CHAPTER I

INTRODUCTION

The increasing use of folded plate structure in the form of inverted floor system is expected in the near future due to the fact that the inverted channel section leads to economical and practical design. Presently this type of structure is designed without a rigorous method and often results in too large or too small sections which are unnecessary or unsafe respectively. Several techniques of analysis have been developed. GAAFAR[1], SCORDELIS[2] and MEEK[3], among others, suggested approximate methods for analysing simply supported prismatic folded plate. Reviews of the various methods can be found in the report of the ASCE Task Committee on folded plate construction.[4] ALLEN and SEVERN[5] suggested the method for analysing this type of structure by an analysis of the horizontal element according to thin plate theory and an analysis of the vertical element, treated seperately, by the theory of simple bending. The fact that these elements are actually integral with each other is then recognised by enforcing displacement and strain compatibility at the junction.

The objective of this study is to develop an accurate and efficient method of analysis of inverted channel floor units simply supported at the two ends and subjected to uniformly distributed load on the horizontal plate as shown in Fig.1. By the proposed method, the element in the horizontal plane is treated as a thin plate subjected to combined bending, due to normal load component, and in-plane forces and the vertical element

as a thin plate subjected to combined bending, due to small deflections, and in-plane forces, The solution of an inverted channel floor unit analysed by this proposed method is obtained. Numerical examples are worked out and the effects of various thickness and depths are shown. Comparisons of the results between the proposed method and the simple bending theory are presented and the accuracy of the effective width specified in the ACI code[6] for conventional flexural analysis is also evaluated.