EVALUATING THE ECONOMIC EMPOWERMENT POTENTIAL OF CONCRETE BLOCK PAVED ROADS FOR DEVELOPING COMMUNITIES.

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ABSTRACT

Historical road construction practices in South Africa, particularly in residential areas, satisfied only the physical objective of providing transportation access. The use of local resources such as labour, skills and materials during construction was not a high priority and the choice of technology was mainly dictated by financial costs. Since 1994, when the current government came into power, choices based on added benefits and economic empowerment of communities have become more prevalent in the built environment.

Concrete block paving was identified some time ago as one of the choices that offered solutions to the problem of employment and skills development. This paper highlights the economic empowerment potential of concrete block paved roads.
The above issues are discussed mainly from the perspective of the Development Bank of Southern Africa (DBSA). The DBSA's business is explained together with some information on how its clients and stakeholders are provided with support throughout the project cycle. Informed decisions, appropriate designs, structured contracts and authorities that understand the benefits of properly constructed roads are all part of this process.

A number of projects have been funded by the DBSA over the past fifteen years. These have recently been evaluated and lessons learned are presented for future application. The main conclusion of all the evaluations has been that, regardless of the technology employed, community involvement at all stages of any project is essential if the maximum empowerment potential is to be realised.

1. INTRODUCTION

It is a well-known fact that before 1994 not all communities in South Africa enjoyed the same level of services provided by municipalities. Roads for the poorer communities were no exception. Typically, access to houses in these areas would be gravel-surfaced roads. For the more fortunate, selected gravel would be used that could reduce the dust generated in dry weather and eliminate muddy conditions when wet. The argument supporting these considerations at the time may well have been that vehicle ownership in these communities was low and hence the need for higher quality roads was less than for more affluent areas. One of the consequences of this situation was that communities took very little pride in their neighbourhood. There were no clearly defined "sidewalks" for homeowners to attend to, so nothing was done. When vehicles did use the "access ways" the whole road reserve was used at random and pedestrians were at risk. Proper drainage of stormwater was also non-existent and roads in many areas resembled marshlands after rains.

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Investments in residential roads infrastructure accounts for about 25% of fixed capital on Municipal Balance Sheets. The author estimates that in South Africa the replacement value of residential roads amounts to around R25 billion. This clearly illustrates that roads are an important part of South Africa's local economic growth potential.

The need for creating employment opportunities has been a high priority in South Africa for many years. However, when authorities do plan to upgrade or construct new roads under the above circumstances the construction methods considered generally do not allow for employment of labour intensive techniques. Local communities become observers in the construction process rather than participants.

In 1990, the Development Bank of Southern Africa (DBSA) became aware of the potential for enhancing the use of local resources, including labour, materials and finance, using concrete block pavers (CBP) to construct roads. Since then the DBSA has continuously encouraged its clients, mostly local authorities, to consider using CBP when constructing roads in their areas. This paper aims to discuss the potential for economic empowerment of affected communities during and after the implementation of a road project based on the results of a number of projects that have been evaluated by staff of the DBSA. Details of the process of interaction between the DBSA and its clients are also discussed later in this paper.

Recently, as part of a renewed drive to promote local economic development, it was decided to evaluate the long-term impact of projects funded by the DBSA utilising CBP for the construction of roads. Included in the evaluation process as one of the outcomes in the report is a comment on "Lessons Learned".

2. ECONOMIC EMPOWERMENT NEEDS

Many studies of the growth of formal employment of new "economically active" job seekers and the absorption capacity of the formal job market have shown how urgent the situation is in South Africa. Currently less than ten percent of new entrants to the job market will find formal employment. Many will have to find alternative jobs in the informal sector but the number of unemployed remains at a dangerously high level.

Traditionally, development projects for low-income communities in South Africa have met only the physical needs of the beneficiaries. Clearly, these communities have other needs that should also be addressed. The structuring of projects that maximise opportunities for employment and the development of skills as well as entrepreneurial abilities is essential for the economic empowerment of communities.

3. THE NEED FOR APPROPRIATE ROAD DESIGNS

During the Apartheid Era in South Africa, growth of most urban areas was strictly controlled. With the lifting of the legislation controlling urban influx the situation changed. Many areas have developed so rapidly that no formal layout plans have been prepared, no basic services put in place and housing, at best, is informal. Most local authorities do not have sufficient resources to do anything to improve services in these establishments. The raison d'etre for the newly established urbanised communities has been the need for employment.

Just as Engineering is not just about calculations and drawings, so the design of a road – any road – is not about how wide, how straight or how flat. There are a number of other factors that have to be considered such as who is going to build and use the road? What resources are available for its

construction? The benefit of a road is not only about the physical facility – it is about its ownership, participation, acceptance and a number of other socio-economic issues.

The costs of a road are determined by a number of factors. In most cases, however, the wearing surface determines the final cost. A variety of surface options are available and each one has its advantages and disadvantages for particular applications. Market forces determine from time to time whether oil-based bitumen products will compete more favourably against cement based products in terms of capital and maintenance costs. When the national strategy for road construction was to construct as many roads as quickly as possible and at the least cost, bituminous surfacing was the obvious choice, particularly as bituminous products were relatively cheap at the time. As oil prices increased with the oil crisis in the early 1970's, alternatives were sought. Concrete roads were constructed in the early 1950's especially near to sources of cement. The long life of these roads highlighted the need to look at the full "life-cycle" costs of road ownership and not just the initial capital costs. A cheaper road may well cost considerably more to maintain during its lifetime and, conversely a more expensive road could cost less to maintain.

Almost without exception clients of the DBSA have been advised by their Consulting Engineers that CBP roads are much more expensive than "conventional" roads and are therefore not affordable. It would appear that the problem is due to the fact that most transportation engineers specialise in "conventional" road design and they are therefore more confident firstly with their estimates of costs and, secondly, can design and control actual construction costs more effectively.

Very few consulting engineers can actually claim to be specialists in the field of CBP and, even more of a problem, very few road "owners" appreciate the benefits of CBP.

As part of a "Job Creation" programme in which the only objective was to employ people who had no work, the community of Bela Bela, an urban village with a population of about 25 000, were fortunate that a local engineer advised them to consider the more sustainable approach to job creation through the upgrading of the roads in their area. It must be understood that the choice of employment projects was left up to the benefiting community. Sadly, much of the money in other areas was spent on basic operational activities such as street sweeping and litter collection. And once the money was spent there was absolutely nothing to show for the programme. In Bela Bela, teams were trained to manufacture blocks and other teams to lay them. The programme was so successful that the funding authorities extended it so that ultimately over 100 people were employed for six years and most of the roads in the community were paved. Marketable skills were developed and at the end of the programme most of those people involved were able to continue using their skills in their own businesses. It took many years for the benefits of CBP roads in Bela Bela to be known in neighbouring communities. It was four years after these roads were constructed that a community leader in a nearby town announced that "the community of Bela Bela built their own roads – we want roads like that". Unfortunately, as the project was not funded by the DBSA, a more detailed case study was not carried out.

As part of the process of giving support to the technology the DBSA prepared a series of documents on Construction and Development which included a special publication on *Concrete Block Paved Roads: The Development Potential.* Development Bank of Southern Africa (1993) It was intended that this document would be used to guide clients through the decision-making process to enable them to accept the benefits of using this technology. The publication is particularly useful for *"development practitioners to acquire a better understanding of the situations in which the use of CBP, with its attendant employment opportunities, should be considered".* A few years later a follow up document was published entitled *Concrete block paved roads: Experience gained on DBSA projects.* Development Bank of Southern Africa (1998)

4. TYPICAL PROJECT CYCLE FOR DEVELOPMENT PROJECTS

Ideally a road project should follow the same project cycle as any other development project, namely: Needs identification, preliminary design, feasibility studies, final design and documentation, implementation, commissioning and ownership.

As can be concluded from statements above, at least 90% of the impact of any project is determined in the early phases of the project cycle. If the needs analysis and preliminary designs are not carried out with clear objectives and with full participation of all stakeholders, the end result will not achieve the desired impact. The current structured planning approach of municipalities highlights economic priorities and the broader needs of communities. It is of utmost importance that the Integrated Development Plans prepared in line with Municipal Legislation (Municipal Structures Act) be used as a guide for planning projects.

5. THE ROLE OF THE DEVELOPMENT BANK OF SOUTHERN AFRICA

The DBSA's mandate requires it to invest in and facilitate the provision of infrastructure. Its key objective is to address socio-economic imbalances and improve the quality of life of the people of the region. As a Bank the DBSA has a dual responsibility to look after the interests of its shareholder as well as its clients (and their customers). In its latest annual report 2002, the DBSA notes, *"All South Africans, especially poor communities and groups with an interest in development, are considered stakeholders of the Bank, and this is reflected in support to society at large."*

In the process of providing finance to its clients the DBSA follows a number of operating principles, of which a few are listed below:

- Alignment of activities to national policies, regional programmes and local priorities
- Sensitivity to the needs of the poor and responsiveness to the demands of clients
- Implementation of best-practice policy in all activities including social and environmental practices
- Collaboration and partnerships with public and private sector institutions, Non Government Organisations (NGO's) and Community Based Organisations (CBO's).
- Adherence to the principles of good governance.

6. CASE STUDIES

Between 1993 and 2000 the DBSA funded the construction of a number of roads in both Urban and Rural areas that utilised Concrete Block Pavers as the final wearing course. Almost without exception the original designs for these roads were for "Black Top" wearing surfaces. One of the most difficult tasks for the project team was to influence a change in thinking on the part of the local authority and their consultants to consider the use of CBP. The lack of knowledge and awareness is still widespread and where there is some knowledge it is based on perceptions such as *"it is intended only for upmarket type developments and is therefore expensive."* A very useful tool in the process of informing these communities was the production of a video by the Concrete Manufacturer's Association called ROADS AND THE R.D.P. (Reconstruction and Development Programme) The message conveyed in this video is very clear about the benefits of CBP.

A brief background to some of the projects evaluated follows. Apart from these a number of other projects were also funded but they were either too small to include in this paper or there was not sufficient information available to report on. Included in this list are urban roads constructed in ThabaZimbi, Hermanus, Dysseldorp (W Cape), and Barberton:

6.1 Phuthadithjaba

Of all the projects funded and investigated, this 10km semi-rural road is the most significant. In preparation for this project the consultant carried out an extensive evaluation of alternative construction techniques including various types of foundation layers and wearing courses. These alternatives were then offered to contractors for consideration in the tendering process. The prices were then compared and analysed for the various economic benefits. Interestingly, the analysis of the road user benefits showed that due to the "roughness" of the CBP, the alternatives were slightly more beneficial. Whether this conclusion is entirely accurate is debatable, as demonstrated by Visser (2002). However, in all other aspects, there is no doubt that the CBP alternative was the choice that provided the most economic benefits.

The road was designed to divert traffic from the existing approach road from Harrismith to the Central Business District and beyond. It was expected that the road would carry over 5000 vehicles a day, including buses and taxis and that the growth in traffic volumes would depend on the rate of housing developments that would be stimulated by the new access to the area. The original design was for a black top surface but through negotiation between the DBSA and its client CBP was added as an option for tender purposes.

The tenders were evaluated using the same criteria developed during the preparation of the project. The appointed contractor indicated that the expected employment creation during the construction phase would be 50 000 person days. This aspect of the project was carefully monitored and the final result was over 80 000 person days of employment. The considerable increase was due to the contractor substituting alternatives for the stormwater management and the fill sections of the road using techniques that employed more labour. These included stone masonry and reinforced earth. The obvious benefit of this approach was the amount of money that remained within the community from the project. Based on the analysis almost three times as much was paid in wages to local artisans and labour as what would have been spent had a bitumen surface been applied.

One of the notable features of the road's "wet weather characteristics" is the considerable reduction in tyre spray from behind moving vehicles. During an inspection for the evaluation heavy rain fell in the area. Some photographs taken from a vehicle travelling behind another on both bitumen and CBP roads highlighted this difference. The skid resistance of the road was also without doubt better than the bitumen roads in the area.

Current road usage is about 10% higher than what was anticipated due to accelerated developments on either side of its route. Various planning problems have also come to light since the road was constructed but these have nothing to do with the technology employed. For example, the local Road Safety Officer complained that most traffic using the road travels at excessive speeds, considering that the road is in an urban environment. Some type of "traffic calming" measures will have to be implemented. Another problem is that the local community use the surfaced shoulders for pedestrian access, as there are no sidewalks adjacent to the road. This creates a traffic hazard during high traffic flows.

6.2 Alexandra

Early in the 1990's an extensive urban renewal programme was planned for Alexandra. This is a high-density urban area very close to the Central Business District of Sandton, where the World Summit on Sustainable Development was held. As a result of "densification" whereby a number of additional houses were built behind existing houses access to many houses became a problem. The local authority, in consultation with the affected communities, decided to construct a number of "panhandle" type roads to improve the situation. Due to the confined space available for the road, heavy construction machinery could not be used. The decision to use CBP was supported by the fact that existing bitumen-surfaced roads in the area needed extra maintenance due to the severe

conditions that they were subjected to. Rubbish was piled up on the road surface and burned, wastewater flowing in the streets caused potholes to expand rapidly and the situation deteriorated rapidly. In many similar communities, CPB was previously avoided because of a perception amongst the security forces that the blocks would be removed and used as "missiles" against them. However, in Alexandra, as with all other CBP projects, where the communities were involved in the manufacture of the blocks, the transport, distribution and the laying process no such incidents occurred. In fact in many areas the workers would simply leave their work at the end of the day and carry on the next day without anything being taken away. Thirteen years later, when the roads were inspected they were all found to be completely intact with the only signs of deterioration being where blocks had been lifted to lay services and were not replaced correctly. This is an aspect that needs to be given attention as part of the training of the local authorities for "ownership and maintenance".

6.2.1 Witbank

The physical objectives of the project, which was part of a larger upgrading programme in an urban area of Witbank, were to provide all weather access to houses and to manage stormwater runoff. The process of implementing the project included an extensive community involvement programme, including all the elements of decision making, training and construction employment that had been identified on similar projects. All of the socio economic objectives were achieved and, technically, the roads are excellent. However, the community highlighted various problems during the follow up evaluation. Firstly, in order to accommodate high volumes of rainwater the roads were constructed with a reverse camber. As all the houses had already been built and the road reserve was fairly narrow this was the most obvious choice. The community complain that when it rains the roads are flooded and water often overflows into their properties. Linked to this problem, topsoil has washed onto the road surface over a long time and grass has grown on this soil, causing other problems. This is clearly a symptom of a lack of institutional capacity to understand and carry out the maintenance that is required on the road. Closer investigation revealed that the local authority simply does not have an adequate budget to do so. A rather unusual report from an independent consultant revealed, *"6% of the homeowners do not use the roads"*. It is not clear what questions were asked in the household survey but the even if the people do not have vehicles, they still need to gain access to their homes.

6.3 Saldanha

Initially the Municipality of Saldanha planned only to surface sidewalks using CBP. Furthermore, the construction of these sidewalks was carried out departmentally, thereby countering any empowerment potential. Following on the initial projects, some of the roads in the lower income areas were also constructed with CBP using the same construction teams. The Municipality employ over 450 local people while there are only 30 names on the list of local small contractors who could have participated in the construction programme. Ideally, according to the DBSA technical representative, *"one would like to see these numbers reversed."* A variety of block types can be found around Saldanha, indicating clearly that all blocks were obtained from local commercial sources. This is a good policy, as is mentioned elsewhere in this document, but it may lead to problems with maintenance later, should any of the blocks need to be replaced. In a DBSA report it notes that, *"where thought is given to the planning, procurement and construction process ... blocks can be not only technically sound but also very attractive. Of importance is to bring the process into a formal one and not regard it as an 'add-on'"*

6.4 Pilanesberg

The Pilanesberg National Park is an international tourist destination that is supported by developments at resorts such as Sun City, KwaMaritane and Bakubung. Due to increasing traffic volumes the Parks Authorities decided that the roads at the entrances needed to have an all weather surface to prevent dust and mud. As a background to the project it must be understood that when

the Park was developed a number of people were relocated from the park area to neighbouring villages. An agreement was made that these affected people would be compensated for their move by being continuously involved in any developments in the area where they could be given employment. The choice of block paving for the roads was an obvious one, not only for its potential to create additional jobs, but also because in the natural environment of the park it was felt that the blocks would not have a more pleasing appearance. All the various tasks related to the road construction programme were subcontracted to small contractors from the local community. However, this created problems that were not originally anticipated during to planning of the project. Sections of the road layers were completed long before sufficient blocks could be manufactured to surface these areas. As access had to be provided at all times it was not possible to provide alternative access roads open for extended times. Alternative supplies of suitable clay pavers were obtained for portions of one of the roads. After eleven years of use it is interesting that there is no visible difference between the two types of pavers in terms of maintenance or wear. It is also interesting that the Game Rangers have indicated that if roads must be surfaced, Concrete Block Pavers would be their first choice. The reason for this is that when animals are being chased by predators, they are less likely to be caught on CBP roads than either the Clay Pavers or bitumen surfaced roads, where they may slip on the surface. During the evaluation of the project in 2003, it was established that there are over 90 kilometres of roads in the area – of which only 7 km are Block Paved. The annual budget for "roads and fence" maintenance is only R500,000. This is totally inadequate and one wonders what would have happened had the higher trafficked roads not been paved, given that the condition of the other roads has deteriorated considerably.

7. LESSONS LEARNED FROM CASE STUDIES

Lessons learned from the above projects are grouped collectively in categories below:

7.1 Decision Making

Clearly the issue of making informed decisions is paramount for the success of any project. As mentioned previously, many road "owners" are not aware of options that are available that could increase economic benefits for the communities. Road construction using bitumen products for the final wearing course is accepted as being the standard. In one area the local official in charge of roads maintenance had considerable experience with concrete paving slabs as used to surface sidewalks. He questioned why these could not also be used for constructing urban roads?

7.2 Design And Tender Documentation

Empowerment potential can only be realised through appropriate design and properly structured contract documentation. Evaluation of tenders is made easier if information pertaining to employment of both skilled and unskilled workers and the use of local resources is provided. Contractors should also be given the opportunity in the tendering process to submit proposals that could improve the economic benefits in the construction of the project. Uses of patented designs, joint ventures, special community training programmes etc. are issues that could be considered.

7.3 Construction

It is imperative that the project is monitored in such a way that the various targets for employment and resource utilisation are actually achieved. Unfortunately existing systems only allow for penalties to be charged where the results fall short of the targets and no bonuses are available where targets are exceeded. Consideration should be given to innovative ways of awarding incentives for achievements. Where there are existing block manufacturing facilities in the area of a project, these should be given preference for the supply of the blocks. Additional employment opportunities (or the retention of skilled employees in the area) can be considered in the calculation of economic empowerment opportunities in the project formula.

7.4 Operation And Maintenance

Experience has shown that actual costs of maintaining CBP roads is less than 30% of the cost of "conventional" roads. Indications are that during the initial period of up to ten years, provided that there are no latent defects, actual maintenance expenditure for most projects is negligible. In one area bituminous surfaced roads had deteriorated so much in ten years that normal maintenance was no longer an option. In the same geographic area, and over the same period of time (both roads constructed at the same time), no money had been spent on CBP other than the painting of road markings. The allocation of adequate budgets for road maintenance is a problem experienced by many road authorities. Under these circumstances the strategy should clearly be one of constructing a road that will last as long as possible without the need for maintenance. To avoid the problem of blocks not being properly replaced after being removed for services, planning should consider the installation of appropriate conduits for these services during the construction of the roads.

7.5 Socio-Economic

Mention has been made of "road-ownership" a few times in this paper. While the asset will always belong to the local authority, the concept of community pride in the roads that they have helped construct and which have helped improve the living conditions of their areas is one that warrants further discussion. Where living conditions are improved by the provision of a properly constructed road it is easy to understand community acceptance. However, where there has been active participation and involvement of the community in the decision-making and construction process, a sense of ownership develops. One anecdote illustrating this concept (which was experienced in more than one of the above projects) was the fact that at the end of the working day, many of the materials, including the block pavers, were simply left open on the site for use the next day. No loss of materials was experienced in these cases. Many of the skills developed during construction are marketable and it needs only a small additional amount of training to convert many of the employees into employers. Small contractors using CBP and other cement based products and technologies do not require large amounts of capital to set up their businesses.

8. CONCLUSIONS

There is no doubt that Concrete Block Paved roads are a viable option for enhancing the economic empowerment potential of development projects. Significantly more employment is created using this technology than with other methods of road construction. Meaningful skills are developed within the community that can be used for sustainable employment. However, the approach to substituting CBP for any other alternative should not be done simplistically. It may well be that the right choice is made for the wrong reason. If the project is not planned as part of an integrated economic development programme it may not be sustainable. Which is not to say that any of the alternative choices would be sustainable either. Concrete Block Paving has also demonstrated its durability in developing areas where maintenance is often neglected due to lack of funds. CBP is also safer and in many areas the appearance of CBP blends in with the surrounding area better than alternative road surfaces. Community involvement in the process of decision-making, planning and implementation of a road contributes towards community "ownership" of the project, thereby ensuring its success. The promotion of Concrete Block Paving is an ideal opportunity for planners, engineers and developers to make a meaningful contribution to the concept of *DEVELOPMENTAL LOCAL GOVERNMENT* highlighted in the Constitution of South Africa. This approach is indeed a challenge for the industry *"to make a difference"*.

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