equivalent total area (mesh and walers) in the "vertical reinforcement area" and "horizontal reinforcement area" boxes and leave the waler information blank, there is no error.

Snail checks the required minimum reinforcement at both mid span and nail head locations. When the number of waler bars and their areas are entered, Snail only

recognize that the waler bars are placed only at nail head locations, and no waler bars in mid span. If there is no sufficient continuous reinforcement in the mid span, Snail check for the minimum reinforcement requirement will prompt the error message.