Toni Bredeveldt, Mark Alexander, & Paul Bowen

The acceptability of concrete block construction in low cost housing in the Cape Peninsula

Abstract

This article presents the findings of a research project examining the acceptabil-ity of concrete block construction for low cost housing in the Cape Peninsula in terms of materials and execution. Data were collected by means of a question-naire survey in which residents of low cost housing were interviewed. In addition, personal and telephonic interviews were conducted with key stakeholders from the construction industry involved in the delivery of low cost housing. The findings indicate that concrete block construction is being used extensively for low cost housing developments in the Cape Peninsula, owing to its defining characteristics such as ease of construction, affordability, durability, speedy delivery and acceptance. End-users are generally satisfied with the construction material used for the wall structure of their current houses. They are, however, dissatisfied with the workmanship of the construction, as they feel that problems such as cracking and damp have arisen because of hurried and incomplete construction. The end-users are aware that the wall structures are not plastered, but only bagged. Even without any formal or technical knowledge of building houses, they state that they should be involved in the planning and construction stages of their new homes with regard to funding and appearance in order to make these homes more affordable and acceptable. Despite a lack of technical knowledge of concrete technology, the respondents felt that the concrete block was the most accept-able form of construction material available for wall structures because of its per-ceived strength and durability.

Keywords: End-user satisfaction, concrete block construction, low cost housing, materials.

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DIE AANVAARBAARHEID VAN BOUBETONBLOK-KONSTRUKSIES VIR LAEKOSTE-BEHUISING IN DIE KAAPSE SKIEREILAND

Met hierdie artikel word die bevindinge van 'n navorsingsprojek oor die aanvaarbaarheid van boubetonblok-konstruksies vir laekoste-behuising in die Kaapse Skiereiland in terme van materiaal en uitvoerbaarheid weergegee. Die menings van die inwoners van laekostebehuising is deur middel van 'n vraelys nagegaan. Persoonlike en telefoniese onderhoude is ook gevoer met alle betrokkenes in die konstruksiebedryf wat laekostebehuising verskaf. Die bevindinge dui daarop dat betonboublok-konstruksies op 'n groot skaal vir laekostebehuisinge in die Kaapse Skiereiland aangewend word weens die besondere eienskappe daarvan soos maklike oprigting, bekostigbaarheid, duursaamheid, spoedige aflewering en aanvaarbaarheid. Eindverbruikers is oor die algemeen baie tevrede met die materiaal wat in die oprigting van hulle huidige huise se mure gebruik is. Die inwoners is egter ongelukkig oor die betrokke vakmanskap. Hulle is van mening dat probleme soos barste en klam mure die gevolg is van oorhaastige en onafgeronde werk. Die eindverbruikers is bewus daarvan dat die mure nie gepleister is nie, maar bloot gesaksmeer word. Selfs sonder enige formele of tegniese kennis van die boubedryf, het hulle aangevoer dat hulle betrokke behoort te wees by die beplanning- sowel as konstruksiefases van hulle eie huise ten opsigte van befondsing en die voorkoms, om sodoende 'n bydrae te maak met betrekking tot bekostigbaarheid en aanvaarbaarheid. Ten spyte van die gebrek aan tegniese kennis van betonboubloktegnologie, glo die respondente dat betonboublokke die mees aanvaarbare konstruksiemateriaal vir mure is omdat dit sterk én duursaam is.

Sleutelwoorde: Eindverbruiker-tevredenheid, betonboublok-konstruksie, laekoste-behuising, boumateriaal.

Introduction

A review of the literature reveals that in many countries, and especially those regarded as developing countries, affordable or low cost housing has many negative connotations, perhaps linked to a historical association with unsafe and sometimes uninhabitable dwellings (Haupt & Coble, 2001). In South Africa, the overarching desire by the Government to reduce the overall cost per unit, while increasing the number of units constructed within a given budget, contributes to these perceptions (Haupt & Coble, 2001).

In improving housing for the poorer communities, constraints such as employment levels, income generation and access to housing, continue to be experienced in the provision of low cost housing. In South Africa, the income of poor communities has continued to be too meagre or unstable to permit commitment of their scarce resources to housing. Consequently, improvement of housing conditions becomes almost impossible, directly affecting the performance of the housing policy (Adebayo & Adebayo, 2000). For many years the lack of appropriate housing has continued to be a serious problem. It would seem that even with an increase in the housing subsidy amount, the goal of a permanent, complete dwelling remains an elusive one. Furthermore, poor

people who are eligible for the capital subsidy programme are also unable to afford the range of ongoing water, electricity and rate charges associated with formalised owner-occupation (Adebayo & Adebayo, 2000; Smit, 1998; Bentil & Herbsman, 1989).

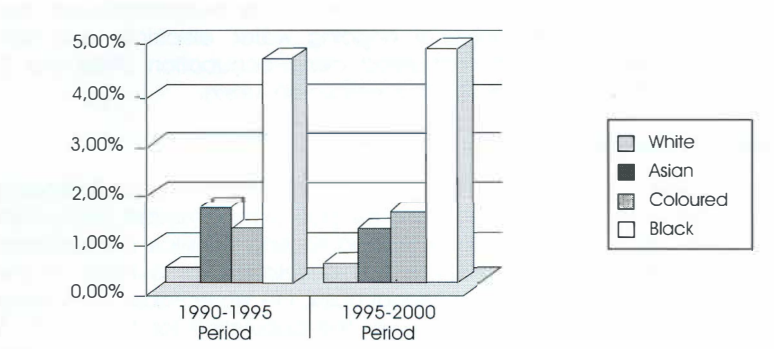
Growing population

During the 1980s and 1990s South Africa witnessed a continuing increase in population especially in the poorer communities (Beaumont & Brown, 1993). Looking at South African housing statistics, it is apparent that a serious housing problem has developed as a result of the increased population. On a national basis, the White Paper on Housing (Department of Housing, 1995) gives the population for 1995 as 42,8 million, with a projected growth rate of 2,27% per annum between 1995 and the year 2000. In terms of the number of households, this totalled 8,3 million in 1995 based on an average of 4, 97 persons per family (Department of Housing, 1995).

More significantly, however, is the changing structure of South Africa's urban areas. From a local perspective, the extent of the migration problem is highlighted in an executive summary of the African Migration Study conducted under the auspices of the Western Cape Community based Housing Trust (WCCHT) (Mazur & Quangile, 1995). The summary showed households to be diverse and often not akin to conventional stereotypes. Quantitatively, there are over 28 million or close to 66% of the population who are functionally urbanised. While the total rural population presently stands at 14,5 million or 34% of the population, many spend some of their working life in urban areas (Mazur & Quangile, 1995). Thus, urbanisation with its associated demand for housing and services remains one of the main challenges in South Africa today.

The major factor of note regarding urbanisation in South Africa, as *Figure 1* shows, is the significant rate of the urbanisation of Blacks, which in real terms is greater than the migration pattern of all the other groups combined. The effect of the increased movement of poorer people to urban areas and the marked deterioration in the availability of finance has forced a move towards more affordable solutions for housing.

Demand exceeds supply by an ever-increasing amount. This may also challenge the capacity of the South African construction industry to deliver at adequate levels to eradicate the shortage of low cost housing.



Source: DBSA: Centre for Information Analysis (1992), SA Housing Advisory Council (1992)

Figure 1: Estimated annual urbanisation rates — natural growth plus net migration

Affordability

The South African Government's basic requirements for shelter are separate ablution and toilet facilities with adequate privacy for parents and children of different gender. Housing needs to increase proportionately as earnings decrease. The number of households not able to afford formal housing, or for whom affordability would be a concern, stood at about 8 million of the population in 1995, as shown in *Table 1* (Department of Housing 1995).

Table 1: Projected monthly household income distribution (1995)

Income category (per month)	Percentage	Population
R0 - R800	42,1	3,30 m
R800 - R1 500	30,7	2,41 m
R1 501 - R2 500	12,5	0,98 m
R2 501 - R3 500	14,7	1,15 m
	100,0	7,84 m

Source: Department of Housing (White Paper 1995)

Making homes more affordable to end-users with moderate to lower incomes in terms of lowering the purchase price has resulted in cost cutting measures that might potentially compromise the quality of the dwelling. Less costly, and sometimes less durable, construction materials have been used in this cost reduction effort, potentially creating dis-

satisfied end-users of these dwellings. Furthermore, critical elements of end-user satisfaction, such as monthly repayments, appearance, quality, maintenance costs and safety are compromised (Haupt & Coble, 2001).

Since current government policies do not seem to be able to accommodate the very poor in terms of low cost housing, it is imperative to develop cheaper housing which is not of a lesser quality, while also offering expanded levels of financial assistance (McIntosh & Fourie, 2000; Aboutorabi, 2000).

Beneficiaries perceive that lowering the cost of construction of a building is similar to lowering the quality of construction. However, construction of acceptable low cost houses may be achieved by the optimum usage of labour and materials and does not necessarily entail the lowering of quality. Imperatively, the cost of housing needs to be reduced in order to make it affordable to the growing population. The inability to do so creates socio-economic problems, such as the mushrooming of slum areas and a resultant burden on society due to crime and vandalism (Cox, 1984).

An investigation carried out by Cox in 1984 revealed that construction costs consist mainly of the cost of materials, as illustrated in *Table 2*. Housing costs consist of the cost of the land and its development, as well as the cost of construction.

Table 2 shows that the majority of the construction cost is taken up by the materials, the bulk of the costs being for the superstructure. Therefore, the construction of low cost houses, using more cost-effective materials, may reduce the cost of construction, and ultimately the overall cost of the house.

Table 2: Low cost housing construction costs

Construction components	Materials (%)	Labour (%)	Total (%)
Foundations	9,5	3,0	12,5
Walls	17,5	5,0	22,5
Roofing	17,5	5,0	22,5
Doors and windows	12,0	3,0	15,0
Flooring	8,0	2,0	10,0
Plumbing	8,0	2,0	10,0
Electrical works	6,0	1,5	7,5
Total	78,5	21,5	100,0

Source: Cox (1984)

Selection of materials for housing

Throughout human history, the selection and construction of shelter has been governed by the availability of materials and the need for protection from the elements and other threats, whether they be from animals or other humans. Where the person requiring shelter has had a choice, aspects such as convenience, comfort and social customs have influenced those choices (Morris & Booysen, 2000).

However, due to the philosophical approach to housing delivery, the inherent weaknesses in the system inevitably resulted in a considerable backlog. The major transparent weakness of inequality and duplication of function, caused by the fragmentation of society, greatly affected the housing supply and distribution. Other constraints to effective housing development and provision lay in the lack of effective housing strat-egy (Rubenstein & Otten, 1994).

Construction of the superstructure of houses

Initially, the structure of housing in urban South Africa comprised circular walls, with a stable timber frame, supporting a grass-thatched roof (Green, 1993, citing Slade, 1981). This was defined as a 'rondavel'. The walls comprised posts set along the circumference and saplings running in horizontal hoops enclosing an internal space between the posts. The cavity was filled with either rubble, stones, or packed earth and the wall then plastered with daga, a dampened cement and sand mixture. Often, uprights were included in the walls to help support the roof (Green, 1993).

Concrete blocks were first introduced into South Africa in the 1950s, as a relatively poor quality, backyard product (Hamm, 1994). Since then, the industry has seen significant growth and improvements, especially in the quality of concrete block units manufactured and the applications thereof. Additional developments in concrete block construction are the interlocking, dry-stacking and soil-cement types of masonry units, which form a small, but important percentage, of the total output of building blocks and bricks. Improved technologies have contributed towards the manufacture of better concrete blocks. The improvement in quality was largely assisted by work undertaken by the Concrete Masonry Association and the then Portland Cement Institute, and the publication and implementation of various standard specifications and codes of practice implemented through the SABS (Low & Kelly, 1993; Hamm, 1994).

A concrete masonry unit is a precast building element of rectangular shape, either solid or hollow, formed from a mixture of cement, aggre-

gate and water. The units are made in a range of sizes, shapes, colours, textures and profiles and are designed to meet various requirements such as strength, thermal and acoustic insulation and fire resistance. Concrete blocks are used extensively in the housing construction industry. Concrete masonry structures will have adequate strength and stability for their purpose when designed and built under competent supervision according to the applicable standards, codes and regulations (Petersen, 1994).

A further benefit of concrete block construction, in terms of the internal environment of a house, is the provision of 'thermal mass' due to the presence of concrete block walls. Thermal mass, as opposed to thermal insulation, is the ability of a relatively thick wall such as concrete masonry, to store heat accumulated by solar radiation, which is then released at a later stage. With South Africa experiencing dry, relatively warm days followed by cold nights, this form of energy conservation is extremely practical. Furthermore, concrete block construction is suitable for housing in South Africa, due to its versatility, since concrete blocks can be manufactured by both manual backyard operations and sophisticated, mechanised concrete plants producing thousands of masonry units per day (Low & Kelly, 1993).

The remainder of this article describes a research project to establish the types of construction materials being used for low cost housing in the greater Cape Peninsula area, as well as the end-users satisfaction levels with respect to the type of construction material used.

Research method

The objectives of the research project were to investigate trends in the use of construction materials in the superstructure of low cost housing through a literature review. Secondly, to establish what current methods and materials are used for low cost housing construction in the Cape Peninsula by means of a questionnaire survey, and thirdly, to establish the end-users satisfaction levels with regard to the use of concrete block construction by means of a questionnaire survey. Finally, the analysis examines the appropriateness of concrete block construction for low cost housing with regard to acceptability by the end-users.

The research project reported here was a qualitative study that, due to the time factor, practicality and cost, only sampled a portion of the total population of developers, contractors and end-users located in the greater Cape Peninsula area. The objective of this study was to gain and develop an understanding, discover meaning and explain phenomena of end-users' perceptions and feelings towards acceptability with regard to the use of concrete block construction.

Research participant identification process
The sampling method employed is an important issue because of the fact that only part of the total population can be covered (Leedy, 1993). However, it was important that the sample size reasonably represented the total population with respect to the situation in the greater Cape Peninsula area.

The results obtained from the respondents in the various fields of construction for low cost housing for this survey may not necessarily represent the views or practices of everyone in the field of low cost housing construction. Few low cost housing developments in the greater Cape Peninsula area use anything other than concrete blocks for the wall superstructure. Two developments were chosen because, although similar in construction methods used, they were different in terms of size and intensity of construction, which would impact strongly on the qualitative data obtained. This factor may help establish the extent to which the use of concrete-based materials is valid in redressing of the problem of acceptability.

The sample of building material suppliers and developers was drawn from a database compiled by the Department of the Built Environment, Faculty of Engineering at the Peninsula Technikon. The database consisted of the contact details of 12 suppliers and 10 developers throughout the greater Cape Peninsula area. A sample size of 3 materials suppliers and 4 developers was selected. In summary, the sample consisted of 2 low cost housing developments (20 personal interviews), 3 material suppliers (personal interviews), and 4 developers (personal interviews).

The use of questionnaires
Social desirability, anonymity, and socio-economic and educational differentials were considered during the questionnaire design. Respondents were not required to state their names, and were assured that the results of the survey were going to be used in aggregate form only. Questionnaires were designed to reflect appropriate levels of the respondent's understanding.

Very little response was expected from postal questionnaires, as initial enquiry revealed that affixed stamps would be kept for private use, and that low-income communities would not use their own funds to return a questionnaire. The questionnaires were therefore administered personally to a selected group residing in the areas to be studied, as well as to material suppliers and developers of low cost housing. In both low cost housing areas, visits could only be made during the morning and midday for security reasons. Furthermore, in a situation where other

forms of communication such as telephones were limited or non-existent, a questionnaire survey remained the most effective method of data gathering.

Results

A summary of the findings of the study relative to the objectives is provided below.

Homeowners' response

Most (80%) of the homeowners interviewed had previously lived in informal settlements before acquiring a formal low cost house. These respondents reported that their houses in the informal settlements were constructed from materials such as wood, corrugated iron, asbestos sheeting and even plastic sheeting, that is, anything that provided shelter against harsh weather conditions and offered protection. These sixteen respondents stated that concrete block houses are a major improvement on their previous houses, but they felt that improvements to their existing house structures are possible. They also reported that they felt safer in a concrete block house. The physical characteristics of the informal houses in which the respondents lived previously, based on information obtained from the respondents, are presented in *Figure 2*.

The respondents, who reported that they did not reside in an informal settlement but in concrete block houses before acquiring their present house, were not the owners of those houses. In most cases these respondents rented or stayed with family or friends.

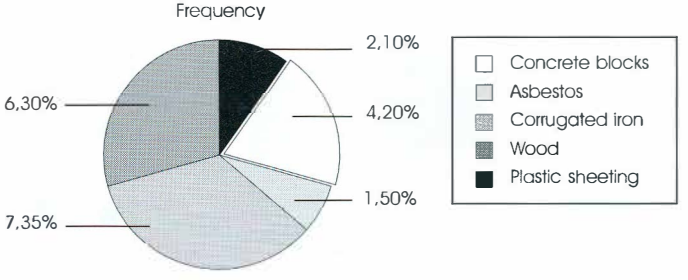


Figure 2: Physical characteristics of the wall structure for informal houses (Total number of respondents = 20 (100%)

The present housing conditions, as perceived by homeowners, vary. Generally, most of the respondents find their houses unsatisfactory in terms of space and privacy. They are, however, in favour of concrete block construction being used for their houses. *Table 3* shows that 5% of the homeowners consider themselves to be living in houses that are in a 'good' condition while 30% find their houses in an 'average' condition. A further 50% live in houses that are considered 'unsatisfactory', while 15% considered their houses to be in a 'bad' condition. These responses were based on the respondents' feelings due to inadequate space and lack of privacy in their houses. They are also unhappy about the lack of a back or front yard due to the houses being very close to each other.

Table 3: Housing conditions

Number of homeowners	Housing conditions
1	Good – mortar cracks
6	Average – mortar cracks and visible damp
10	Unsatisfactory – mortar cracks, visible damp, thickness of walls and inadequate space
3	Bad – mortar cracks, structural cracks, visible damp, thickness of walls, inadequate spcae and a lack of privacy

To establish what homeowners considered to be major problems concerning quality, respondents were asked to list the major quality problems. Responses to this question are shown in *Figure 3*.

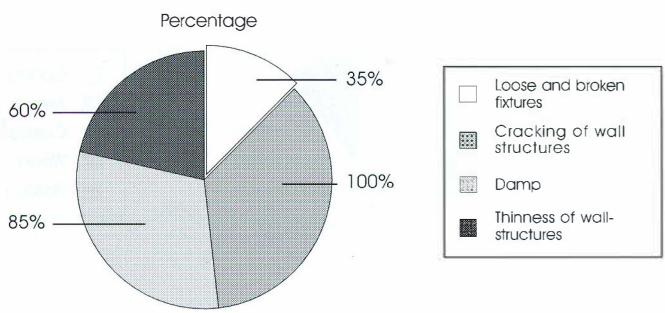


Figure 3: Major quaity problems associated with low cost housing (Total number of respondents = 20 (100%))

Two problems are considered to be dominant among all the respondents questioned. These are cracking of walls and the appearance of damp due to exposed foundations or lack of damp-proof courses, and the fact that there are openings at the intersection between the roof and the walls. Both these problems became evident very soon after the respondents moved into their homes. The cracks are fine mortar cracks, which are to be expected in any masonry construction. The damp appears to be emanating from the ground in some cases and from the roof structure in other cases.

Most (90%) of the residents considered that the appearance of damp is to be expected because the walls are not plastered. Another problem that 12 (60%) of the respondents noted was that the walls are too thin as in most cases the external walls were observed to be only one layer thick (110 mm).

An attempt was made to establish the type of construction material that respondents preferred for their homes. All the respondents preferred concrete block houses. They stated that concrete is solid and permanent. The respondents reported that concrete is an extremely strong and durable material, and that the poor quality of their houses was due to bad workmanship by the contractors who are only concerned with the speedy delivery of houses, with no concern for the families who would eventually live in them.

None of the homeowners had a choice in the type of construction material used to construct their homes. The respondents did, however, report that they would most likely choose concrete block construction after the researcher informed them about other methods of construction using clay bricks, timber, steel or adobe.

Materials suppliers' response

The majority of materials suppliers reported that they supplied contractors with concrete blocks for wall construction, timber for roof trusses, door and window frames, as well as fibre cement and metal sheeting for roofs of low cost housing. One material supplier, who only specialised in concrete, supplied concrete lintels, vents and trestles for low cost housing. Their general response was that concrete blocks are the most commonly used construction material for wall construction in low cost housing because they are cheap and easy to build with.

Materials suppliers reported that the technical problems concerning quality are associated with the poor manufacture of concrete blocks rather than poor workmanship on site. Another serious problem as perceived by the materials suppliers, which is evident in most wall structures of low cost housing visited by the researcher, is cracking of walls. The

materials suppliers reported that this was due to the concrete foundations not being cured for the correct period of time. The materials suppliers explained that the foundations are cast and the wall structures are started the very next day because the contractors are only concerned with the number of houses to be built and not concerned with the quality of the houses they produce. This speedy delivery and insufficient curing time usually gives rise to rising damp in the wall structure. Another interesting feature, which also gives rise to damp, is the fact that these walls are not plastered, but only bagged.

All the materials suppliers agreed that concrete blocks are readily available as construction materials. Materials suppliers reported that concrete blocks have been in use for forty years, and will continue to be readily available in the future.

All the materials suppliers reported that concrete block construction is the most affordable form of low cost housing construction because of the ease of construction as well as saving on construction time because the concrete block is a large unit. This is due to the fact that concrete blocks are larger than conventional bricks and therefore requires less labour, as the labour rates in the Cape Peninsula are higher than in any other province in South Africa. Concrete block construction is an established form of construction and does not require additional or new training. In addition, because concrete block units are larger than bricks, fewer units are required.

The materials suppliers reported that concrete blocks are acceptable to the end-users, provided the manufacturing process can be monitored more effectively so as to ensure that the standards, as set out in SABS 1215 and SABS 0400, are adhered to. The respondents stated that houses built forty years ago are still structurally sound, and therefore concrete blocks will still be used for construction purposes in the future.

Developers' response

All the developers reported that they constructed walls of concrete blocks. One developer reported that his company uses a concrete block cavity wall for the external walls and a single concrete block wall internally, depending on the cost that was allowed for each house in a particular development.

All the developers stated that concrete blocks are always their first choice as a construction material because of their durability in low cost housing construction. Concrete block construction allows the contractors to use less material, because they are hollow, and can be laid by unskilled labour. The developers all stated that concrete blocks are affordable in terms of fewer blocks being required per house. The time

taken to build with blocks is therefore shorter than building with smaller types of bricks. Concrete block houses can be maintenance-free because of their proven durability as is evidenced by houses which had been built thirty and forty years ago.

Two-thirds of the developers questioned agreed that if the concrete blocks were manufactured according to the standards, the end prod-uct would be durable and cheaper in terms of maintenance costs. These developers stated that manufacturers are producing poor quality concrete blocks to save on costs, and that houses built with these blocks would need significant maintenance work.

Analysis of findings

It is apparent that the sole construction material used for the wall structures of low cost housing is concrete blocks. It is evident that homeowners prefer concrete block construction as it gives the appearance of a 'conventional' house. Homeowners are aware that concrete is a durable building material, which offers protection against harsh weather conditions as well guarding their valuables and keeping them safe. However, the homeowners reported their dissatisfaction with the similarity of low cost houses in the same development in terms of their shape, finishes and colour. Very importantly, low-income communities are not prepared to sacrifice quality for affordability, as they know that it will cost them even more in the long term due to repairs and maintenance.

The end-users are generally satisfied with the construction material used for the wall structure of their current houses. The end-users are aware that the wall structures are not plastered, but only bagged. Even without any formal or technical knowledge of building houses, they state that they should be involved in the planning and construction stages of their new homes with regard to funding and appearance in order to make these homes more affordable and acceptable. The end-users felt that concrete blocks were the most acceptable form of construction material available for the wall structures because of its strength and durability.

It would have been futile asking for the income levels of these households, as this would have inferred that it was their choice to live in such unacceptable conditions. However, it was noted that household possessions tend to be greater in better houses. This implies that households living in concrete block houses command higher income levels and are able to acquire more assets. Alternatively, it could be that households in houses built from less durable materials might delay consumption of conspicuous assets for security reasons. The developers stated that the main reason for the similarity in houses built in the same scheme was due to the limited expenditure that is allocated to each unit in a low

cost housing development, which in turn restricts any innovations in the design of the low cost house. This also verifies that home owners do not have choices in the design and construction of their homes.

Materials suppliers appeared to be highly experienced individuals within their areas of expertise. Materials suppliers stated that concrete blocks are cheap compared to bricks and will always be readily available, provided that the manufacturers maintain the required standards for the concrete blocks. Alternative methods of construction for low cost housing would require the additional expenditure of labour and training costs, as concrete block construction is a well-known form of construction used by all contractors.

Concrete blocks must be manufactured according to the South African Bureau of Standards, codes SABS 1215 and SABS 0400. These standards set specifications for the materials used to manufacture the concrete blocks. The strength of concrete blocks is considered only when handling the blocks on site. The important properties of these concrete blocks are their finished texture and appearance. This is a result of low cost houses not being plastered, only bagged, as the cost of plastering is too expensive. The materials suppliers agreed with the developers that the contractors of low cost housing prefer concrete blocks, as the concrete blocks are cheaper and faster to build with than smaller bricks. This is due to the concrete blocks being hollow, which results in less material being used to manufacture the blocks. The concrete block is also much bigger than the brick, and this means that fewer blocks than bricks are required to build a low cost house. It is then evident that a saving in material costs of low cost housing, resulting in a saving in the total cost of the house.

Further questions relating the affordability of low cost housing yielded answers that generally supported concrete block constructions. Developers would nevertheless be willing to use alternative methods of construction, provided that the new method is acceptable to the low-income communities and is more affordable than concrete block construction.

The materials suppliers questioned all agreed with the homeowners as to the technical problems concerning quality, such as cracking and damp, associated with low cost housing. They also stated that the problems experienced by homeowners after moving into their homes are a result of hurried construction, where the concrete foundation is not given enough time to harden sufficiently and cure. As a result, cracks and settlement occur due to poor workmanship, and not poor quality of construction materials and methods employed. Therefore, one of the major reasons for maintenance identified in this survey, with respect to

the durability of low cost houses built using concrete block construction, stemmed from poor construction and site practices. The material suppliers and home owners agreed that quality of site work was inadequate and was probably the major cause of maintenance being required.

The developers, however, disagree. They contend that the cracks are joint cracks, which generally occur in any form of masonry construction. All low cost housing have damp-proof courses installed, but no waterproofing. It must be noted that the concrete block is a porous material, which does allow moisture and gases to migrate slowly through the material. The majority of the materials suppliers questioned are aware of new and alternative methods of construction using concrete, such as foamcrete, but stated that contractors are not using these methods for fear of failure and unacceptability to the end users. However, materials suppliers do admit that limited knowledge exists on alternative methods of low cost housing construction and would encourage their use if more information were made available.

The developers, however, stated that no alternative method of construction for low cost housing is as effective and efficient as concrete block construction. This is due, as stated previously, to the ease of construction, no training being required, less concrete block units being required than bricks, and concrete's durability and proven performance in the construction industry. Finally, it appears that all low cost houses in the greater Cape Peninsula area are currently being constructed using concrete block construction.

Conclusions

The study set out to determine the satisfaction levels of the end-users with regard to the construction materials used for the wall superstructure of low cost houses in the greater Cape Peninsula area. The study showed that end-users are generally satisfied with concrete block construction. However, feelings of dissatisfaction arise as a result of the ongoing costs associated with maintaining the end product. The delivery of low cost housing is driven by the need to accommodate as many of the poorer communities as speedily as possible. This usually results in poor workmanship and dissatisfied end-users.

The construction of low cost housing should be seen as an all-inclusive approach with regard to the developers, end-users and the construction process. Accordingly, concrete block construction is the preferred choice of construction method by the developers as well as the end-users because of its quality and durability. The study showed that the defining characteristics of concrete block construction include its ease of construction, affordability, durability, speedy delivery and acceptance.

Concrete block construction is driven by the need to make low cost housing construction more cost effective, while producing more units. In essence, acceptability of low cost housing calls for a holistic and integrated approach towards the delivery of housing for the poorer communities. Past and present low cost housing construction approaches have not addressed the needs of the very poor in conjunction with the needs of the developers of low cost housing. The ongoing political pressure on the government to overcome the housing backlog has resulted in significant pressure on housing delivery organisations to rapidly deliver large numbers of houses at the lowest possible price. The lowest possible price usually results in the use of cheaper construction methods, where developers are given a budget within which they must produce a certain number of units, which in turn, determines the cost per unit. This usually results in the use of cheaper construction materials as material costs make up the bulk of the construction costs. This pressure has superseded quality and acceptability considerations, which in the long run may result in dwellings that are only marginal improvements on the existing shacks. The appropriateness of concrete block construction for low cost housing can, therefore, be shown in terms of:

a) the attributes of concrete block construction, namely, affordabil-ity, speedy delivery and acceptance by the low-income com-munities;

b) the attributes named above are important for the housing needs of South Africa, and more specifically the Cape Peninsula area, because of the high employment rate and the growing population;

c) contractors producing more units of housing per unit time due to the ease of construction and durability of concrete blocks; and

d) concrete blocks, being larger than conventional bricks, results in the use of less materials for the wall superstructure, and in turn, this results in a reduction of the cost of the house. An additional cost reduction is achieved by bagging the walls instead of plastering them as concrete blocks gives a smooth final finish.

Finally, housing the poor in South Africa is a long-term programme, the success of which is dependent on a delivery system in which individuals must participate. It is anticipated that a good record of economic growth will be able to place the poor on the road to affordability.

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