$$X_1 = 1.80\ c^{0.32}\ \ell^{0.59} \qquad (5\text{-}20)$$

The average error [Eqn. (5-18)] of this fit was 7.37%. Expressed in terms of Westergaard's variables, the best fit is:

$$X_1 = 1.90\ (a_1)^{0.31}\ (\ell)^{0.60} \qquad (5\text{-}21)$$

with an average error of 7.36%. Using (F,G,H)-values of (2.10,0.50,0.50) yielded an average error of 9.69%, while Westergaard's [8] equation with (2.00, 0.50, 0.50) produces an average error of 11.28%. The best-fit equations indicate that the influence of the radius of relative stiffness, ℓ, is much greater than that of the size of the loaded area. Westergaard's equation suggests that these two parameters contribute equally in the determination of X_1.

5.6 RECOMMENDATIONS FOR ILLI-SLAB USERS

The following recommendations for future users of ILLI-SLAB can be formulated as a result of investigations presented in this Chapter:

1. The load(s) must be placed over the finite element mesh with at least one node at the anticipated location of maximum response. For example, in the case of interior loading, a central node must be provided. Otherwise, the results must be carefully interpreted. Any peaks in response missed by the finite element analysis because of node spacing, must be

reconstructed;

2. The finest mesh practicable must be used. Accuracy of 99% can be expected if the element size, 2a, is about 0.8 times the thickness of the slab. There is no gain in making the mesh any finer than this, although correct answers will be obtained with finer meshes too. Computer resources are more efficiently utilized if element aspect ratios are improved, as per Recommendation 4, below, instead. A fine zone equal to twice the size of the loaded area(s) is recommended, with progressive decrease in fineness outside this area;
3. The convergence characteristics of the work equivalent uniform subgrade `WINKLER' model (option IST=6 in modified ILLI-SLAB) are slightly better than those of the `SPRINGS' option (IST=7 in modified ILLI-SLAB). The latter option should only be used for research purposes;
4. Element aspect ratio should be kept close to unity, particularly in a region around the loaded area(s), extending to three times the radius of the loaded area. Within this region, this recommendation is a requirement. If at all possible, no element aspect ratio should be greater than 4 or 5, anywhere in the mesh.

These recommendations apply to all three fundamental loading conditions, viz. interior, edge and corner loading. Some of the meshes used in this study were designed before these guidelines were established, and illustrate that a compromise is often necessary.