



CONSOLID TOPICAL

CONSOLID UK

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You know ahead what you get in the field:
THE CONSOLID SYSTEM shows in a reliable way
already in laboratory testing the improvement

The great security in respect of effectiveness of the CONSOLID SYSTEM makes failures in the field impossible, but ...

One of greatest advantages of the CONSOLID SYSTEM is the security that it works absolutely reliable.

Laboratory tests allow adapting any in-situ soil to the requirement on the site. The test results in the laboratory can always be shown on the construction site and if not, you can be sure that there was a mistake in the workmanship.

This is important to know and gives you the certainty that you can rely on the test results in the laboratory. Disappointed clients – if this should ever occur – try to blame the products for not being effective.

A prerequisite is that you follow the recommendations based on the - informative - soil test in the laboratory; the test blocks are the effective proof for full effectiveness. In the event of a complaint, the test results can be verified at any time by repeating these tests. This shows also the importance to have such test blocks at hands as evidence if anybody tries to put the blame on the CONSOLID PRODUCTS.

Why this recommendation?

Recently we heard complain on a road the CONSOLID SYSTEM was said to have failed ... A follow-up of this complain confirmed once more that only ignoring principal construction laws caused the problems. Therefore this TOPICAL deals with these principal physical laws. If they are respected, a trouble-free behaviour will always be sure on the site.

The Design of any earthwork has to take the soil parameters into account to achieve the desired performance.

For Roads and similar constructions certain rules must always be respected:

- **Drainage** in the underground and the sub-grade is the **No. 1 of all measures** and decisive for the durability of the construction. **Water being the greatest**

enemy to stability has to be controlled and led away from the construction so that it cannot endanger its stability.

- The designed embankment must fully **respect the required stability** for the necessary loading capacity and the in-situ conditions with regard to their static requirements as well as the dynamic forces caused by the traffic.
- Each road construction is the building of a bridge over the existing underground and can be calculated only as a whole construction and not only by improving a single layer's stability by using the CONSOLID SYSTEM.

We know that the CONSOLID SYSTEM can upgrade any soil. Plain or as a soil mix improved with missing fractions, it will receive a substantial improvement in its stability, load bearing and shear strength by 3 to 5 times over the same values for the same untreated soil or soil mix. Often the improvement is even more than 5 times. But this excellent performance of a layer, treated with the CONSOLID SYSTEM, becomes useless if the above-mentioned design criteria are not fully taken in consideration.

Placing a treated layer on untreated soil, which cannot take up the loads due to the fact that e.g. the bearing ratio is too low, must lead to problems. The bridge of the treated layer will break in. It is like a sandwich where a soft layer is placed between two stable layers; the soft material will be squeezed out and the stable layers will break into pieces. This fact not only applies to stabilized soil; you find it on asphalt pavements too when the pavement is placed on top of a too flexible base course – exposed to traffic it will break into pieces.

This means that any change in the design by using soil layers treated with the CONSOLID SYSTEM makes it also necessary to respect the loading capacity of the other, untreated layers – only observing all essentials will lead to a durable and, maintenance-poor, improved quality of the construction. We can do a lot in improving in-situ soils to excellent construction material, but we must not neglect physical laws; they will always dominate our work.

You are aware from all our literature but also from your own experience of the great advantages of the CONSOLID SYSTEM. Do not expect a performance that is simply physically impossible. As you know from former TOPICALS there are only a few rules to respect to have full access to the excellent behaviour of treated soil in the field, but these few rules will have to be followed in full. In respect of the depth of a treatment you will always depend upon the measurements in the sub-grade and the subbase; the lower the loading capacity of the underlying soil layers, the deeper the required treatment will have to be.

In mountainous areas, where the existing roads usually have no problem with the loading capacity due to lot of stones in the sub-grade and the embankment, the problem is in most cases only erosion; washout of fines by rain and loss of fines by dusting when dry. In such cases it may already be sufficient to place on top of the leveled, existing old road a thin layer of 150 mm of pre-treated soil mix as base course reinforcement to get again a smooth and water-stable top layer on which the wearing course can directly be placed. But it would be dangerous to recommend such a thin layer for any road. It must be made absolutely sure that a thin layer will solve the problem. In many cases, especially in flat areas, the problem is a completely different one. There you deal with

thick layers of water-sensitive soils (with high contents of clay and silt) and in these cases the design has to respect this water sensitivity in full:

Roads with a high content of clay and silt need for best possible results with the CONSOLID SYSTEM the two above-mentioned fundamentals to be fully respected:

- Take care that the road gets the proper drainage. Water must have the chance to run off the road and away from the embankment to avoid that it will be under-washed. This has to be observed not only for the road construction, but it must also include the protection of the shoulders as well as the slopes of the road embankment.
- Always take care that the road is placed higher than the surrounding area, at least 300 mm higher, to be sure that a heavy rainfall will run off. The required soil material for this embankment may be taken from both sides of the road.
- If a road is placed between two hills, it is anyway necessary to bring the road above the level of the ditches on both sides, which should drain away water and be at least 300 to 600 mm deep.

The layers on such roads are recommended to be treated to a depth of 250 mm to 400 mm; the actually required depth can be very well calculated by respecting the shear strength of the construction material involved especially that of the cohesive soils. Due to the fact that water "lubricates" the performance of an embankment with regard to the loading factor, it is so important that the soil layer treated with the CONSOLID SYSTEM can get the influence of water fully under control, even become impervious, if required.

Soil roads with a high content of clay and silt need more than only the above-mentioned care. The addition of sand and coarse material to the in-situ soil will enable a much higher improvement with the same quantities of CONSOLID and SOLIDRY. The increase of the mechanical stability by improving the sieve curve of the soil mix allows a raise far beyond the results possible only with the in-situ soil alone. Therefore check this possibility by

Adding to the in-situ soil the missing fractions to get ahead of the treatment with the CONSOLID SYSTEM an improved mechanical stability. Missing fractions can be found everywhere; even demolition rubble can be used for this purpose as coarse material;

This procedure of improving the composition of a soil mix is especially very effective if the soil mix is prepared and treated in a central mixing plant and taken to the site already prepared for application. In this way it is possible to obtain always the same quality of the treated material, adjusted to the local requirements. Following the recommendations of this TOPICAL grants you for all future.

Based on your own informative laboratory test results, that you will never have a failure on a road if the recommendations are respected.

Be sure that the recommended depth of the treatment corresponds with the design and the existing loading capacity of any underlying layer. Never use too little treated material; do not forget a bridge can only stay stable if it is not overloaded.

There is never, in respect of costs, a "cheap" solution of a stability problem. A 'cheap' solution usually turns out to be the most expensive one.