General report

Béton armé et béton précontraint
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General Report

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Va. Connection Methods

The subject under consideration has been elucidated considerably by the contributions made in connection with the Stockholm congress. The main points of the corresponding papers will be reviewed in what follows.

D. McHenry and A. H. Mattock give in their paper a most valuable report on very extensive investigations of precast prestressed constructions made at the PCA Research and Development Laboratories in USA. The tests dealt with individual girder-slab members, and included studies of continuity performance, horizontal shear, diagonal tension, flexural strength, creep and shrinkage effects, and reverse bending. Then a complete two-span, two-lane bridge was constructed on a half scale in the laboratory and tested to failure.

The test results were in every respect favourable to the pre-cast, prestressed construction system under consideration. Continuity from span to span of the precast girders was obtained by the use of diaphragms at the girder ends, together with a situ-cast deck slab in composite action with the girders. The deck contained deformed bar reinforcement to carry the negative moments at

intermediate supports. This simple connection of the precast girders gave a degree of continuity of about 90% for live load.

The authors state at the beginning of the paper that continuity between adjacent spans of bridges leads to well-recognized advantages. And finally they state that application of this type of connection to building construction as well as to bridge construction results in sounder and more economic structures than those made from precast concrete members which do not utilize continuity.

The interested reader is referred to a series of PCA Development Department Bulletins containing detailed reports on the investigations and aspects on design criteria.

D. H. NEW gives in his paper some comments on the paper by CASADO and GOÑI. He emphasizes that careful attention must be focused on the necessity of developing joints that give adequate strength and rigidity combined with economy and speed erection. He explains his points of view in discussing three cases of detailed connection joints shown in the author's paper. NEW also emphasizes a statement in the General Report that the Designer should design any unit for handling in all its stages of manufacture and erection and not merely in its final position.

C. F. CASADO gives a short answer to Mr. NEW, with some supplementary information.

H. ZEIDLER describes in his paper a system which has successfully been used in the erection of a 10-storey hospital building. In each storey, pairs of reinforced concrete members were set up as half frames opposite each other, and were supported in the middle of the structure by a latticed steel column. The steel column in the first place served as an auxiliary mounting scaffold but was later enclosed in a situ-cast concrete column then serving as reinforcement. Simultaneously the half frames became monolithically connected with the column. The author of this paper wishes to draw the attention to the possibility of combination of steel constructions with precast reinforced concrete structural units.

E. LEWICKI announces in his contribution some trends in the practice of the last four years while commenting a survey of different connection joints that the author had published at the Lisbon congress 1956. The author considers that additional arrangements to make connection joints rigid for full continuity should be restricted only to cases where this is absolutely necessary. The reason is saving in cost and in time for erection. It is seen that this attitude is somewhat contradictory to that of the authors above.

Conclusions

1. Careful attention must be focused on the necessity of arranging supports for, and connection joints of, precast concrete members that give adequate strength and rigidity combined with economy and speed of erection.

2. The Designer of precast concrete units must co-operate with the Fabricator and the Erector, and must consider fully manufacture, handling off the casting beds, transport to site, safety during lifting, and erection.
3. Continuity between adjacent spans leads to well-recognized advantages, e.g. less field moments, less deflections, less sensitivity to secondary influences, such as eccentric loadings or eccentric supports.
4. Expansion joints or shrinkage joints are in some cases necessary.
5. Supports and connection joints without continuity, but with adequate fixing and stability, are often quite satisfactory.
6. Many examples of details from precast building constructions are given and discussed from practical points of view.
7. The possibility of a combination of steel constructions (used as auxiliary mounting scaffolds later enclosed in concrete) and precast reinforced concrete structural units should be considered for special cases.
8. In a single paper, by McHENRY and MATTOCK, very extensive experimental investigations on the properties of connection joints are reported. Further studies of that kind are highly desirable.

Vb. Redistribution of Stresses due to Creep

In the paper by J. N. DISTEFANO the author treats in principle the problem of calculating the deflections of a concrete beam under loading, resting on a continuous bed of visco-elastic material. In this case there will be visco-elastic deformations both in the beam and in the bed. In particular, the author makes different assumptions regarding the influence of age of concrete on the creep function. The author is of the opinion that this influence is considerable for situ-cast constructions but that it is less pronounced for precast units long-time-stored before use. For the latter case the author has made explicit calculations and confirmed the correctness of the classical method of using a reduced elastic modulus.

It has been advisable not to formulate any conclusions regarding theme V b but only to refer to the General Report.

Note. In accordance with the proposal made in the General Report, a subcommittee of the IABSE Working Commission III was created during the Stockholm congress in order to study more systematically problems connected with prefabricated structures.

Rapport général

Va. Moyens d'assemblage

Les communications présentées au congrès de Stockholm ont largement contribué à éclaircir le problème des moyens d'assemblage. Nous allons passer en revue les points principaux des mémoires y relatifs.