The Undrained Shear Behaviour of Cohesive Soil at High Stresses

Brendan Casey, Massachusetts Institute of Technology

ABSTRACT

Normalized undrained strength and friction angle decrease with increasing stress level (Fig. 1). A particular emphasis of the current study is the effects of end restraint caused by the use of conventional fixed ends in the triaxial device (rough porous stones at the top and bottom of a specimen). Fixed ends cause non-uniform stress and strain conditions to develop within a specimen during shearing. Smooth (lubricated) end platens reduce end effects, resulting in lower and more reliable pore pressures measured during undrained shearing. This changes the form of the effective stress path, particularly for overconsolidated soil (Fig. 2). The use of conventional fixed ends generally results in an underprediction of undrained strength and can also encourage the development of slip surfaces in specimens.

CLICK ON IMAGE FOR LARGER VIEW

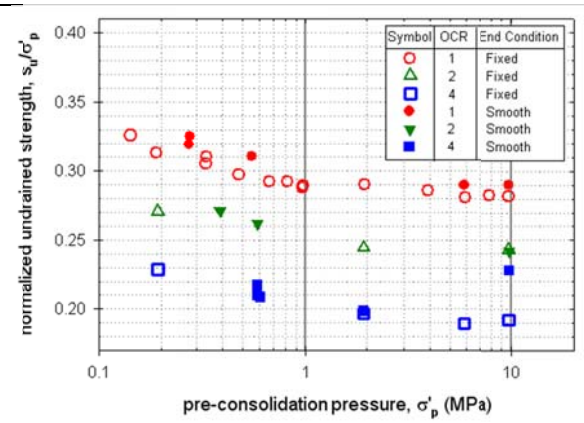

Fig.1: The variation in *normalized* undrained strength of Resedimented Boston Blue Clay as a function of stress level and specimen end condition. Undrained strengths are normalized with respect to pre-consolidation pressure

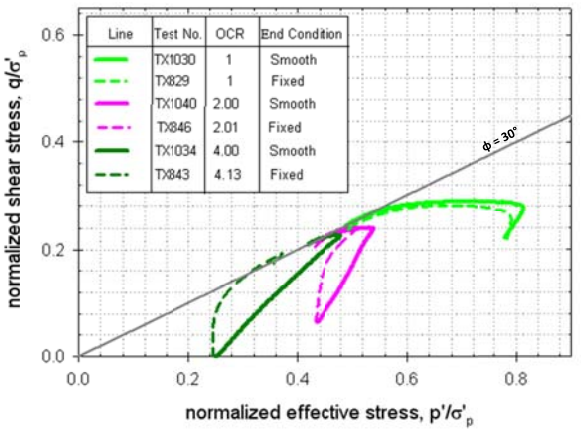

Fig.2: Normalized effective stress paths for undrained shearing at overconsolidation ratios of 1, 2 and 4 as measured in tests performed using smooth and fixed ends. The stress paths are drawn in MIT q-p' space and all are normalized by the same pre-consolidation pressure of 10 MPa

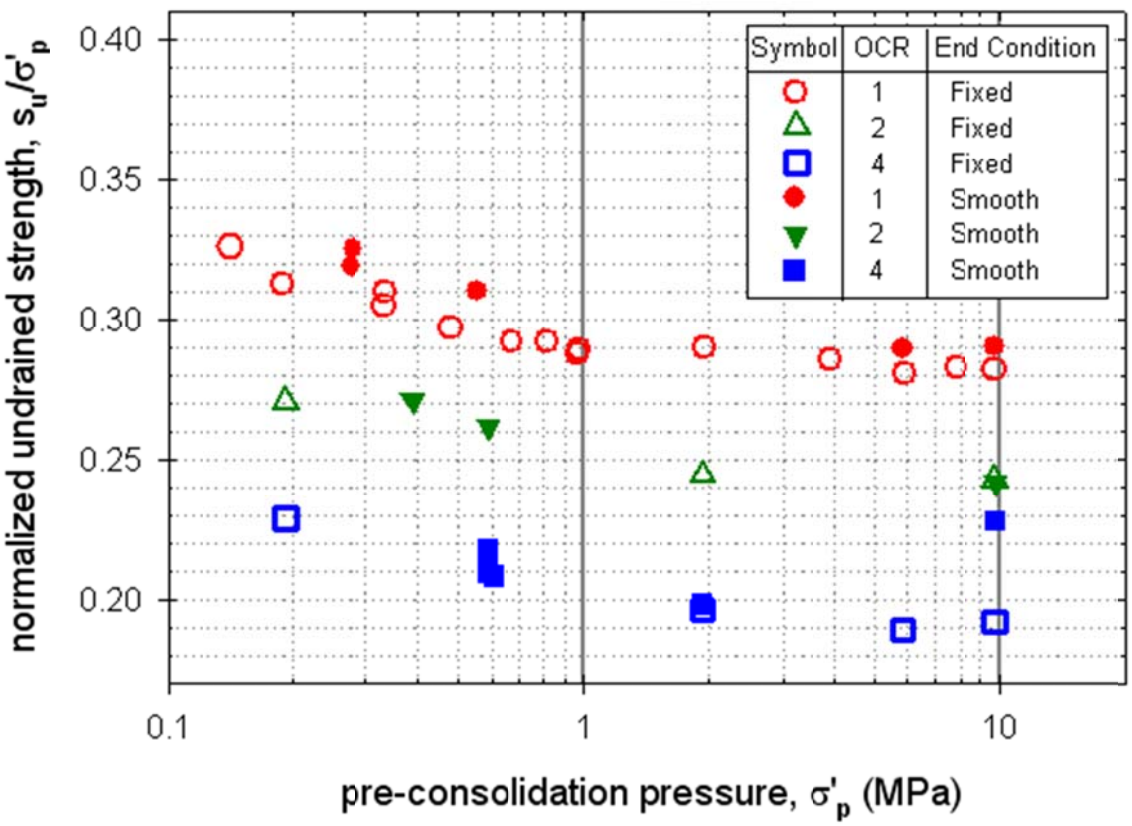

Fig.1: The variation in *normalized* undrained strength of Resedimented Boston Blue Clay as a function of stress level and specimen end condition. Undrained strengths are normalized with respect to pre-consolidation pressure

Back

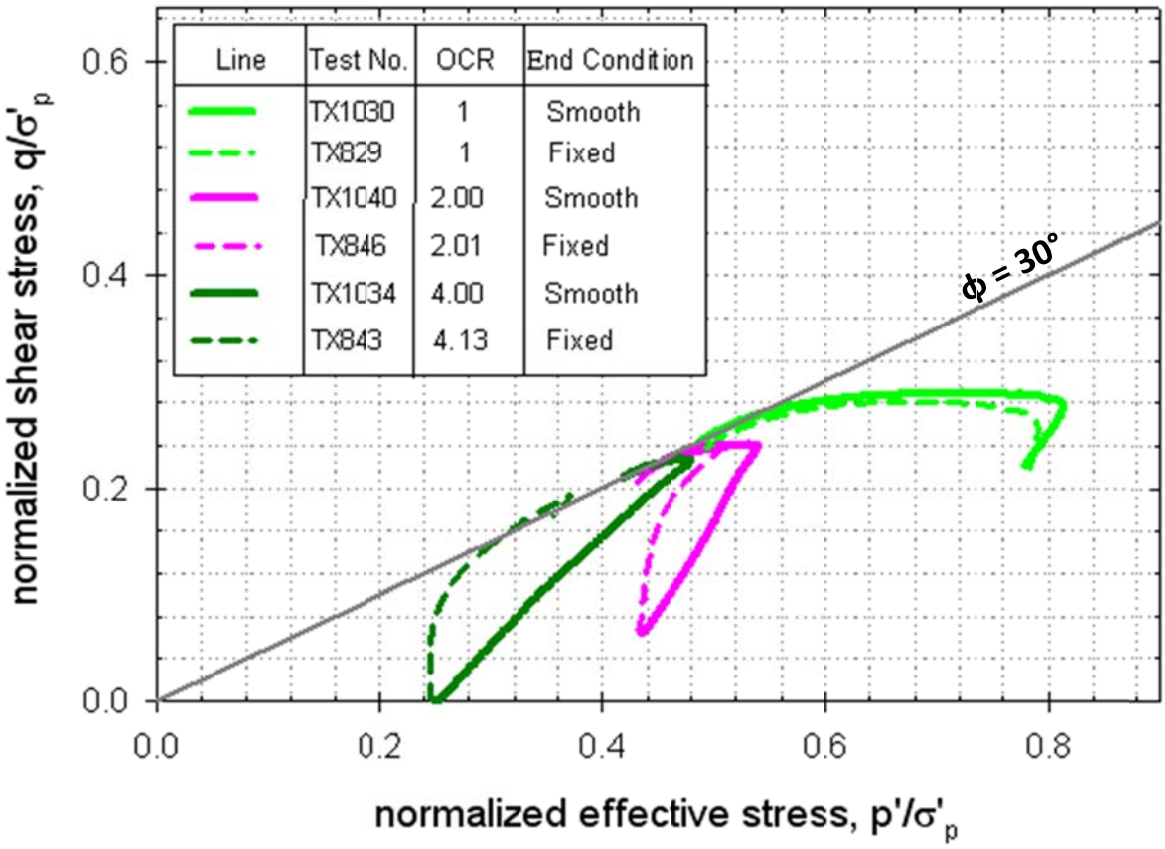

Fig.2: Normalized effective stress paths for undrained shearing at overconsolidation ratios of 1, 2 and 4 as measured in tests performed using smooth and fixed ends. The stress paths are drawn in MIT q-p' space and all are normalized by the same pre-consolidation pressure of 10 MPa

Back