



Grupo Sofonias

**SKAT**

SKAT/RAS CASE STUDY SERIES DOSSIER: EDUCATIONAL FACILITIES EF2, 2000



## Rural School Construction in Southern Nicaragua

Front Page:  
 Carlos Miranda Blanco,  
 built in 1989 with quarry  
 stones and brick vaults.

Background image:  
 The local team developed  
 their own "colonial style",  
 to the delight of the  
 villagers.



**PROJECT INFORMATION**



Above:  
 A rural school revisited ten  
 years later (1998)

Left:  
 A Cuban teacher and her  
 class under an improvised  
 roof.



**The Country**

Nicaragua is one of the five countries of Central America, located in the tropical area of the Northern Hemisphere, the climate of its southern area being hot humid. It covers some 130,000km<sup>2</sup> and has a population of about 4.5 million. Its history is that of a typical "Banana Republic": foreign intervention, local and regional wars, coups d'état.

After the civil war in 1979, the newly installed government gave education absolute priority. In

**Context**

a country where the vast rural areas had little or no infrastructure, this was a gigantic task. Newly recruited teachers with rudimentary training and hundreds of well-prepared Cuban teachers started the task of educating the rural population, in makeshift shacks erected by the population and even under the shade of trees.

The Ministry of Education asked Grupo Sofonias, a small international NGO, to assist in the

**Objectives**

construction of schools. Swissaid, a Swiss NGO, was approached for financing and between 1980 and 1991, 380 classrooms were built in some 120 villages and their neighbourhood.

Nicaragua has suffered many changes over the centuries and there is no clearly defined cultural identity in the field of architecture. While traditional dwellings in the south are rather simple wooden structures, the modern

**Architecture**

influences from the US have focused upon the use of cement for walls and tin sheets for roofs. Among the rural and semi-urban dwellers, there is little desire for architectural expression.

However, people generally like the colonial structures with arches, tiles and verandas and consider them as the indigenous architecture. Thus, the project team felt that this was a reasonable point of departure for a rural school construction



Left top:  
Building colonial façades in 1985

Left bottom:  
Cut quarrystones are the locally available material in Carazo

Below:  
Fibre concrete sheets were produced on site and later replaced by MCR tiles

## BUILDING CONSTRUCTION



### Appropriate Technology

### Individual Adjustment

### Review

project, which should place emphasis on the use of local materials and easy replication.

The main task was to use local materials and technologies and not to depend upon imports. Many villages had no access by road and each one had to be assessed separately with respect to the design and the choice of locally available materials and technologies. Mainly in the first project phase, no school was made identical to the

other. Most of the time walls were made with stones and lime-cement mortar or locally burnt brick roofs with locally burnt clay tiles or hand-made fibre-concrete sheets, one of the early strengths of the project.

After the homemade fibre-concrete sheets proved to be a failure (some sheets cracked after one or two years on the roof), the project turned towards micro-concrete tiles or vaults made with fired clay bricks. The

vaults allowed elegant and low cost constructions. However, the communities would have liked more "decorated" buildings. By building a front wall in face bricks with pillars and arches, the schools acquired a higher status among the villagers. Even the leading architect felt it was the right thing to do, though it certainly violates contemporary architectonic beliefs...

This case study has

been elaborated more than ten years after the project finished and almost 20 years after its start. Most of the buildings are still in use and well kept. Many have been renovated, mainly the early ones. Sometimes new buildings have been added to the school, invariably planned and built by international aid programmes using the same standard and the same industrial materials all over the country and not taking into account community participation.



This CASE STUDY SERIES is a collection on intelligent architecture and best practices of cost and economical building systems, taking into consideration traditional and socio-cultural aspects as well as the requirements of modern way of life. The CASE STUDY SERIES comprises three dossiers Housing, Health Facilities and Educational Facilities.

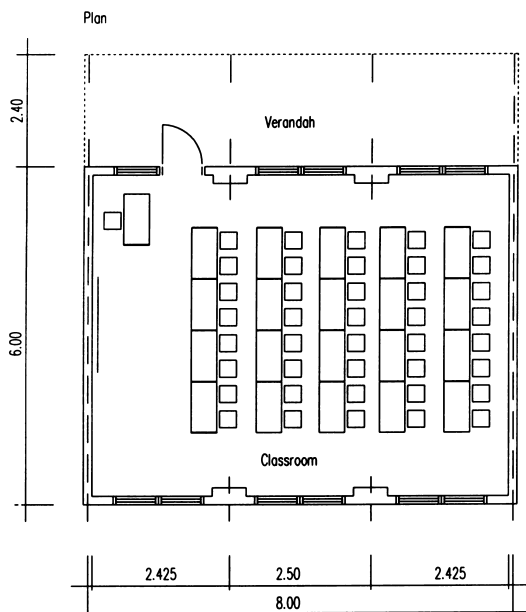
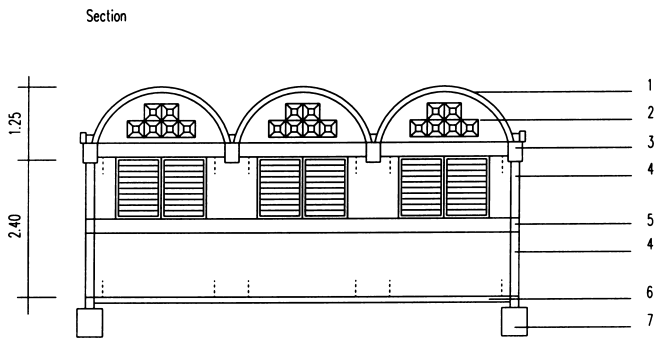
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<b>FUNCTION</b>	School buildings for basic education
<b>LOCATION</b>	Southern Nicaragua
<b>PROMOTER</b>	Ministry of Education, Nicaragua
<b>ARCHITECTS</b>	Kurt Rhyner / Emiliano Armira / Marcelino Castro
<b>PROJECT IMPLEMENTATION</b>	Grupo Sofonias
<b>YEARS OF CONSTRUCTION</b>	1980 - 1990

**Legend:**

- 1 Brick vault
- 2 ventilation blocks
- 3 reinforced concrete beam
- 4 bricks or stone
- 5 reinforced concrete beam
- 6 concrete floor
- 7 foundation

**PROJECT SCOPE**

Primary Schools	120
No. of classrooms	380
Total built area	24'000 m <sup>2</sup>
No. of children attended	12'000

**BUILDING COSTS**

External contribution	US\$ 2'200'000.— (67%)
Community contribution	US\$ 1'100'000.— (33%)
Total cost	US\$ 3'300'000.— (100%)
Average construction cost per m <sup>2</sup>	US\$ 137.—





# Learnings

## Integration of the communities

To achieve true integration of the communities, constructions must be tailored to the possibilities and needs of the community. However, their perceived needs were often different and, in some cases, the approach did not work well.

## Fight against illiteracy

The political programme of the Sandinista revolution greatly enhanced the natural drive of Latin Americans to strive for education. A nation-wide literacy campaign reducing illiteracy from over 60% to 13% in only 6 months created unprecedented enthusiasm for education. Cuba deployed several hundred teachers who worked in the rural areas, where never before a school had existed. During the first years, they played a decisive role in the organisation of the project and some of them organised stone collections with the children during playtime or their sports lessons (see picture).

## Standard designs

Too rigid standard designs to be implemented all over the country, with the same materials, often transported over hundreds of kilometres, are a threat to local cultures and jeopardize the use of local materials and initiatives.

Neither national governments nor international donor agencies usually take into account the local context when planning school programmes.

## Technology

Roofing was the most controversial of the technical issues. After the failure of the fibre cement sheets, a solid roof was needed to give back confidence to the communities. Vaults made with burnt bricks provide a strong and lasting roof and are relatively easy to construct over moving shutters. However, rather than rendering them with lime/cement mortar, the communities did it with pure cement, which inevitably leads to cracks and leaking. Most communities accepted the lesson learnt; however, in some places they re-plastered the vaults with cement mortar, and keep having infiltrations. Lime being rated as "not good enough" and substituted by cement in renderings is a common problem in many countries.

## Maintenance

Most communities try hard to maintain the buildings, even after ten years and more, but suffer from the lack of financial means which are much more restricted than ever before.

