A Concrete Code for Africa

Jan A Wium
Professor
University of Stellenbosch
South Africa
janw@sun.ac.za

Jan Wium, born 1957, received his BScEng from the Univ. of Pretoria in South Africa and a PhD from the EPFL in Switzerland. He specializes in design and analysis of reinforced concrete structures.

Ali S. Ngab
Professor,
El Fatah University, Tripoli, Libya
ngab@acmc-ngo.org

Ali S. Ngab, born 1950, received his Ph.D in Structural engineering from Cornell Univ. MS from Pennsylvania State University. He specializes in the behaviour and design of reinforced concrete structures.

Summary

Many countries in Africa use either foreign developed concrete codes or no codes at all. This paper presents the process for the development of a concrete code for Africa (The African Concrete Code: ACC). The code will use existing international codes as reference documents, but will reflect the materials, construction practice and local environment of the African regions. The basis of design and durability aspects will receive special attention in the development of the code. A working group structure has been created, consisting of African participants and international specialists. The task is now to compile information about the African continent which will include climatic and environmental regions, materials information, level of technology and training, and construction practices. Decisions are also needed on the scope of the code, both as it relates to structures and loading. The process started towards the end of 2005 and a date of 2010 has been set for the preparation of a first draft.

Keywords: Africa, climate, concrete, construction, design code, durability, environment, materials, technology.

1. Introduction

In order to support its economic growth, Africa needs to develop its infrastructure in this twenty first century. Nowadays, in Africa there are various standards and codes for the design and practice in concrete and concrete structures. Some African countries developed their own codes based on international and accumulated local experience. Other countries adopted international foreign codes, whereas, many countries have neither a local code nor an adopted one.

Obviously, foreign codes reflect the source of their making. Codes that are developed in Europe, America or Asia reflect the material quality, technological level, climate and economic conditions of these regions, and may be inappropriate for direct application in another region of the world.

This paper provides an overview of the process for the development of a concrete code for Africa. It provides the background to the code development initiative and provides an appraisal of the African continent. The paper highlights two aspects that need special attention, namely basis of design and design for durability. An overview is presented of possible reference codes, and finally, the status and progress of the initiative is reported.

2. Background

A committee was founded in 2005 with the intention to start the task of drafting a new concrete code for the whole region of Africa. A target date of 2010 for a draft code was provisionally set. To help this African concrete code committee achieve its goals, an international advisory committee was established. The African concrete code committee would start the process of drafting a new
Improving Infrastructure Worldwide

code over a period of five years through additional technical subcommittees in Africa. It was decided that the new code would use well established international codes such as ACI-318 and Eurocode-02 as reference codes.

3. An appraisal of the vast and varied continent of Africa

For the development of the African Concrete Code, the broad continental climatic regions need to be grouped into regional zones which can be used as reference by designers and specifiers.

In many African countries, steel and cement are imported from abroad. Labor cost in these countries is much cheaper than developed countries. Therefore, design and construction practices adapted in developed countries which aim to minimize cost of labor at the expense of using more materials may not yield economical designs in African poor countries. Although the specifics may differ for the African context, the development of the frame-works for the Eurocode and the Asian code are good examples to be followed where multi-country approach can be successful to insure safety, serviceability and durability of concrete infrastructure.

4. Special aspects to be considered

Considering the specific diverse nature of the continent, and in line with the development of other international codes, two aspects of the code will need to receive special attention. These are:

- the basis of design
- design for durability

5. Development and objectives

The goal of the African Concrete Code is the development of a regional standard that will insure the optimized design objectives for concrete structures in the continent. These design objectives include safety, serviceability, durability, constructability and service life. Ideally, these objectives have to be fulfilled in accordance with local environment and local practice leading to sustainable concrete practice in the region.

Early in 2006 five working groups were identified and requested to report on the scope, contents, and background for the code at the African Concrete Code symposium held in November 2006 in South Africa. These working groups are: Basis of design, Materials, Durability, Design, and Seismic loading design.

Certain issues now need to receive attention in order to take the code development initiative further. Some of these will have short term and longer term ultimate targets and are identified as follows:

- Decisions are needed on the scope of the code
- A framework or proposed table of contents needs to be drawn up.
- A database with information about African practice and conditions is required.
- Broad participation and consent is needed from across the continent.

6. Summary and Conclusion

Decisions are now required on the reference documentation to make the most use of existing knowledge and developments. A framework is being developed which will direct technical committees and enable them to work in a coordinated and harmonized approach. Important aspects are now to obtain broad participation from across the continent and internationally, and to compile information on typical environmental and construction characteristics in Africa. Finally, a realistic timetable with achievable milestones will be drawn up for the process of establishing a Concrete Code for Africa.
F5 Infrastructure as a Unifying Concept