Stability of Natural Slopes and Embankments Underlain By Weak Clays

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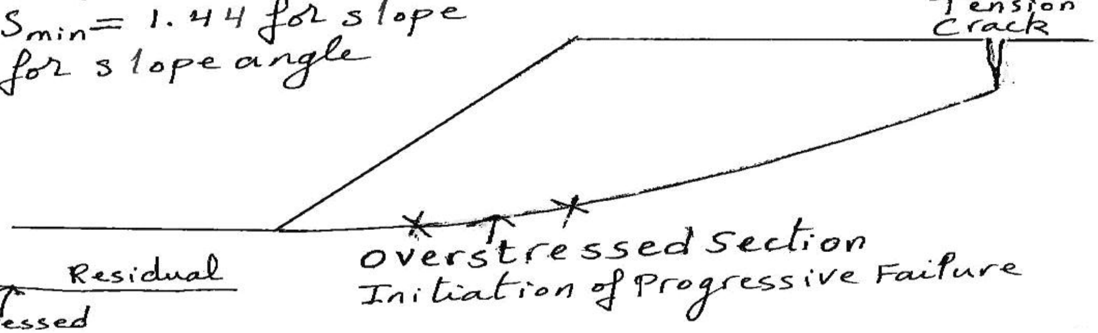
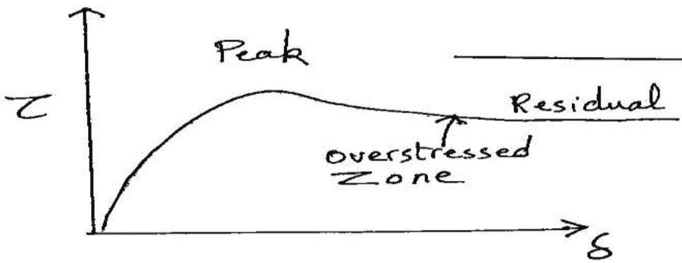
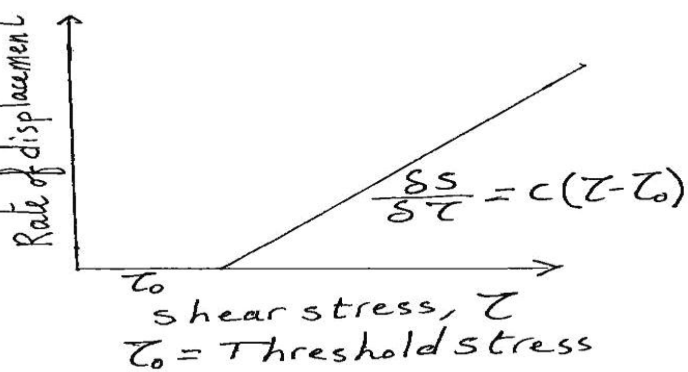
Underlain by Weak Clays

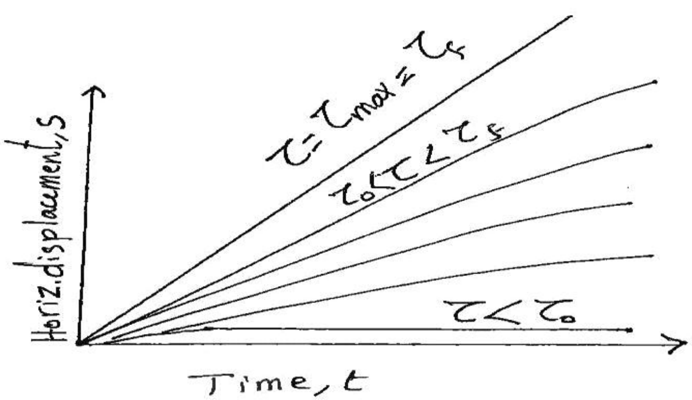
Creep displacement and progressive failure

To avoid progressive failure in cohesive soils with $\Phi_u = 0°$, $F.S_{min} = 1.44$ for slope angle of 16° and 1.49 for slope angle of 34°









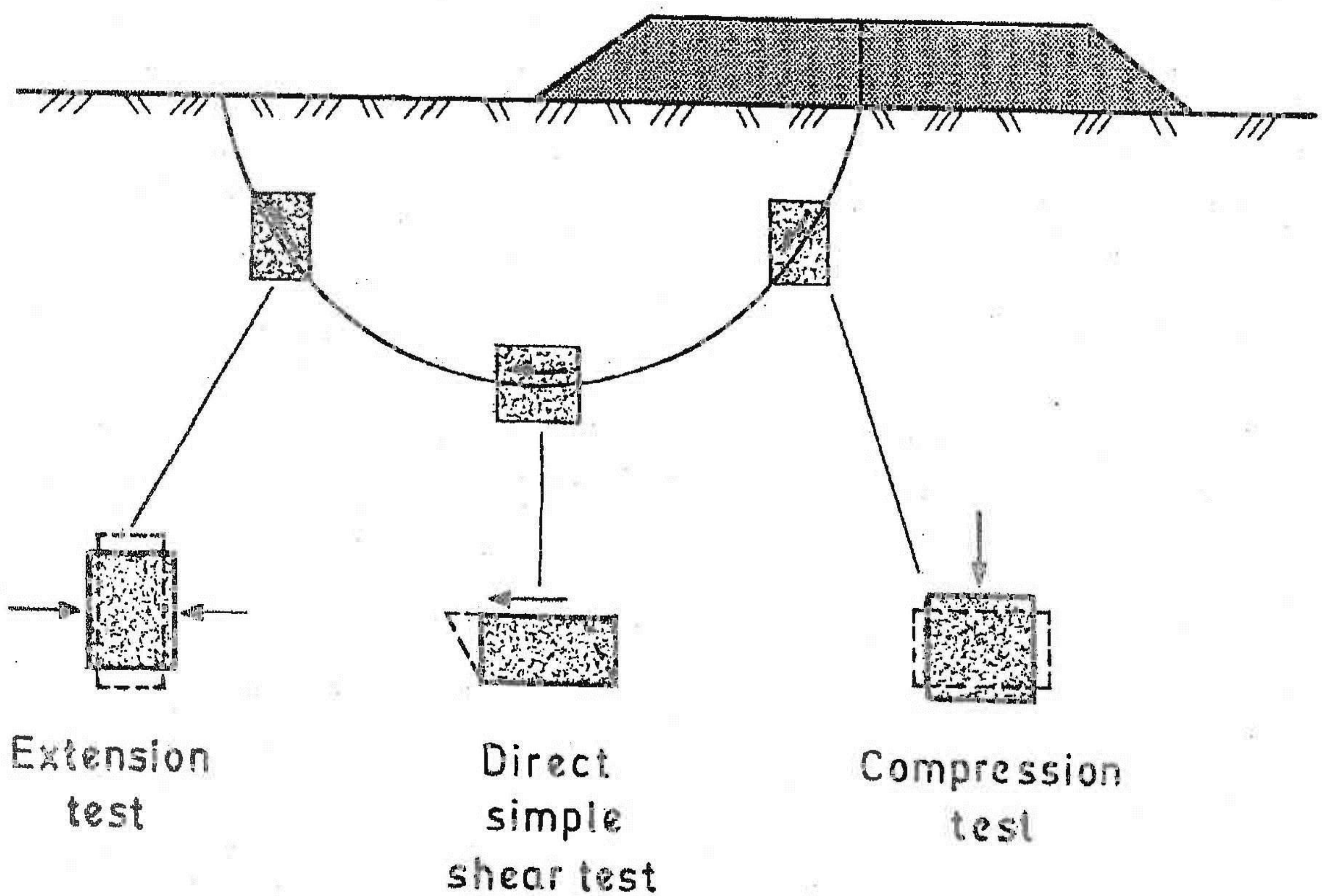


Fig. 1 Relevance of laboratory shear tests to shear strength in the field (Ref1).

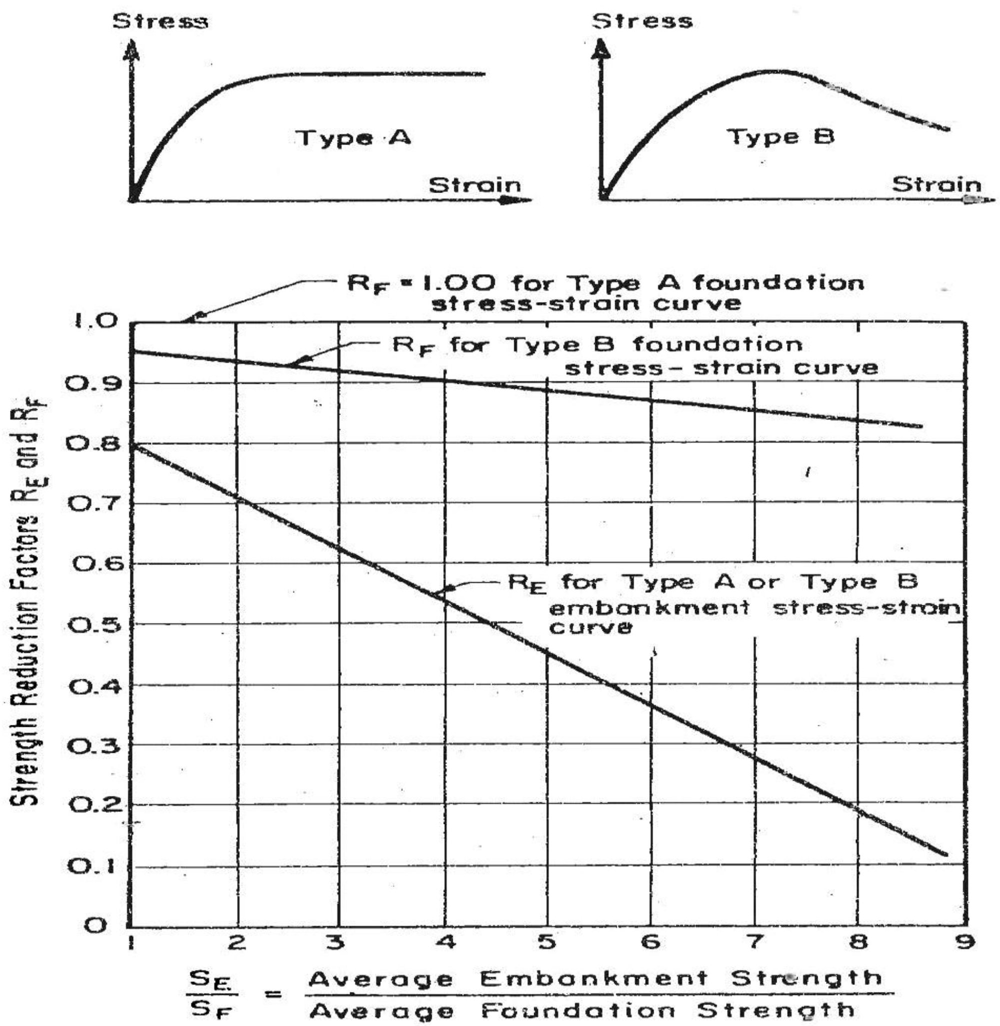


Fig. 2 CORRECTION FACTORS R_E AND R_F TO ACCOUNT FOR PROGRESSIVE FAILURE IN EMBANKMENTS ON SOFT CLAY FOUNDATIONS. (Ref 3)

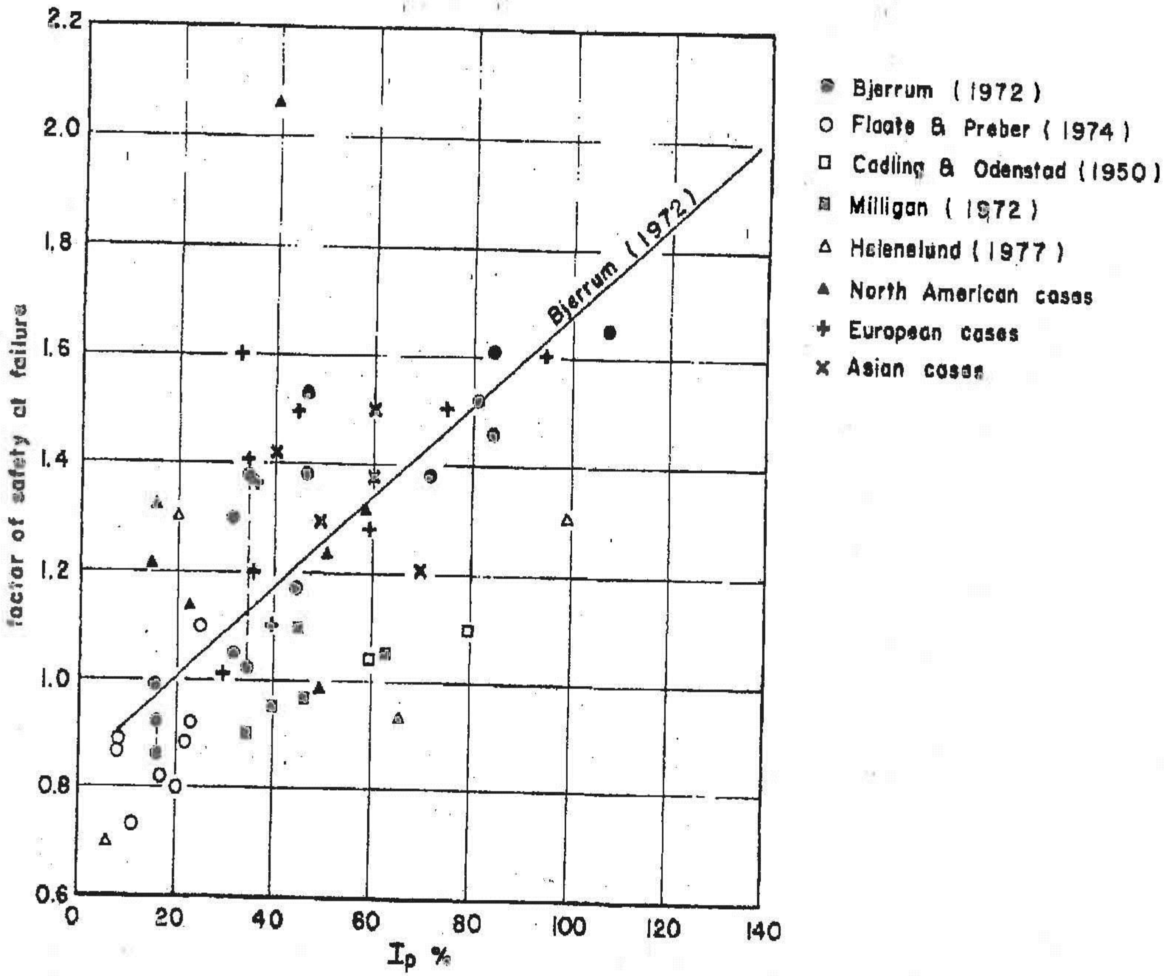


FIG. 3 Factors of safety at failure from all published case histories (as of 1979)(Ref14).

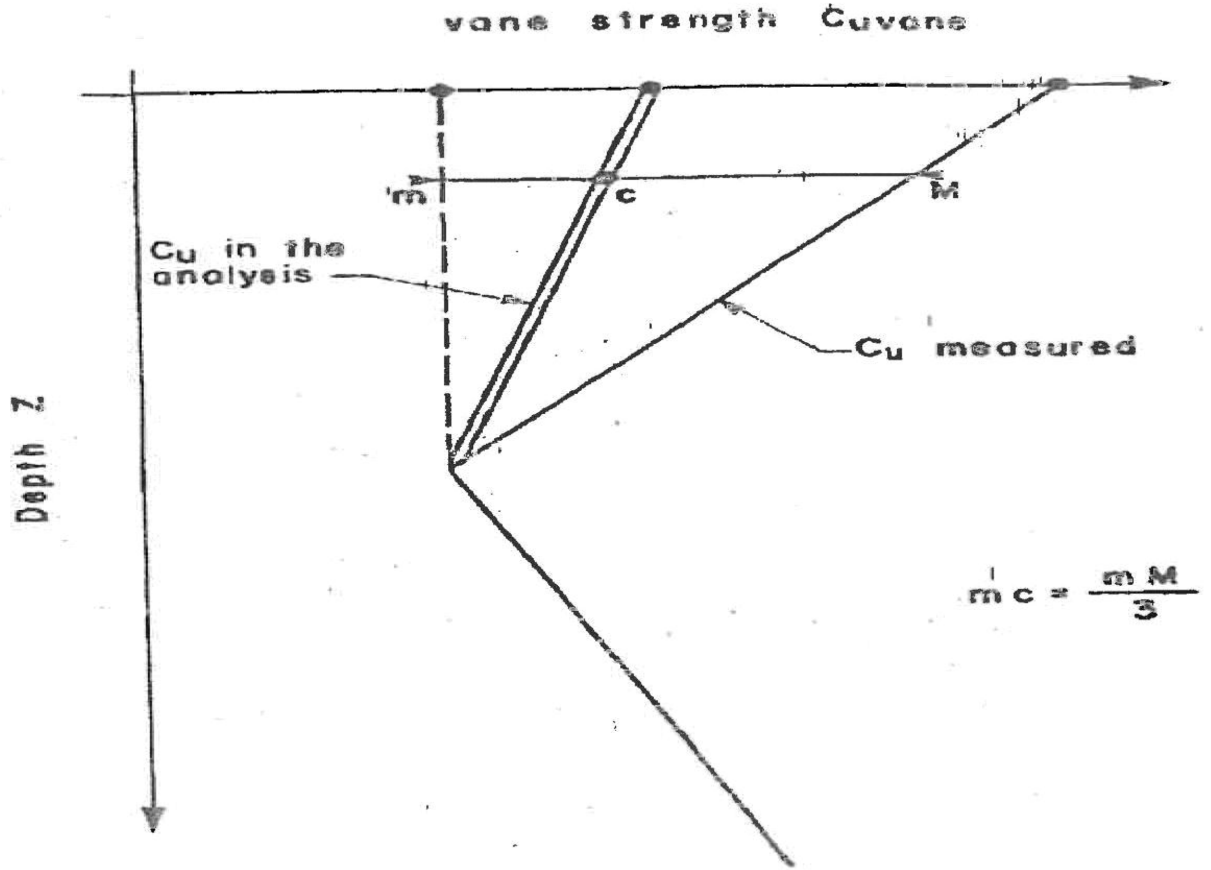


FIG. 4 . Strength profile in the weathered crust.
(REF 14)

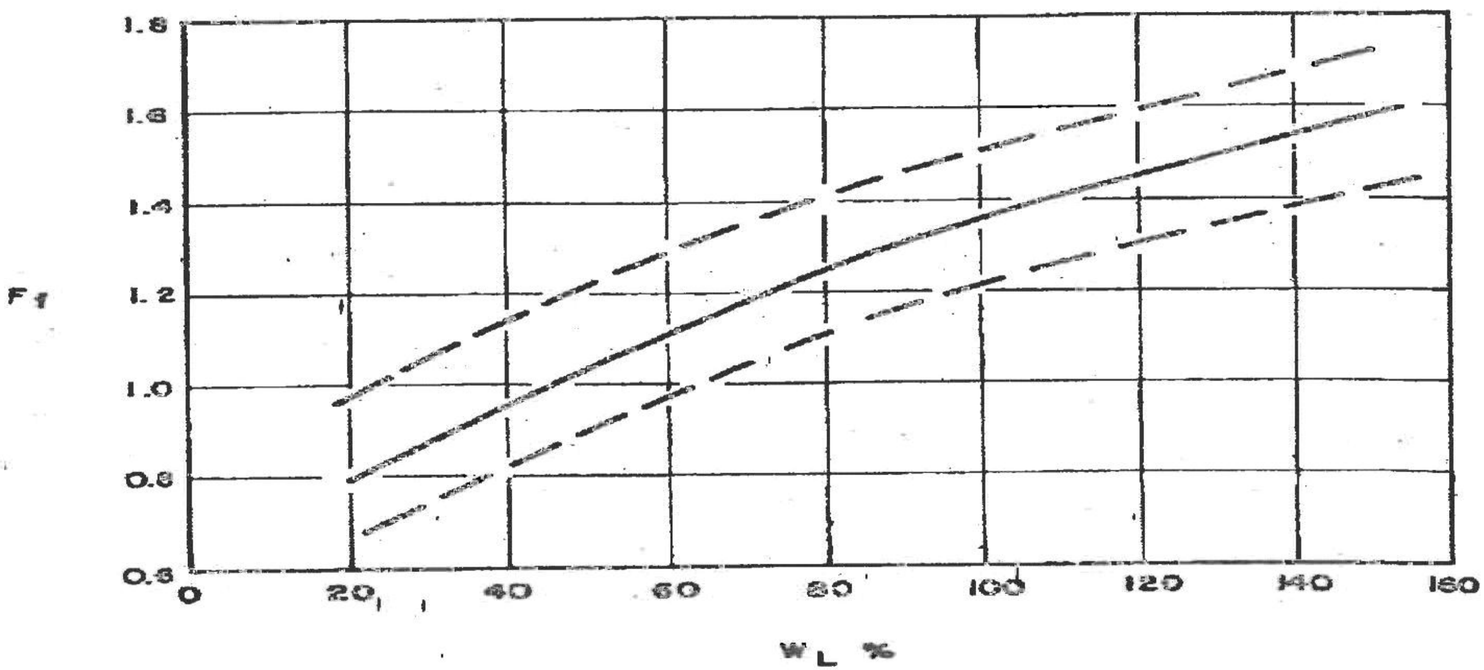
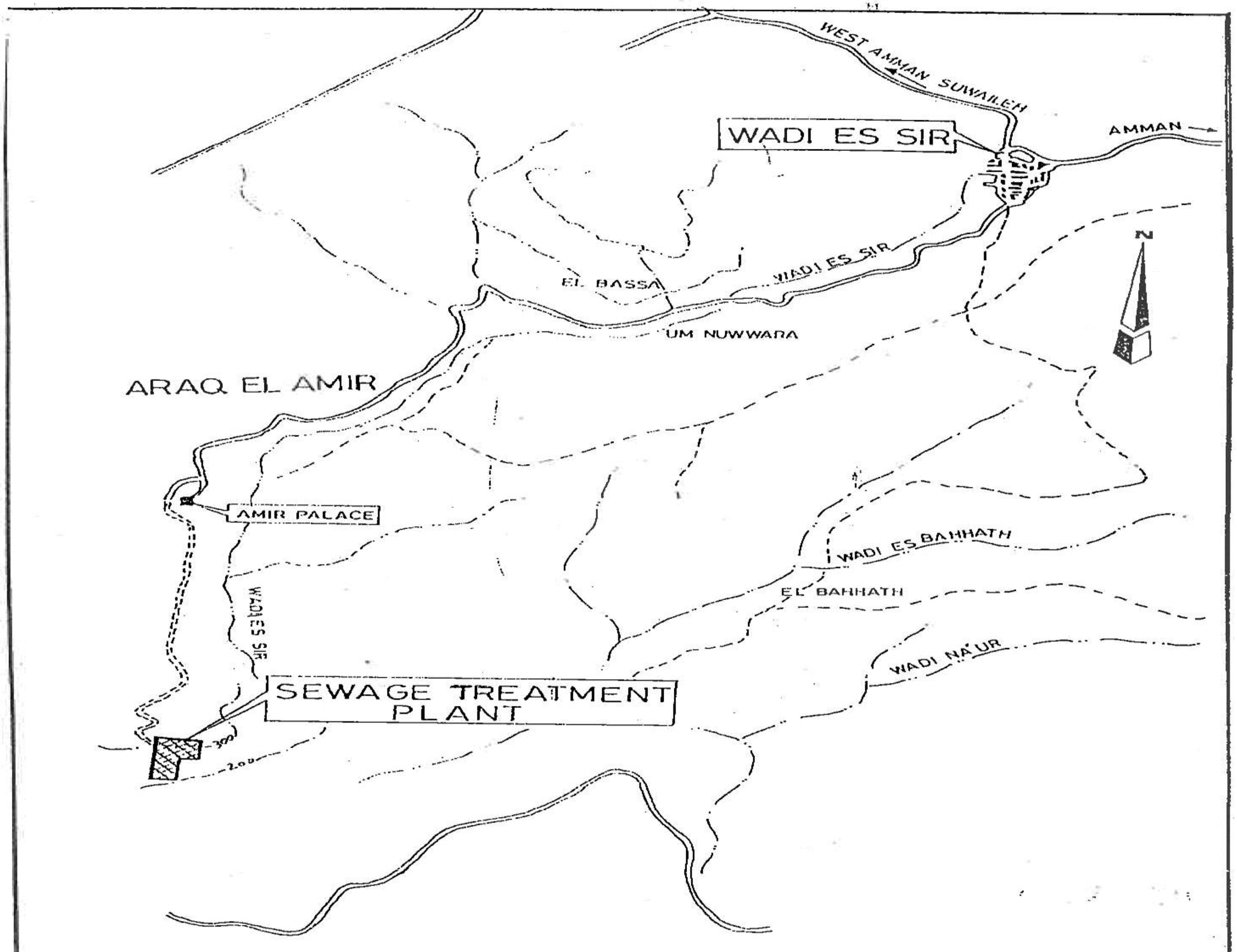


FIG. 5. Proposed correction of the factor of safety computed from the vane strength (Ref 14).



WADI ES SIR
SEWAGE PROJECT

Fig.6
GENERAL MAP

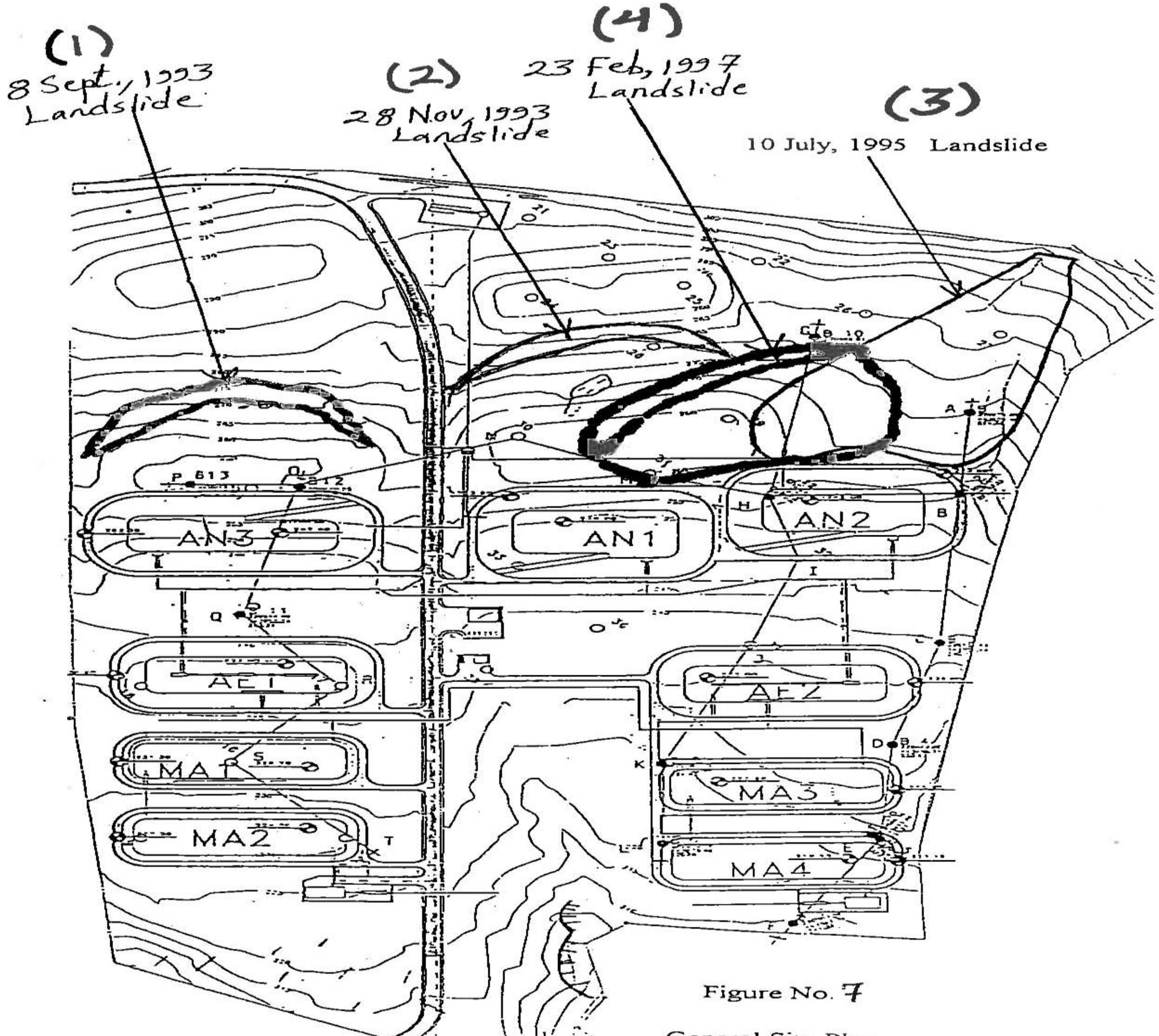


Figure No. 7

General Site Plan

(a)

(b)

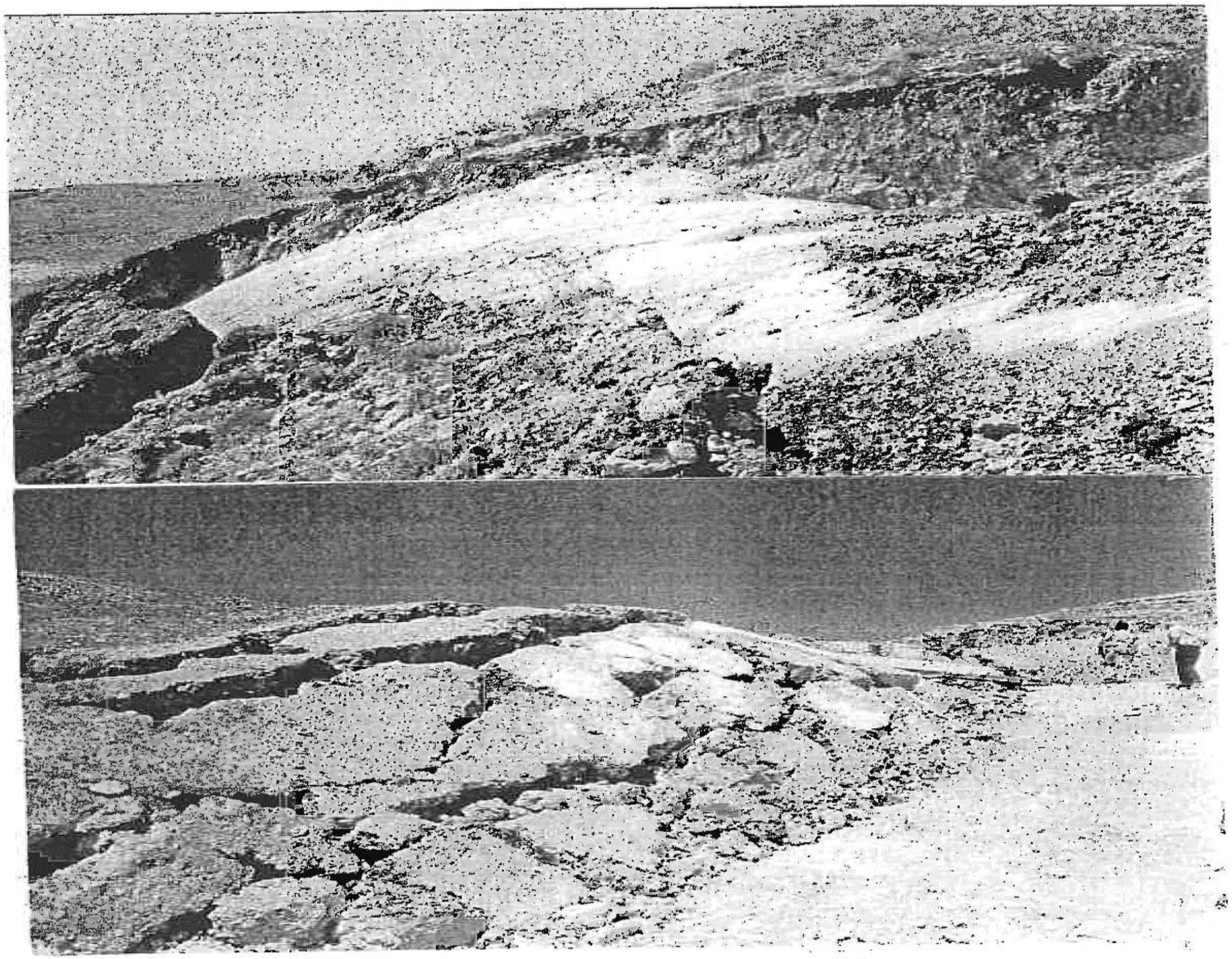
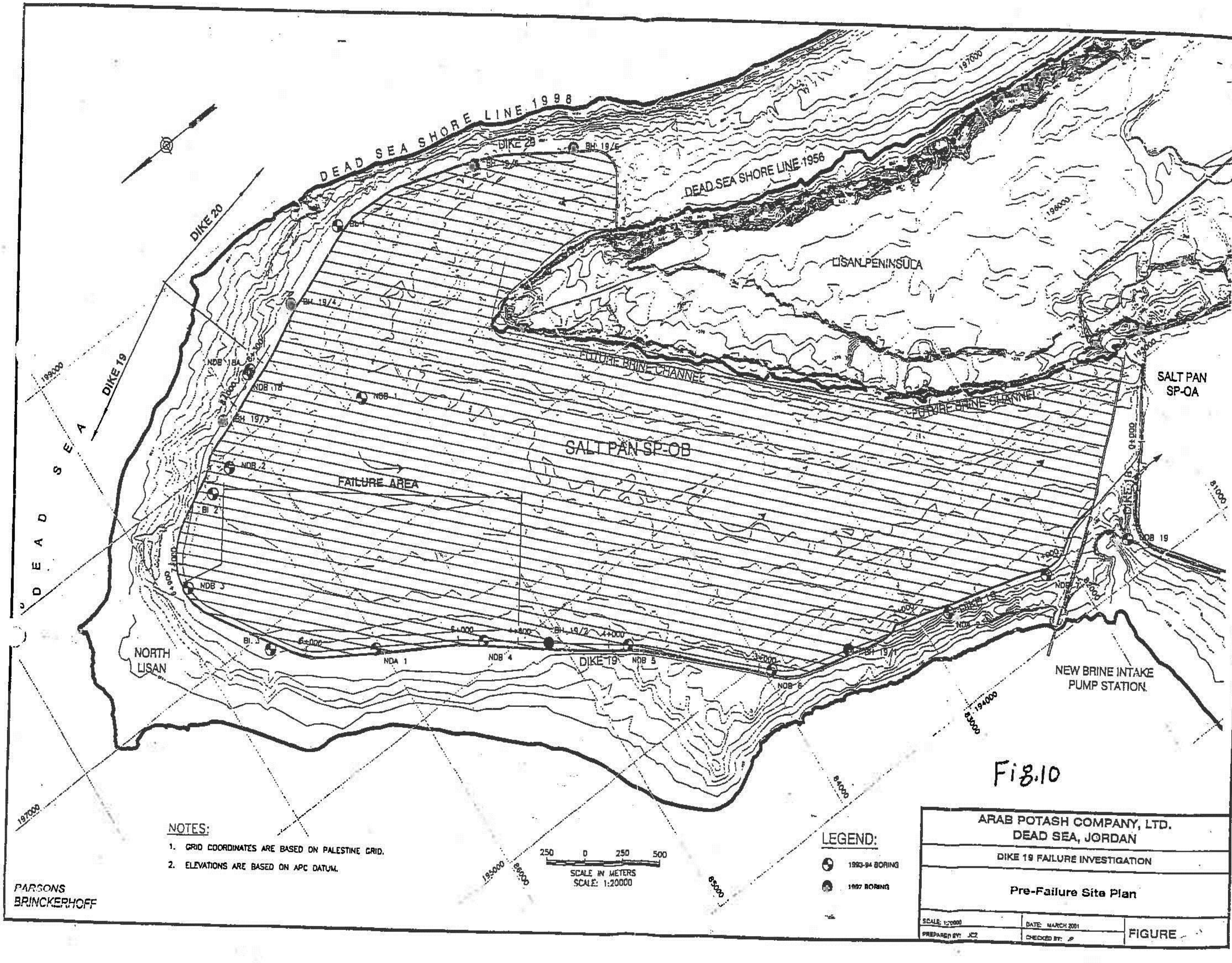


Figure 8. July 10, 1995 landslide at WESTP project, (a) the 2 to 8m deep scarp with the sliding surface along the moderately dipping stratum of plastic clayey marl underlying the jointed weathered limestone, (b) the heave at the toe of the rotational slide in the plastic clayey marl.

(a)

(b)

Figure 9. February 23, 1997 landslide at WESTP project, (a) the dislocation and separation of the gabion wall in the middle of the slide, (b) the standing undisturbed gabion adjacent to the displaced one with a dislocation of about 6 to 9m at the toe of the slide.


DEAD SEA SHORE LINE 1998
DIKE 20
DIKE 19
DEAD SEA
DEAD SEA SHORE LINE 1956
LISAN PENINSULA
FUTURE BRINE CHANNEL
SALT PAN SP-OA
SALT PAN SP-OB
FAILURE AREA
NORTH LISAN
DIKE 19
NEW BRINE INTAKE PUMP STATION
Fig.10
NOTES:
1. GRID COORDINATES ARE BASED ON PALESTINE GRID.
2. ELEVATIONS ARE BASED ON APC DATUM.
SCALE IN METERS
SCALE: 1:20000
LEGEND:
1993-94 BORING
1997 BORING
ARAB POTASH COMPANY, LTD.
DEAD SEA, JORDAN
DIKE 19 FAILURE INVESTIGATION
Pre-Failure Site Plan
DATE: MARCH 2001
FIGURE
PARSONS
BRINCKERHOFF

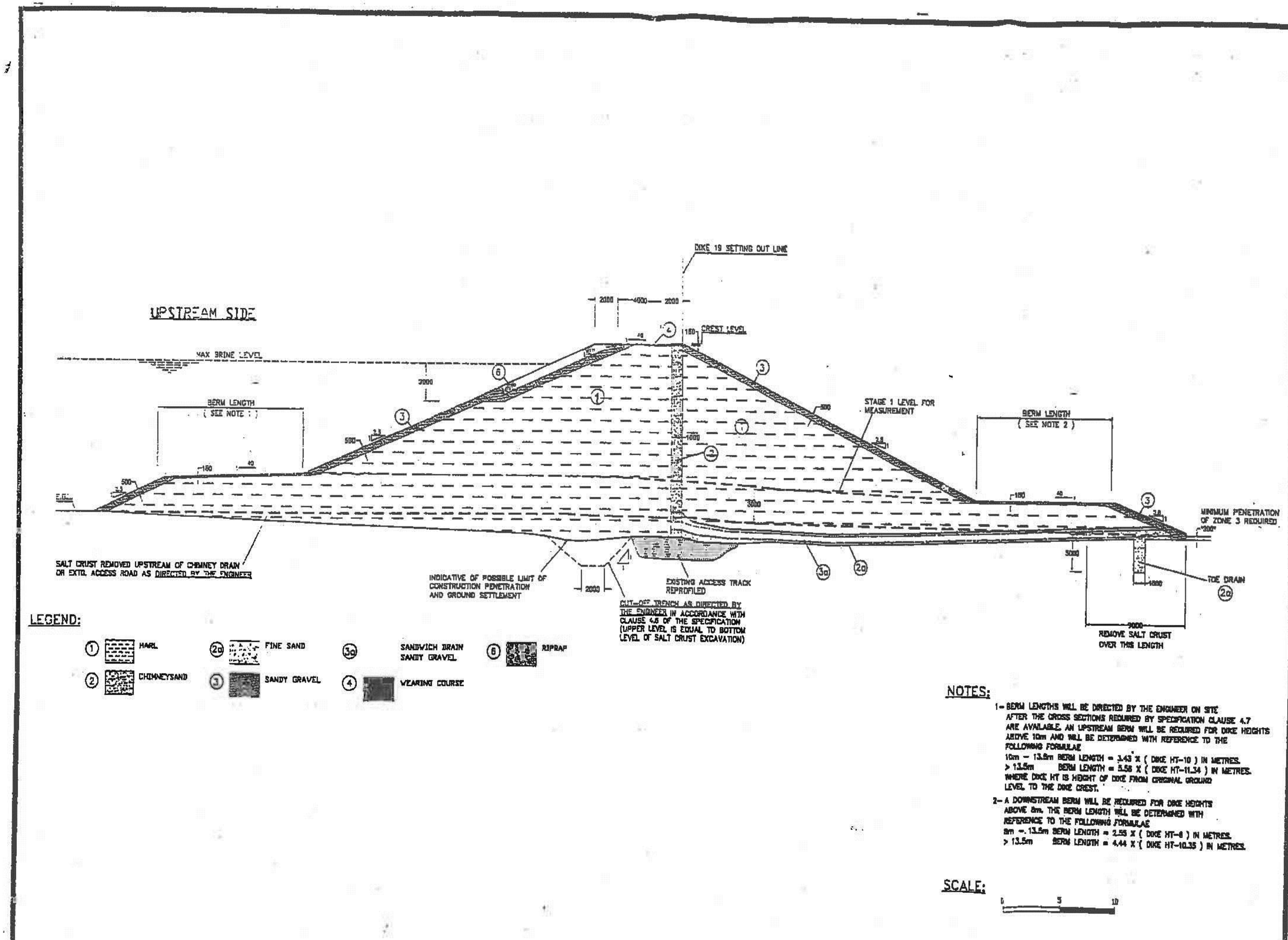


Fig.11 DIKE 19 CONTRACTUAL CROSS SECTION

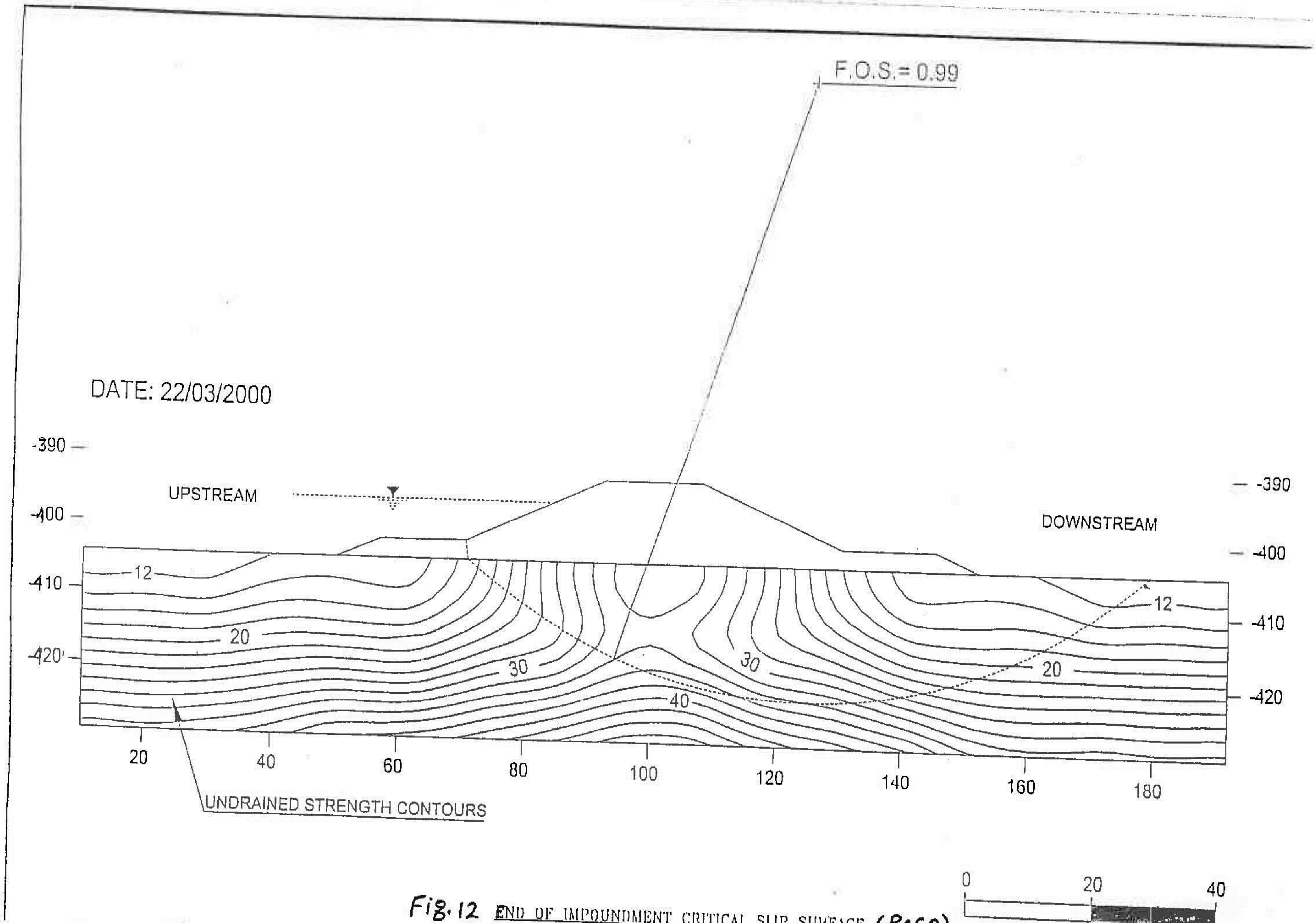


Fig. 12 END OF IMPOUNDMENT CRITICAL SLIP SURFACE (Ref. 2)

Not to Scale

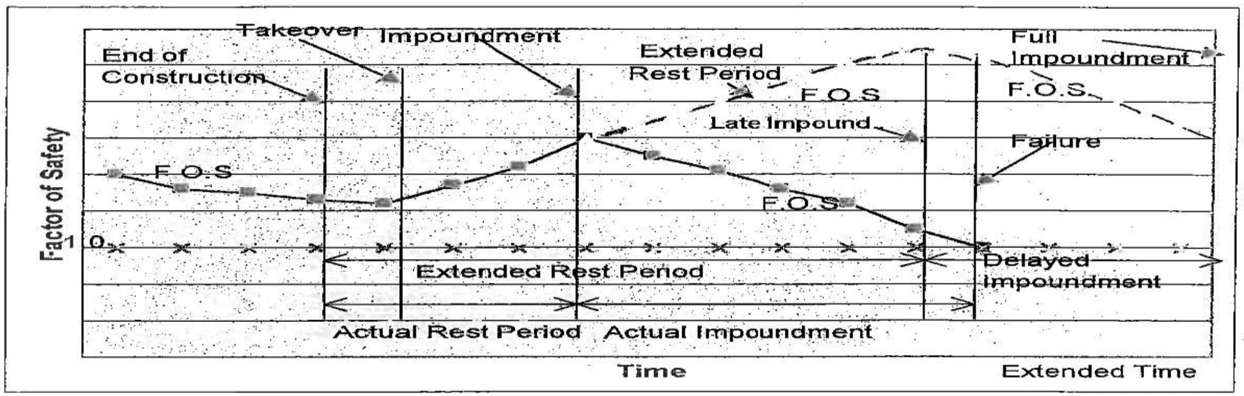


Fig. 13

An illustrative sketch that shows how the F.O.S. started to increase during the rest period and started to drop during impoundment until it reached 1.0 at time of failure. It also shows how an extended rest period and slower impoundment could have saved the dike with F.O.S. higher than 1.0 at full impoundment.