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## Design to Suit Local Physical, Social and Legal Conditions

Importance des conditions locales d'ordre topographique, climatique, social et juridique

Anpassung an die örtlichen topographischen, klimatischen, gesellschaftlichen und rechtlichen Gegebenheiten

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**SUMMARY**
It is suggested that the design should aim at the use of indigenous material and labour so far as possible. Planning should avoid the creation of excessively large conurbations; design of dwellings should take into account social customs and practices. Flexibility for change in the future should be maintained. The inhibiting effect on development of bridges inadequate in strength to carry heavy loads is discussed. The designer is advised that one of his duties is to ensure there is a clear understanding between him and the client on all matters and that he has a sufficient knowledge of the relevant civil and criminal law.

**RESUME**
Il est suggéré que les projets tiennent compte d'une utilisation de matériaux et main d'oeuvre indigènes autant que possible. La planification devrait éviter la création de trop grands complexes urbains; la conception des logements devrait tenir compte des coutumes et des habitudes locales. Une certaine flexibilité pour des changements futurs devrait être maintenue. L'évolution dans la construction de ponts et la conséquence de leur construction trop faible pour supporter de grandes charges est évoquée. L'ingénieur a intérêt à s'assurer qu'une compréhension totale existe entre lui-même et son client et à avoir une connaissance suffisante des lois civiles et pénale locales.

**ZUSAMMENFASSUNG**
Es wird vorgeschlagen, dass für das Projekt so weit wie möglich einheimisches Material und einheimische Arbeitskräfte verwendet werden. In der Planung sollte das Schaffen von zu grossen Stadtkomplexen vermieden werden; beim Entwurf von Wohnungen sollten die örtlichen Sitten und Gewohnheiten berücksichtigt werden. Eine gewisse Flexibilität hinsichtlich zukünftiger Änderungen sollte aufrechterhalten werden.
Die Entwicklung von Brückenbauten, deren Tragkraft zu schwach ist, wird hervorgehoben.
Der Ingenieur tut gut daran, sich zu vergewissern, dass ein klares Einverständnis zwischen ihm und seinem Klienten herrscht, er sollte auch die örtlichen zivil- und strafrechtlichen Gesetze genügend kennen.

The prime object of technological development in any country must be the improvement of the standard and quality of living of the citizens of that country; not just improvements in the long term, but also in the short term, and indeed so far as is possible some improvements which are immediate in their effect.

Development should also be directed towards achieving the maximum return for the minimum outlay in terms of the country's capital resources.

Towards these ends planners and designers should, before committing their schemes to the drawing board, make a thorough study of materials indigenous to the country with the object of exploiting these so far as is possible. In doing so it will also be essential to consider what the effect of this exploitation will have on these material resources; is there a danger that they may become rapidly exhausted, and if so, what are the consequences? Can measures be taken to replenish them or can new resources be introduced in a way that does not cause serious social inconvenience and distress, a diminution of the standard and quality of living, even in the short term.

One of the most important of a country's resources is the skills and labour of its citizens and again, so far as is possible, construction should be directed at using this to the utmost. Taking an overall view this is the most economical approach for the country concerned and one that will provide early benefits for its citizens. Moreover, in using indigenous materials the indigenous population is likely to have a knowledge and understanding of them which may be traditional, but will certainly be founded on experience.

It is not, of course, necessary or desirable that no further sophistication of materials or techniques should be introduced; on the contrary, where improvements in either can be adopted from the technologies of other countries this should be done, but done at a pace which can be absorbed and retained within the country concerned so that it will not continue to be dependent on skills from outside. There are certain projects which will call for the extensive importation of materials and plant. Where this is so it should be regarded as an essential part of the design exercise to ensure that in the shortest term possible the continued reliable functioning of the project can be maintained by the indigenous population.

It may be felt that these strictures make excessive demands on the designer, calling for studies and in many cases "in depth" consultations with specialists in other fields, but design in this context is considered to be a very broadly based exercise going far beyond the simple matter of calculating and specifying a structure which is adequate in strength and capacity.

In the design of dwellings and communities it is again of the utmost importance that existing social customs and practices should be thoroughly studied and taken into consideration. There has been a great deal of experience in the developed countries of the ill effects of a designer imposing a style and concept of a suitable dwelling entirely at variance with that desired by the potential user. The result of that can be dissatisfaction and a growth of resentment which may lead to a variety of undesirable consequences. It is also evident that the growth of cities into vast conurbations has brought about undesirable social, administrative and economic consequences. While there are situations where this may be unavoidable there are as many and more where development can be planned on the basis of numerous small or moderate sized cities, and this despite the growth of population.

If the rational of small or moderate sized cities is adopted this would permit several advantages to be exploited:

1) A gradualist change in the style of living which would avoid the severe shock to a population of becoming too rapidly urbanised in conditions which inevitably create acute poverty and misery.

2) It is suggested that housing in such new cities should be based initially on traditional methods of construction or, at least, on techniques which do not call for the introduction of expensive new materials or techniques not quickly or readily absorbed by the people. Built for a fairly short life, say 15 to 30 years, this would lead to;

3) Economic initial construction and the provision of improved housing within the means of the people, together with a spread of development costs over a longer period of time.

4) Flexibility in the future for replanning and redevelopment as the need arises, together with the opportunity to provide a progressive improvement in housing. It is becoming more and more obvious that we cannot anticipate what circumstances and needs are likely to prevail much more than 20 years ahead. Our very large cities are being strangled by their own existence, the considerable permanence of their structures and the enormous social and economic costs of altering them. It is an important element of good design that so far as is possible it should not inhibit future development and improvement.

5) The adoption of the solution of well dispersed moderate sized cities would, it is considered, help to avoid the excessive urbanisation of populations and to maintain a greater proportion in essential rural occupations. The benefits made possible by the existence of cities would be brought nearer to those living in rural areas and made accessible.

Bridges, the structural aspect of surface communication require special consideration. In many instances the development of areas in even the so-called developed countries is inhibited by the inadequate strength of bridges. It is clearly more economical to transport goods, whether by road or rail, in vehicles with a laden weight of 30 to 40 tons, rather than in vehicles half that weight. What is often not so readily noted is that the construction of, for instance, electricity generating plant can be greatly reduced if such elements as transformers can be transported to site in a finished condition as loads of the order of 250 tons. The same order of magnitude of load may be required for many industries likely to be called for with further development.

The cost of bridges other than very short span ones is scarcely affected materially if they are designed to carry these very heavy loads with the temporary exclusion of other traffic while they are crossing. The cost of this sort of bridgeing for a long life of say 100 years is again no different from that where a much shorter life may be aimed at. In these circumstances it is clearly of the greatest overall economic benefit to build new bridges capable of carrying these substantial loads unless it is quite clearly obvious that this will not be required within the currency of the life of the bridge.

On the other hand it is recommended that when considering the volume of traffic to be carried, only fairly short term forecasting of the order of around 20 years should be adopted. Building bridges to a greater width than is required does substantially increase the cost and in due course it may well be found that it was unnecessary, or, as has happened quite frequently when the time came the extra width provided was quite inadequate, or that it was desirable to move the route to another location, so that the extra expenditure incurred was wholly wasted. If, at the end of 20 years it has become necessary for additional construction to be

provided, the community will have had the use of the money saved and the existing bridge will have earned its own cost either from tolls or in benefits to the society concerned.

In dealing with other aspects of the infra structure being brought into being the same sort of considerations as have been briefly mentioned for bridges ought to be carefully examined.

There are great differences in the civil and criminal laws of various countries and the person who commits himself to an undertaking without making himself fully aware of these before becoming obligated does so at his peril. The client and the authorities in any country quite naturally expect people working in these countries or being responsible for the execution of undertakings there to conform with the laws of the country concerned.

There are certain measures which can be taken by agreement which can provide that the designer or constructor will be able to work under familiar legal constraints; these relate to the law of contract where the terms of the contract and the courts under which these are to be interpreted may, with the full agreement of the other party, be specified. It is essential in contracts between parties in different countries that this should be done. Such an arrangement,however, relates wholly to the obligations between the two parties. These arrangements are generally well executed for the construction part of the undertaking and the contract drawings, specification, etc., form the description of what is being undertaken. The design contract can and does frequently fall far short of this. Being the outcome, as it should be, of much discussion between client and designer a good deal is often left unrecorded. It is essential that a full and clear brief should be prepared and agreed by both parties describing what is the subject of the contract and specifically what is not covered by it. For instance, after completion and handing over of the construction it has been known for alterations to be made to a structure which brought about its collapse. It should be made clear that the designer is not responsible for such a mishap where it is the outcome of wrongful use. It may seem absurd to suggest that this should be done, but many of the difficulties which arise between client and designer or contractor stem from lack of adequate communication. The client has one sort of expertise and conducts his affairs under the laws of his country; the designer or contractor has an entirely different sort of expertise and is ordered by his country's laws. To both, these are so innately part of life that they respond to their respective disciplines almost like Pavlov's dogs - that is to say as a reflex action. These differences can and do lead to serious misunderstandings and these are made all the more likely because of language differences. Not two languages exactly parallel each other; members of I.A.B.S.E. committees will know well how, even within one discipline, it can be extremely difficult to arrive at an identity of meaning in different languages. It is for these reasons that the preparation of an extremely carefully prepared document describing the object, the obligations and responsibilities should be drafted and that it should deal explicitly with those matters which one or other of the parties consider is so obvious as not to be worth mentioning. It is also important that which party is to be responsible for the legalities of the project should be clearly defined at the outset. So far as language difficulties are concerned it is a wise precaution to have any documents of importance translated from language A to B and then independently translated from B to A.

Beyond that, however, it remains that a party's civil liabilities to the public at large and to authority will in the main be in accordance with the laws of the country and that its criminal law will also apply. It would be a wise precaution to associate with some engineer practising and experienced in the country concerned and to obtain the advice and guidance of a lawyer who has some knowledge of the law as it relates to the kind of project contemplated.