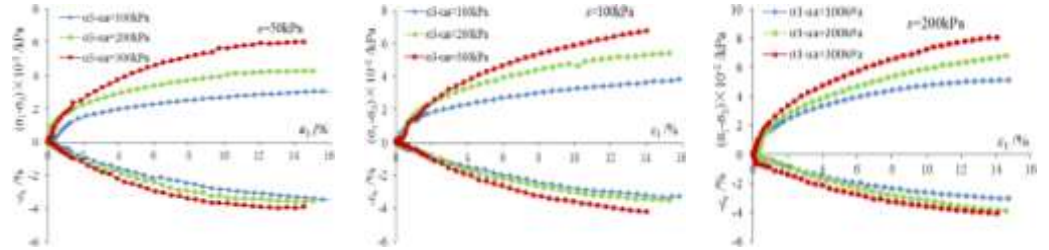
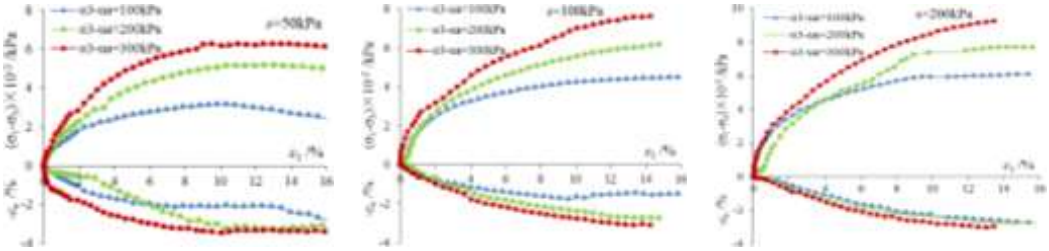


（a）n=0.88



（b）n=0.93

Fig. 13 Relationship curves of $(\sigma_1-\sigma_3)\sim\varepsilon_1$ and $\varepsilon_v\sim\varepsilon_1$ of m=4:6 soil samples

Lateral comparison from Fig.13 shows that when compaction factor of soil samples is the same, under the same suction, if net confining pressure is greater, the strength of the sample is greater and volume change gradually from the shear shrinkage converts to dilatancy. When they have the same net confining pressure, if the suction is greater, the strength is greater and volume change is greater. It shows that suction has important influence on strength of soil sample and its volume change.

By longitudinal comparison, the sample who has the same net confining pressure, the suction and the same mixture ratio, if the compaction coefficient is higher, the strength of specimen is greater. Strain curve gradually convert to the ideal elastic-plastic model from strain hardening type. Some soil sample under low net confining pressure tends to be strain softening model, and under the higher the compaction factor, softening phenomenon is more obvious, but overall softening is not obvious.

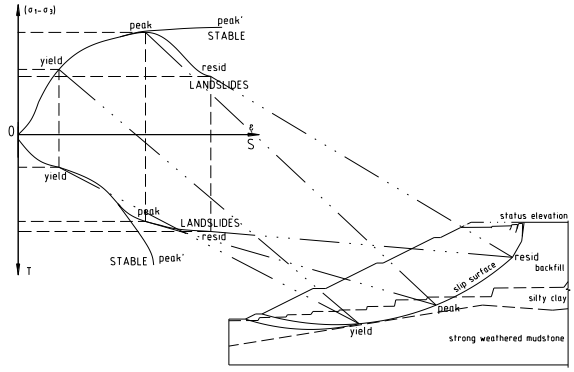


Fig. 14 Relationships among destabilized process and time-space evolution of high fill slope

Although space-time evolution characteristics of different high fill slopes are different, but its essence is shear damage in rock and soil mass. The shear deformation is related to the sliding surface properties. Based on the analysis above, as shown in Fig.14, mountainous area high fill slope deformation time-space evolution and failure mechanism are: 1) in the normal construction process, before strength of soil at the trailing edge of fails to reach the yield status, slope deformation should be finished in a short time. The value mainly depends on the filling body resistance and the filling load. In theory, there will be no cracks; the accumulative deformation would not exceed the experience value in table 1. 2) when entering the stage of initial deformation, the stress of slope body makes original pore shut or nearly shut. Granules contacting area increases, and the trailing soil strength constantly reinforces, which is generally less than the peak state (peak), at the same time, the yield state of slope moves down along the potential sliding surface; At this point, the soil at trailing edge which reaches the yield point has cracks first, and macro deformation characteristics begin to strengthen. Now some measures can be taken according to warning deformation rate above mentioned, which is most effective and reasonable. 3)when getting into the uniform deformation stage, the slope stress changes constantly; the soil presents a hardening effect; the strength of trailing edge soil is in the peak state approximately. The yield situation (yield) of slope continues to move down along the potential sliding surface; the cracks at trailing edge of this stage constantly extend and increase; shear cracks appears at flange; the leading edge hunches and fracture. At this time, according to the deformation warning rate above mentioned, some measures should be taken quickly. Generally, it can avoid the deformation of slope entering into the acceleration phase. 4) if the measures is taken correctly in the initial and uniform deformation stage, there is still a hardening effect inside the slope; the slope deformation goes into stable convergence stage. stress state of each point and the, width and quantity of cracks on the potential slip surface remain basically unchanged. Some cracks tend to be closed; If slope stress increases further in uniform deformation stages, hardening effect disappears; the initial yield and peak state soil significantly tend to peak and resid state respectively, at the same time, each point goes down along the potential sliding surface; cracks extend intensively. The trailing edge berm and frontal uplift phenomenon is obvious; the sliding surface cut through; the deformation rate increases with time which is close to sliding state, until it is destructive. According to the slope deformation warning rate put forward before, early warning plans for safety and disaster mitigation should be initiated. The deformation failure of mountainous area high fill slope develops progressively. The failure occurs firstly at trailing edge, and it is often in a state of post-damaged area(this area lies behind the “resid” point); the part between leading edge and trailing edge is in the state of critical stress.

5. CONCLUSIONS AND SUGGESTION

(1) The mountain area high filling body is sedimentation medium as well as load. The displacement is mainly settlement and also is obvious horizontal lateral displacement. Since the original foundation treatment is not qualified, the loading is too fast, the rain is heavy or the underground water arises, under excess pore water pressure and high pressure from overlying fill body, the relatively weak interlayer inside

the filling body soil or original foundation soil firstly develops into slide face which is mild at front and steep backward.

(2) From aspect of space, the forming and the developing of cracks mainly includes the forming of trailing edge tensioned cracks, the forming of middle flank shear cracks and the forming of leading edge uplift cracks. From the aspect of time, the deformation normally goes through 3 stages which are initial stage, uniform stage and the stable convergence stage. Seizing cracks evolving and deforming rules, it can provide the significant reference for high fill deformation control and sliding warning.

(3) During the normal construction period, it should be paid attention to if the high fill slope deformation speed greater than 0.33mm/d for 3 continuous days and if the speed greater than 0.8-1mm/d for 3 continuous days, it should be warned and take some corresponding measures. If the deformation speed is greater than 20-25cm/d, it is determined that the whole sliding face has connected and the whole slope begins to slide.

(4) When the samples have the same compacting factor and net confining pressure or suction is bigger, the samples volume change gradually converts to dilatancy from contraction. When the samples have the same net confining pressure and suction, if the compacting factor is greater, the strain curve gradually converts to ideal elastic-plastic type from strain hardening type. Under low net confining pressure, some samples become strain softening type.

(5) The samples deformation and stress state is corresponding with high fill slope temporal and spatial evolution and failure mechanism macroscopically. Deformation firstly happens at the trailing edge and it is always in in a state of damaged area(this area lies behind the “resid” point). The deformation develops asymptotically. Leading edge is in a state of before the peak stress and a critical stress state is between the leading edge and trailing edge.

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