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Notre souhait est que cette assemblée malgré le manque de communications à ce sujet ne se sépare pas aujourd'hui sans avoir reconnu que nous avons un problème immédiat de sécurité à résoudre, que ce problème est d'un intêret très pratique on peut même dire vital, et surtout de reconnaitre aussi qu'il existe des solutions possibles et pas très onéreuses, qu'il faut essayer d'adopter, et auquelles il faut à notre avis très sérieusement réfléchir.

VII

Load Factors in a Proposed Norwegian Standard Specification

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So far, Norwegian standard specifications for structural design have been based on the concept of allowable stresses. An exception is the code for prestressed concrete, which includes an ultimate limit state analysis.

Most of our standard specifications for design of structures in various materials are at present under revisjon. At the same time a new code for calculation of loading [1] is under preparation. Thus the time was found suited for introduction of a unified limit state approach, and load factors have been included in a tentative version of the loading code. The load factors given are intended to allow for abnormal and unforeseen loads and reduced probability of combinations of loads. Thus, the load factors include the product of γ_{s1} and γ_{s3} described in [2], p. 17.

Two sets of load factors are given as shown in Tables 1 and 2, both of which include three different combinations of loading.

The abbreviations used in the tables are:

D dead load (weight)

L live load

W water (liquid) pressure

S earth pressure

O ordinary loading (occurring frequently or for longer periods)

E exceptional loading (occurring occasionally with larger intervals, or seldom occurring with the characteristic value)

Table 1 gives values for an ultimate limit state, whereas Table 2 gives values for a serviceability limit state. The values in Table 2 are also intended for use in combination with allowable stresses in the transition period until the various design specifications have been revised.

A load factor of 1.0 for earth pressure has been used for the ultimate limit state. The cause is that there is no linear relationship between the magnitude of earth pressure and the magnitude of for instance angle of friction. Thus, the whole factor of safety must be taken in the strength reduction coefficient γ_m (compare [2]) for this case. In spite of the lack of linearity, a factor of 0.8 has been introduced for earth pressure in Table 2.

If two or more exceptional loads occur simultaneously, the

largest one is to be multiplied by the load factors given in the tables, whereas the remaining ones are reduced by 30 %.

REFERENCES

1. The Norwegian Council for Building Standardization. Calculation of Loading NBR F 8/69, Oslo 1969.

2. Rowe, R.E.: Safety Concepts, with Particular Emphasis on Reinforced and Prestressed Concrete. Symposium on Concepts of Safety of Structures and Methods of Design. London 1969.

LOADING	LOAD FACTOR FOR				
	D	L	W	S	E
0	1.3	1.7	1.1	1.0	-
D+E	1.3	-	-	-	1.5
0+E	1.04	1.36	0.88	0.8	1.2

TABLE 1

LOAD FACTORS FOR THE ULTIMATE LIMIT STATE

LOADING	LOAD FACTOR FOR				
	D	L	W	S	E
0	1.0	1.0	1.0	0.8	-
D+E	1.0	-	-	-	1.0
0+E	0.8	0.8	0.8	0.64	0.8

TABLE 2

LOAD FACTORS FOR THE SERVICEABILITY LIMIT STATE