



The Aga Khan Award for Architecture

32, chemin des Crêts, 1218 Grand-Saconnex, Geneva, Switzerland, Telephone (22) 98 90 70

1983 ARCHITECTS' RECORD

CONFIDENTIAL

I. IDENTIFICATION

- A. Project Title Chikal Literacy Centre and Antidesertification Builders Training Workshop
- B. Postal Address Projet Tapis Vert (P.T.V.)
Chikal, Filingué, Niger

II. PERSONS RESPONSIBLE

(Please give name and address for each. If more than one, please state precise roles and relationships.)

- A. Client/Owner P.T.V. is administered by the Niger Ministry of Agriculture's research unit "INRAN": B.P.2605, Balafon-Niamey, Niger.
This project was initiated and funded by the Institute for the Study and Application of Integrated Development: ISAID, 566 Church St., Toronto, Ontario, Canada.

- B. Architect/Planner DEVELOPMENT WORKSHOP
Box 133
238 Davenport Road
Toronto, Ontario
Canada M5R 1J6

- C. Consultants (e.g. Economist, Sociologist, Demographer, Engineer)
The project was planned in collaboration with P.T.V. staff, which comprised an integrated team of professionals in the fields of ecology, sociology and appropriate technology.

- D. Contractor
Because of the educative nature of the project, contractors were not used. A group of local builder trainees were selected from Chikal and the neighbouring villages to take part in the Workshop.

- E. Master Craftsman
Allan Cain of the Development Workshop was the training workshop leader (instructor).

III. USE

- The Chikal Literacy Centre is part of a program for developing literacy in the vernacular Hausa language, research into local dialect, training and library.
- A. Type(s) of Use
- B. User/Occupant P.T.V. and Chikal village population
1. Occupation agriculture, husbandry
 2. Income Level subsistence/marginal
- C. Specify any change(s) between planned and actual use.

IV. PROJECT HISTORY

A. Programme Development

1. Date of Commencement spring 1979
2. Date of Completion August 1980

B. Design

1. Date of Commencement October 1980
2. Date of Completion November 1980

C. Construction

1. Date of Commencement November 1980
2. Date of Completion December 1980

D. Date of Project Occupancy

December 1980

V. PROJECT ECONOMICS

(For Costs, please give amounts and currencies. Specify their date(s) of validity)

- A. Total Initial Budget open ended
- B. Total Actual Costs see below

C. Analysis of Costs

1. Land donated by village
2. Materials 280,000 CFA (1980)
3. Labour 350,000 CFA (1980)
4. Professional Fees 5,800 (dollars)

D. Source(s) of Funds (indicate percentage)

1. Private
2. Public
 - a. Local
 - b. National
 - c. International 100%

VI. CONSTRUCTION DETAILS

A. Site Area and Characteristics The P.T.V. project region comprises a number of villages of various sizes, in an area hit by the recent severe Sahelian drought. The Literacy Centre is situated in the centre of the largest village, Chikal. The site is located adjacent to the new youth meeting house and is nearby the well, both foci for the village community.

B. Total Floor Area of Individual Building(s) 40 sq.m.

C. Structural System (describe) Vault and dome roofing without shuttering (Nubian and Iranian systems).
Loadbearing walls.

D. Materials (describe and indicate whether locally produced or imported)

1. Infill Wall materials were locally produced mud blocks made using improved techniques in the village mud brick yard.
2. Rendering of Facades Development Workshop carried out research into available materials in the Chikal region and developed a new render using crushed acacia pods in a stabilizing plaster.
3. Floors local laterite rock in soil cement
4. Ceilings vault and dome
5. Others (interior and exterior)

E. Site Utilities and Building Services (describe)

A cooling system was introduced employing a wind catcher and evaporative cooling. The design was based on careful analysis of climatic data and local micro-climatic factors. Cooling is extremely important in this extreme hot arid climate.

F. Construction Technology

- The Literacy Centre construction was preceded by an initial period of builder training and development of materials production methods. All transportation of materials from local production sites was by animal traction. Work was divided into stages of foundations, walls, roofing and finishes, each taking roughly similar periods of time. Construction was organized so that each builder/trainee had experience of practice with every element of construction.
1. Describe the Basic Method of Construction
 2. Indicate which major building parts were fabricated on-site and which were fabricated elsewhere.
- All components were fabricated either on site or in the village. Even door and window hinge hardware was designed to be made by the village blacksmith (see slide).

G. Type of Labour Force (indicate percentage)

- | | |
|--------------|-----|
| 1. Skilled | 40% |
| 2. Unskilled | 60% |
- Consistent with the workshop method of training, unskilled labour was also encouraged to participate in the training process; therefore it is difficult to draw a clear division

H. Origin of Labour Force (indicate percentage)

- | | |
|-------------|------|
| 1. Domestic | 100% |
| 2. Imported | |

VII. EVOLUTION OF DESIGN CONCEPTS

Please describe the genesis of the project, through programme, design and construction to final and present occupancy. Projet Tapis Vert was established at Chikal, Niger following the disastrous Sahelian drought, as a pilot project to develop appropriate strategies and experiment with techniques for countering desertification within the region.

Local timber cut for traditional roofing is one of the factors adding to the depletion of vegetation and consequent advance of the Sahara southwards. In this context the Development Workshop was invited by P.T.V. to carry out a program with the local community in Chikal to develop resource-conserving methods of construction, particularly for roofing.

The Development Workshop has been working for a number of years on similar problems in Egypt, Oman, Iran and other countries in Africa and Asia where technologies for Habitat problems in arid regions have been effectively developed through the evolution of mud-brick and masonry vault, dome and roof shell forms.

In the winter of 1980, Development Workshop carried out an intensive workshop and building program in Chikal which involved:

1) Improving Local Building Materials -

Clay for mud-brick making existed in good quantities near to the village, but brick making was unorganized and materials produced were of poor quality. Analysis was made of soils, using portable lab equipment, and it was discovered that stronger mud blocks could be made by mixing 40% sand with the clay. Modular forms were introduced for the first time, allowing for blocks to be used in interlocking courses, greatly strengthening local wall building. A smooth sand bed as a base for the floor of the brick yard increased block regularity and decreased breakage. The most important innovation was the introduction of a management system for the efficient use of labour in digging, stacking and transporting blocks. None of these innovations required capital expenditures and in fact could lead to a marginal reduction in the price of local blocks.

A render to protect external mud-brick walls against wind and rain erosion was developed using locally available acacia seed pods. The acacia render proved in tests to be between three and four times more resistant to water damage than an unrendered wall.

2) Builder Training -

An intensive training workshop for ten local builders and building assistants was carried out to upgrade general building skills through sharing knowledge and experience. The training focused on the introduction of methods for building vault and dome roofs without centering or formwork. A small room and a shade shelter were built and rebuilt to demonstrate the different forms and techniques.

3) Village Literacy Centre -

The Centre was designed and constructed not only to meet an important need but as a project to consolidate the builder-trainees' skills in improved roofing methods. The construction activities became the focus for the villages' attention for several weeks and the potentials of the new building techniques were demonstrated to everyone.

The Literacy Centre was conceived as a base for Tapis Vert's program of developing vernacular language (Hausa) literacy. The project was discussed with the village community and land which was held in a traditional form of communal tender was donated for the Centre. It was planned that in the future the Centre would come under full community control as part of Tapis Vert's devolution program.

The building called for a flexible space to function for small group teaching situations, and a library/office space which could be a base for a small research team.

The building consists of two intercommunicating rooms which can be subdivided or opened up for large group teaching activities; a small entrance hall;

P.T.O...

a storage chamber; alcoves for book shelves and seating; and a wind tower cooling system.

The material used is mud brick with a stabilizing render.

The structure uses load bearing walls and vault and dome roofing.

The project was completed in early December 1980.

VIII. SIGNIFICANCE OF PROJECT

In what way is this project important?

Please describe the aspect(s) of the project which you feel represent a particular achievement, for example, the technical, economic, or social achievement, or its response to culture or climate, etc.

This project should not be seen as an individual building but should be considered in terms of i) Projet Tapis Vert's antidesertification program; ii) Development Workshop's integrated training, research and community development approach to building and planning.

Development Workshop sees the village builder as a development agent in rural regions of Third World countries. It is through the rural builder that new methods can be developed and introduced to the community at large. The fight against desertification in the Sahel is a multidimensioned problem and must involve the full participation of the local community. To this end the village builder, already an important and respected member of the community, can be enrolled as an activist.

Initially skeptical, the Chikal builders soon saw the advantages of using technologies which eliminated the need for timber and exogenous materials requiring high capital outlay. Timber for roofing traditionally cost between $\frac{1}{3}$ and $\frac{1}{2}$ of total construction costs and would last only a few years due to chronic termite attack. The ecological arguments began to make sense when the impact of desertification could be measured in terms of meager family budgets.

The Development Workshop has for some time been concerned with the problems of Technology Transfer. This is most often seen as the imposition of inappropriate high technology equipment from industrialized countries in the Third World. This project illustrates an alternative approach: that being the sharing of simple but sophisticated techniques of construction between Third World countries which have similar environments, cultures, and economic problems. The vault and dome techniques evolved centuries ago in Egypt and Iran when those countries experienced environmental crises not unlike that which the Sahel is now facing.

Community buildings like schools and clinics normally become the channel for introducing new building forms into rural areas. Unfortunately, these new forms too often create aspirations to inappropriate models which in turn bring dependency on the importation of expensive materials such as concrete and corrugated metal sheeting. Vault and dome techniques it is hoped will be an innovation which will strengthen the local building tradition.

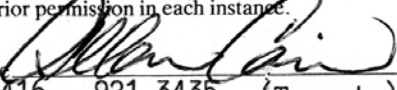
The Chikal project is only a small beginning. It has however sparked interest in neighbouring Sahelian countries and discussions are underway for carrying out more workshop/prototype projects throughout the region.

IX. DOCUMENTATION

Please indicate the materials you enclose for project documentation:

- ☒ 10 Photographs; Color, and Black & White; 8" x 10" (18 x 24 cm).
- ☒ 20 Slides; Color, and Black & White; 35 mm.
- ☒ Drawings: Community plan, Site plan, Floor plans, Sections, Elevations.
- ☐ Project Brief/Programme
- ☒ Biographical Data
- ☐ Other (Please specify: _____).

Please note: The submission of this Record is a prerequisite to candidacy for the Award. All information contained and submitted with the Form will be kept strictly confidential until the announcement of the 1983 Award recipients. Subsequently, such information may be made available by the Aga Khan Award Foundation for scholarly purposes only. Nevertheless, persons wishing to publish, reproduce or reprint such information shall be required to secure prior permission in each instance.

Authorized Signature  Allan Cain Date July 15, 1982
Telephone 416 - 921 3435 (Toronto) Telex _____