AN EVALUATION OF THE SELF-HELP SCHOOLS CONSTRUCTION PROGRAMME, PAKISTAN

Sept-Nov 1989

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Geneva

EXECUTIVE SUMMARY

Located in the extreme north of Pakistan, the Northern Areas (formerly the Gilgit Agency) and Chitral (a District of the North West Frontier Province), are characterised by extremely poor communications with the rest of the country. Until the construction of the Karakorum Highway (KKH) there was no all-weather link. Even today, many parts of the region are isolated during the winter, and flights to Gilgit and Chitral are subject to weather throughout the year.

Education in the region has been traditionally provided primarily by the government using a system of free primary, middle and more recently, high schools. These schools, with stone walls and corrugated iron roofing on timber trusses, often used to be built on land donated by the local community, but increasingly the government is having to buy the land as it becomes both more valuable and more scarce.

In the region, as in the rest of the country, the schooling of girls is separated from that of boys except where the pressures of space or shortage of teachers forces co-education, and that too is restricted to primary and middle school levels.

The Shi'a Ismaili community, concentrated in the northern half of the Northern Areas and the western part of Chitral (where often whole villages are Ismaili), has had a long tradition of establishing girls' schools. In 1940, to mark the Diamond Jubilee of His Highness Sir Sultan Mohammed Shah Aga Khan III, the Ismaili community undertook to establish primary schools for girls in the Northern Areas of Pakistan. Many of these were initially housed in makeshift accommodation, though many later had purpose built buildings constructed for them by the local community. Known commonly as DJ Schools, they were built through the initiative of the villagers. Those built in the 1960's usually consist of three rooms arranged in an L-shape with a verandah, and are modelled after government primary schools. They were built in local materials: stone walls with timber roofs, earth floors and with little or no furniture. Most of these are now in a poor state of repair, and with an expansion and upgrading of girls' education to beyond primary level, most are also overcrowded.

There was increasing pressure on the Aga Khan Education Services, Pakistan (AKES[P]), who took over the responsibility for the management of these schools in 1974, to provide better teaching environments for the DJ Schools. The Schools managed by AKES(P) operate in parallel with government schools. The running costs are met by AKES(P) and parents pay only nominal fees.

In 1978 the Central Education Board (Pakistan) proposed building 71 3-room units in the Northern Areas. This proposal led to the decision in 1981 to construct instead a prototype school at Sherqilla.

While the Sherqilla school was being constructed, some 11 communities went ahead and constructed schools totally out of their own resources. Five of them went as far as to obtain a rough sketch of the plan of the as-then unfinished Sherqilla school and proceeded to build their schools based on that design with minor modifications, out of local materials using traditional techniques. Unfortunately, without technical guidance, in using traditional techniques and applying them to a building designed to be built using sophisticated methods and materials, a number of defects became obvious in the construction. Poor management also led to delays.

Nevertheless, the spirit demonstrated by these communities was much admired and the question was how to foster (not finance) the replication of the Sherqilla-type schools throughout the Northern Areas while maintaining some control over the design of the buildings and the quality of the construction?

The response to this resulted in the current school-building programme, the Self Help Schools Construction Programme (SHSCP). The primary objective for the SHSCP was to develop a system that could improve the educational environment of girls' schools in the Ismaili communities of Northern Areas and Chitral, particularly of the 100 or so that were then housed in temporary accommodation. This was to be done in a way that capitalised on the demonstrated enthusiasm and capabilities of the communities, combining external technical assistance and their participation.

Amongst other things, this implied that the schools had to be capable of being able to utilise local manpower, and be capable of being constructed quickly, rather than drag on and perhaps remain unfinished as enthusiasm waned. Since little or no building construction is possible during the winter, ideally the schools would need to be built during a single building period, April to October. The process of construction was also expected to improve and enhance building skills in the region.

The school design had to respond to the often difficult terrain and to an environment where there are few large flat building sites available. The design also had to be capable of coping with the range of schools from primary through to middle and high schools, including the possibility for expansion from one level to the next. Climatically, the design had to respond to the long cold winters as well as to the heat and solar radiation of the summer months in certain areas.

The school buildings, like the Jamaat Khanas before them, were expected to present a distinctive image, symbolising the communities' attitudes and commitment to education. Obviously the schools could not be built without adequate seismic resistance. Indeed it was expected that in case of an earthquake, the

schools should provide temporary shelter to those whose houses are destroyed. In winter, inadequate climatic protection could pose more of a threat to life than the earthquake itself, particularly in remote and isolated localities which food and medical aid may take many days to reach.

The SHSCP started in 1983, and the award of 15 classrooms was made to 4 villages in early 1984. In brief, the procedure is that the villagers are informed of the SHSCP through the Village Organizations. Those villages that want to, and feel they are able to meet the requirements of the SHSCP, make applications for an award. These applications are scrutinised, including visits to the site, by the Project Coordination Committees (PCC) in Gilgit and Chitral. A list of eligible villages is then sent to the Policy Committee in Karachi which makes the final selections and communicates the decision to the villagers through the PCCs.

The work is undertaken in the village by their Village Project Committee, formed for this purpose. The work is supervised through regular visits by the engineering staff of the Aga Khan Housing Board (HB), which is the implementing agency for the Programme, who also look after the supply of non-local materials and the finances of the programme.

The school design is essentially made up of 13 rooms, 16' x 30' or 16' x 32' which can be built in a sequence of four phases providing 3, 6, or 7,9 or 10, or 13 rooms respectively. The construction is of reinforced concrete beams, slabs and hollow blocks. The villagers provide unskilled labour, sand and aggregate and gravel, while the Programme pays for the skilled labour (mason, carpenter etc) and cement, steel and joinery.

Since 1983/84, awards have been made for 222 classrooms to be built in 41 villages in the Northern Areas (37 villages including 2 non-Ismaili) and Chitral (4 villages, 2 awarded in 1988, 2 in 1989). Of these, some 148 classrooms have been built, and by the end of 1989, a total of about 185-190 will have been completed.

The progress and particularly the quality of the construction have been remarkable, even without taking into account the logistics and other difficulties of many of the sites. Given the actual conditions, near miracles have been achieved in some villages.

There is a generally high level of satisfaction with the programme amongst the villagers themselves and considerable pride and sense of achievement, particularly in the Ismaili areas.

While there is little doubt that the programme as designed is being delivered well and cost-effectively, questions remain regarding both the product and the process which, on the basis of the experience of the last five years or so, need to be re-examined.

Generally speaking, the procedures for making the awards and the construction of the school have been well conceived and work very well, particularly in the Ismaili villages. The main problems stem from a very justifiable desire to ensure a high standard of construction. This has been interpreted as requiring a near absolute reproduction of the building design at all sites, which of course ignores many of the local realities of shortages of flat land and building materials.

As long as the programme remained essentially limited to Ismaili villages, their faith in the programme and its objectives overcame most problems, though of course often at great expense to the villagers. However, it cannot be stressed enough that the insistence on a type-plan and uniform standards of performance have resulted in a remarkable achievement in terms of both the number of schools built and their quality. It has also demonstrated that it is possible to construct to a high standard if the right training, supervision and support is provided.

However, if the programme is to be extended to other, non-Ismaili villages, then it will have to be changed to make it more acceptable. This means responding more to the local conditions and giving more scope for local and on-site participation in matters such as choice of materials and layout.

The current programme works because of the relationship that the villagers perceive and that indeed exists between themselves and the AKES(P) and HB. These perceptions are very different from those they have regarding the equivalent agencies of the Government of Pakistan, the departments of education and of public works. In the former case the villagers know that the AK network is working on their behalf, and that anything that is built will belong to the community and be for their benefit. Their experience of government agencies is not as altruistic or benign. If anything, there is a lack of trust in the motives and disappointment with their performance and fulfillment of promises.

Thus the essential ingredients of the SHSCP will have to be rethought. On the one hand the AK agencies too may not enjoy the same regard in non-Ismaili villages, and on the other, they may not have the mandate or the desire to operate there. For example, the AKES(P) provides the furniture and equipment as well as qualified teachers once the school has been built. In the non-Ismaili villages currently this role would have to be performed by the government, and on past performance is unlikely to inspire or act as an incentive to villagers, who moreover see the construction of schools as a government responsibility.

The need to make the schools more responsive to local conditions means that the present standard design and specifications will have to be modified. In the process, a number of other shortcomings associated with the present design and system can also be rectified.

Although much of the expense associated with the present school construction has been justified on seismic resistance criteria, the actual design is not ideal, and is certainly over-designed. It would be possible to achieve the same level of seismic performance with a simpler and cheaper design and one which was also better related to the local culture and customs.

In making proposals, therefore, the basic objectives regarding image, education, building, self-help, expansion and extension of the programme and of costs are examined and alternative ways of looking at these issues are examined.

As a result three options are presented.

The first option is for the continuation of the present programme of providing schools, using the existing design and institutional arrangements. As now, the programme would be available to the non-Ismaili community through their village organizations. The key difference from existing practice being to achieve some flexibility and responsiveness to local conditions. This will allow the programme to reach more villages with siting or accessibility and building material availability constraints. However, it is unlikely that it will have a significant impact on the non-ismaili communities if the institutional arrangements remain as they are.

The second option suggests that in order to overcome all the shortcomings of the present design (pointed out in Section D), and to be able to implement it in the non-Ismaili villages would require more than minor modifications. The option involves redesigning the school and field-testing the proposals and processes by the communities before being offered on a wide scale.

The basic objective of providing improved access to education facilities for girls in the Northern Areas and Chitral through the provision of schools remains as at present. The notion of a distinct image and identity of the schools too is retained, however, the image is sought to be created not through a uniform design so much as through a uniform quality and a scale which is different from the surrounding buildings.

Rather than developing a style that is in stark contrast to the indigenous, it is suggested that the school integrate more into the locality through the use of familiar materials and symbols.

Educationally too, the environment, particularly for the younger age-groups, should be perceived as an extension of that in the home, and lend itself to a gradual progression that the local community can relate to. The school should provide more opportunities for incorporating practical learning relating to the everyday life and experience of the community.

The construction process should, as now, be capable of quick execution, but this can as well be achieved through more training as through pre-fabrication.

Though technology transfer is not of primary concern, nevertheless the skills being imparted should be of a sort that can find application locally in domestic architecture as much as public construction.

The community must continue to be involved in the construction of their school, but they should have more of a say in its design. There should therefore be greater flexibility built into the system to take local conditions and aspirations into account. This has already been demonstrated in Rabat.

The cost of the school must of course be kept low, not just for the agencies, but also for the local communities, and therefore the availability of local resources must be a prime consideration.

Finally, the process and procedures must be such as to make them acceptable to and implementable by a variety of communities. This would mean ensuring some correspondence and compatibility with other projects and programmes being carried out in the Region (AK Health; GoP schools).

The third option suggests a programme for improving construction skills and techniques in the Region with a view to both improving the standard and costs of buildings, particularly shelter, and to developing construction as an economic activity.

This option can either be selected independently, or be combined with any of the other options. Independently this option would provide improved schools and other public buildings as a by-product. If combined with the second option, much of the exploratory work necessary would not have to be done; this would also meet the aspirations of the HB for the region.

The primary objective would be the improvement of the quality of construction and construction skills in the region, particularly with a view to improving housing and living conditions. School building is nevertheless an important basis for on-the-job training.

Training and technology transfer would be key considerations while the construction of schools would only be secondary to the programme, though improved construction capability will certainly lead to improved local capacity for construction of public buildings as well as dwellings.

The programme would rely on self-help, and promote self-reliance. It follows that it would also be replicable and would lend itself to expansion to all communities in the region.

Considering the desirability of expanding the programme to non-Ismaili communities, it is recommended that:

1. The obvious shortcomings of the existing SHSCP buildings be rectified by remedial actions to improve their performance.

2. The second option be initiated in 1990 and the third option in 1991. The two options together would meet all the objectives of the AKES(P) and the HB for the region in terms of an improvement in the quality of both education and general environment, housing and living conditions.

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A. INTRODUCTION

1. Terms of Reference

The Terms of Reference for this assignment had been drawn up following discussions in Karachi and Geneva between the Consultants and the Aga Khan Foundation (AKF), and Aga Khan Foundation Pakistan (AKF(P)), Aga Khan Education Services Pakistan (AKES(P)) and the Aga Khan Housing Board (HB).

The Terms of Reference of the Consultants was to undertake "an external evaluation of the Self-Help Schools Construction Programme .... to produce a two-part report, the first part of which reviews critically the progress to date, the second part of which charts a new five-year programme of construction activity." (See Appendix 1)

2. Inputs

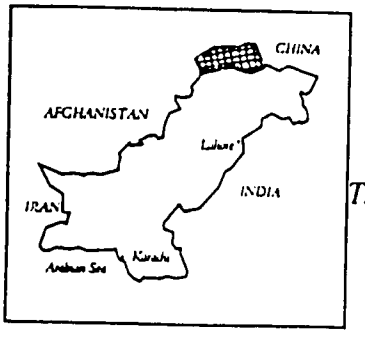
Accordingly, the Consultants conducted field visits and discussions during 11 to 24 September 1989. (See Appendix 6)

The discussions started with briefings in Islamabad by officials of HB and AKF(P) and later also with the AKES(P) team members who had just returned from the Northern Areas, and continued in the Northern Areas and Chitral, on-site in some 20 villages with school children, teachers, villagers, builders, members of the Village Construction Committees, Village Organizations, as well as with officials of the HB and AKES(P), AKRSP and the Government of Pakistan. Back in Islamabad and Karachi there were de-briefing sessions with the HB and AKES(P) and AKF(P) during which the findings and preliminary proposals were outlined and discussed. On the basis of which, this report has been finalised.

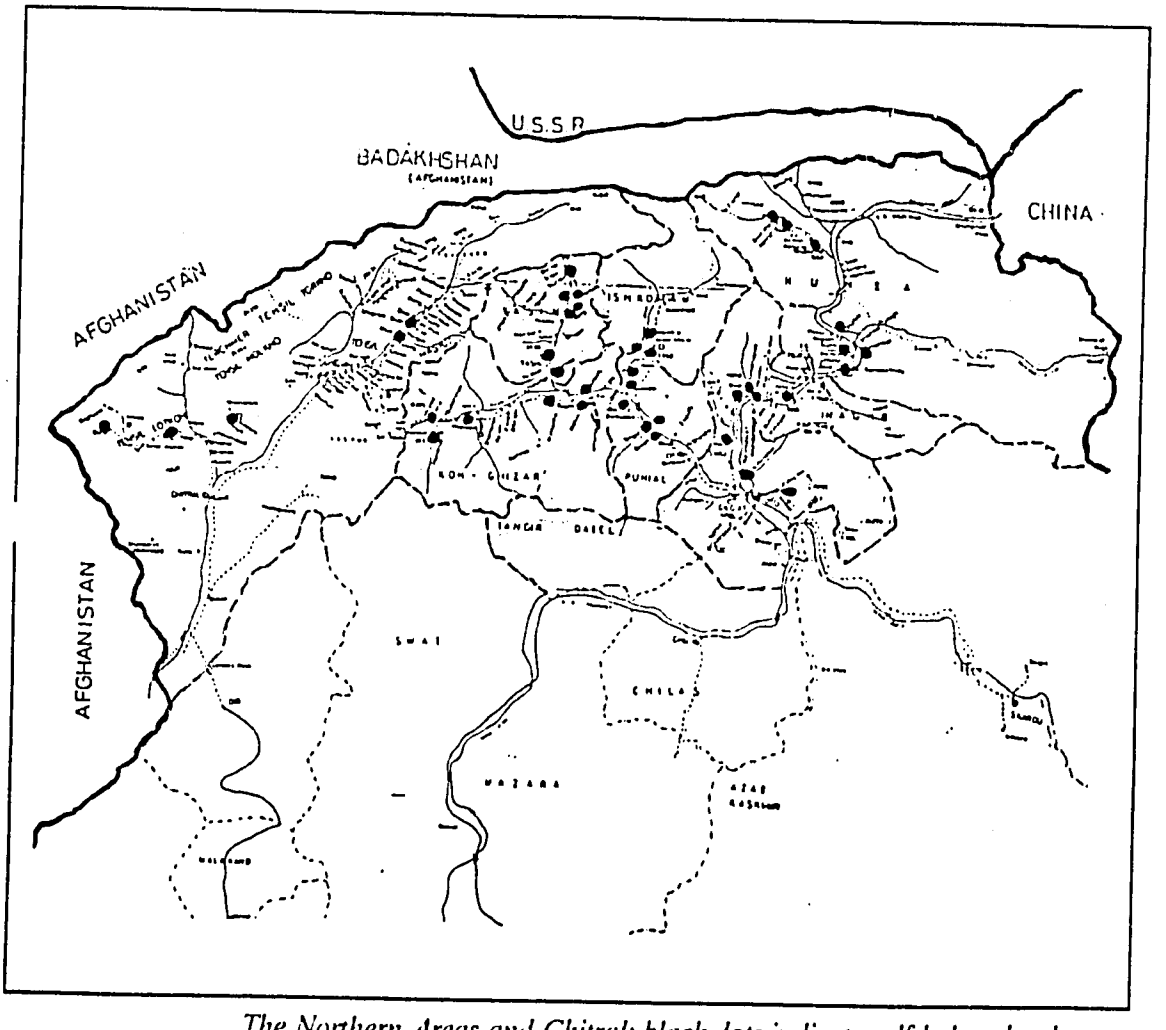
3. Acknowledgements

The Consultants would like express their gratitude to the many people they met who gave so much of their time to provide information and insights into the SHSCP. In particular those involved in the construction of the schools: the builders, the construction committees and the village organizations, and the school teachers. We would also like to thank the Aga Khan network, both in the field and in Karachi. Without their support, this report would not be possible. To them and our discussions with them we owe not just most of our findings about the present system, but also many of our ideas for the future. If we have managed not to mis-represent them, we feel we will have repaid them in some small part.

LOCATION



The programme area in Northern Pakistan



The Northern Areas and Chitral: black dots indicate self help schools.

B. BACKGROUND

1. The Northern Areas and Chitral

Located in the extreme north of Pakistan, the Northern Areas (formerly the Gilgit Agency) and Chitral (a District of the North West Frontier Province), are characterised by extremely poor communications with the rest of the country. Until the construction of the Karakorum Highway (KKH) which connects Pakistan to China through the Khunjarab pass, there was no all-weather link. Even today, many parts of the region are isolated during the winter, and flights to Gilgit and Chitral are subject to weather throughout the year.

Most of the population live in small scattered settlements along the river valleys, primarily engaged in subsistence agriculture. The construction of the KKH has transformed life along its length, opening up the area to outside influence. This is having a rapid effect on the indigenous economy and culture, bringing them both more closely into line with the rest of Pakistan. Away from the KKH too, improvements in communications are eroding traditional lifestyles.

Few but the largest land-owners are able to make a living from agriculture alone, and most households have long relied on supplementing their earnings by one or more male members working for varying lengths of time in other parts of Pakistan. Until relatively recently, there was also no higher education within the region, and all professionals and university graduates have been educated in the South.

In the last ten to fifteen years there has been a great increase in the number of schools and in school enrolment in the area, but literacy levels are still very low (in Chitral they are less than 1/2 the national average, which itself is only 26%), particularly for females (2.3% in Chitral, 1/8 the national average).

Education in the region has been traditionally provided primarily by the government using a system of free primary, middle and more recently, high schools. These schools, with stone walls and corrugated iron roofing on timber trusses, often used to be built on land donated by the local community, but increasingly the government is having to buy the land as it becomes both more valuable and more scarce.

In the region, as in the rest of the country, the schooling of girls is separated from that of boys except where the pressures of space or shortage of teachers forces co-education, and that too is restricted to primary and middle school levels.

The Ismaili community, concentrated in the northern half of the Northern Areas and the western part of Chitral (where often whole villages are Ismaili), have had a tradition of establishing girls' schools since the 1940's, and this has been further boosted with the Self-Help Schools Construction Programme which started in 1983 in the Northern Areas and in Chitral from 1987. These schools, which operate in parallel with the government schools, are managed by the Aga Khan Education Services who meet all the running costs, with the parents paying only a nominal fee.

2. Origins of the SHSCP

In 1940, to mark the Diamond Jubilee of His Highness Sir Sultan Mohammed Shah Aga Khan III, the Ismaili community undertook to establish primary schools for girls. Many of these were initially housed in make-shift accommodation, though many later had purpose built buildings constructed for them by the local community. Known commonly as DJ Schools, some of the earlier schools were housed in Pir Khanas, Langar Khanas and the verandahs of Jamaat Khanas, in 'kutcha' rooms of stone rubble and mud mortar, built through the initiative of the villagers. Those built in the 1960's usually consist of three rooms arranged in an L-shape with a verandah, and are modelled after government primary schools. They were built in local materials: stone walls with timber roofs, earth floors and with little or no furniture. Most of these are now in a poor state of repair, and with an expansion and upgrading of girls' education to beyond primary level, most are also overcrowded.

There has been increasing pressure on the Aga Khan Education Services, Pakistan, who took over the respon-

sibility for the management of these schools in 1974, to provide better teaching environments for the DJ Schools. In 1978 the Central Education Board (Pakistan) proposed building 71 3-room units in the Northern Areas. This proposal led to the decision in 1981 to construct instead a prototype school at Sherqilla. However, while this was still being designed, it was decided to upgrade the project and incorporate it and the Health Centre being designed for Singal into the set of projects being built around the world to mark the Silver Jubilee of His Highness Prince Karim Aga Khan IV.

The design therefore required a status beyond that of a prototype that the community could replicate, and was expected instead to be an inspiration for the community. While the Sherqilla school was being constructed, some 11 communities went ahead and constructed schools totally out of their own resources. Five of them went as far as to obtain a rough sketch of the plan of the as-then unfinished Sherqilla school and proceeded to build their schools based on that design with minor modifications, out of local materials using traditional techniques. Unfortunately, without technical guidance, in using traditional techniques and applying them to a building designed to be built using sophisticated methods and materials, a number of defects became obvious in the construction. Poor management also led to delays.

Nevertheless, the spirit demonstrated by these communities was much admired by the Central Education Board (now The Aga Khan Education Services (Pakistan) [AKES(P)]). The question was "How are we going to foster, not finance, this replication (of the Sherqilla school) throughout the Northern Areas and, at the same time, maintain some control over the design of the buildings and the quality of the construction?" The working Paper which raised the question in January 1982 also outlined proposals for a self-help school construction programme backed up with technical assistance which has formed the basis of the current Self-Help Schools Construction Programme (SHSCP) in the Northern Areas and, more recently, in Chitral.

3. Objectives of the SHSCP

The primary objective for the SHSCP was to develop a system that could improve the educational environment of girls' schools in the Ismaili communities of Northern Areas and Chitral, particularly of the 100 or so that were then housed in temporary accommodation. This was to be done in a way that capitalised on the demonstrated enthusiasm and capabilities of the communities, combining external technical assistance and their participation.

Amongst other things, this implied that the schools had to be capable of being able to utilise local manpower, and be capable of being constructed quickly, rather than drag on and perhaps remain unfinished as enthusiasm waned. Since little or no building construction is possible during the winter, ideally the

schools would need to be built during a single building period, April to October. The process of construction was also expected to improve and enhance building skills in the region.

The school design had to respond to the often difficult terrain and to an environment where there are few large flat building sites available. The design also had to be capable of coping with the range of schools from primary through to middle and high schools, including the possibility for expansion from one level to the next. Climatically, the design had to respond to the long cold winters as well as to the heat and solar radiation of the summer months in certain areas.

The school buildings, like the Jamaat Khanas before them, were expected to present a distinctive image, symbolising the communities' attitudes and commitment to education. Obviously the schools could not be built without adequate seismic resistance. Indeed it was expected that in case of an earthquake, the schools should provide temporary shelter to those whose houses are destroyed. In winter, inadequate climatic protection could pose more of a threat to life than the earthquake itself, particularly in remote and isolated localities which food and medical aid may take many days to reach.

4. The SHSCP

After the Self-Help Schools Construction Programme was designed and detailed, it received funding from the Aga Khan Foundation in 1983. The first awards, for the construction of 15 classrooms were made to 4 villages in January 1984 and construction started around May that year.

The procedures for applications by the communities, making awards by the various committees, and construction of the schools have in essence remained the same as outlined in the 1982 Working Paper, though modifications have continuously been made to both the design and the procedures.

In brief, the villagers are informed of the SHSCP and its procedures. Those villages that want to, and feel they are able to meet the requirements of the SHSCP, make applications for an award. These applications are scrutinised, including visits to the site, by the Project Coordination Committees (PCC) in Gilgit and Chitral. A list of eligible villages is then sent to the Policy Committee in Karachi which makes the final selections and communicates the decision to the villagers through the PCCs.

The work is undertaken in the village by their Village Project Committee, formed for this purpose. The work is supervised through regular visits by the engineering staff of the Aga Khan Housing Board (HB), which is the im-

plementing agency for the Programme, who also look after the supply of non-local materials and the finances of the programme.

The school design is essentially made up of 13 rooms, 16'x30' or 32' which can be built in a sequence of five phases providing 3, 6, or 7, 9 or 10, or 13 rooms respectively. The construction is of reinforced concrete beams, slabs and hollow blocks. The villagers provide unskilled labour and locally available materials (sand and aggregate and gravel, and sometimes even timber) while the Programme pays for the skilled labour (mason, carpenter etc) and cement, steel and joinery.

The main changes to the design have been in order to reduce costs, and to the procedures to encourage the participation of non-Ismaili villages. The design and the procedures and their evolution and evaluation are dealt with in detail in Section C below.

5. Progress to date

Since 1983/84, awards have been made for 222 classrooms to be built in 41 villages, 37 in the Northern Areas (37 villages including 2 non-Ismaili) and 4 villages in Chitral (2 awarded in 1988, 2 in 1989). Of these, some 148 classrooms have been 'completed' (see comments in Section D), and by the end of 1989, a total of about 185-190 will have been completed.

The progress and particularly the quality of the construction have been remarkable, even without taking into account the logistics and other difficulties of many of the sites. Given the actual conditions, near miracles have been achieved in some villages.

There is a generally high level of satisfaction with the programme amongst the villagers themselves and considerable pride and sense of achievement, particularly in the Ismaili areas.

While there is little doubt that the programme as designed is being delivered well and cost-effectively, questions remain regarding both the product and the process which, on the basis of the experience of the last five years or so, need to be re-examined in their entirety before making proposals for the future.

C. THE EXISTING PROGRAMME

1. The S.H.S.C. Programme

1.1 Scale of the programme

The SHSCP is operating in the Gilgit District (Gilgit, Hunza, Puniyal, Yasin, Ishkoman and Gupis valleys) of the Northern Areas and in the Lotkho and Mastug valleys of Chitral District of the North West Frontier Province. Gilgit District covers an area of some 28,500 square kilometers and has a population of 0.37 million. Chitral District is 14,850 square kilometres and has a population of 0.25 million. Since 1983, 41 schools having 222 classrooms have received the award for construction. Of these 23 schools having 148 classrooms have been completed.

The total cost of the programme so far, inclusive of the investment made by the villagers in labour and materials, has been Rs 30,666,000. Of this, the AKF contribution is 65%.[1] This works out to Rs 136,333 per classroom (toilet block included) in 1987 as opposed to an expected cost of Rs 185,666 in 1989.[2] The costs of classrooms without the toilet block being included were Rs 106,000 in 1987 and Rs 147,000 in 1989.

Comments and Observations

The area in which the programme is operating is large, but sparsely populated. Distances are considerable and the communication network, except for villages directly on the KKH, extremely poor. Keeping these factors in view, the fact that so many classrooms have been constructed in a span of 5 years, is a considerable achievement. Again, in an area which has only recently been connected to the rest of Pakistan by road, and in some cases badly so, it is remarkable that so many girls are already receiving education.

Although the average cost of a classroom built by the Programme is considerably higher than that built by the GoP's school building programme,(Rs 253 per square foot as opposed to Rs 192 [3]) the quality of construction is far superior, maintenance costs are negligible and the earthquake resistance factor higher. Per item rates in the government schedules indicate that if GoP was to construct schools of similar quality to the ones constructed by the SHSCP of the AKF, their cost would be considerably higher. In addition, the contribution of the villagers to the programme is considerable. Again, this is remarkable, for apart from some villages on the KKH, the area still has a subsistence agricultural economy.

1.2 Increase over the years

The scale of the programme has increased steadily over the years. In 1984, construction awards were given for 15 classrooms. In 1985 this increased to 21; in 1986 to 30; in 1987 to 45 and in 1988 to 60. In 1989, the figure has fallen to 36. However, the number of classrooms completed during this period are 6 in 1985, 57 in 1986, 39 in 1987, 23 in 1988, and so far about 20 in 1989.

Comments and Observations

The fall in the number of awards given in 1989 as against 1988 is mainly because AKF requested AKES(P) to first complete the ongoing schools and to allow an assessment of the first five years of the programme to be done before making substantial additional awards. The fall in the number of schools being completed in the last two years as opposed to the previous ones, is also because more of the new schools are being built in less accessible areas, some with significantly shorter building seasons. The original target of completing a phase of construction in one building season has become increasingly difficult to attain.

1.3 Distribution of self help classrooms over the region

The distribution of self help classrooms over the region shows that awards have been given for 60 classrooms in Hunza, 47 in Ishkoman/Puniyal, 34 in Gilgit, 35 in Yasin, 28 in Gupis, 3 in Nagar, and 15 in Chitral (total 222).

Comments and Observations

The distribution of self help classrooms over the region shows that initially most of the classrooms were constructed in the areas that were more easily accessible and where the Ismaili population is in a majority. Attempts to build in the less developed areas are resulting in considerably higher HB management and supervision costs and, due to the problem of logistics, in higher building costs. Overall, the task of extending the programme to cover the whole region will, for a variety of reasons, get increasingly difficult if the present model is followed.

2. The Award Procedure

2.1 Actors in the Award Procedure

The main actors in the award procedure are AKES(P), who manage the programme; HB who arrange for the physical implementation of the programme and AKF who fund the programme. They operate through the Policy Committee and the Project Co-ordination Committee.

i. Policy Committee (PC)

a) Membership: The membership of the PC is derived from the AKES(P), AKF and HB.

b) Functions: The PC takes decisions on all major policy issues related to the programme, confirms awards for classrooms, reviews progress of construction through reports from PCC and HB and ensures that project requirements are met. It also carries out relevant changes or modifications in the designs and specifications of the school, if advised by the architects or the Housing Board.

ii. Project Coordination Committee (PCC)

a) Membership: The membership of the PCC is derived from the field representatives of the AKES(P) and the HB.

b) Functions: The PCC is responsible for all dealings with the villages leading to the award. It makes recommendations to the PC for confirmation of the awards and monitors field operations. In addition, it gives regular feedback to the PC on the progress of construction of each site, problems, and suggests corrective action.

Comments and Observations

The composition and functions of the different actors in the award procedure are accepted by the people and by the HB as satisfactory.

2.2 Award Criteria

All villages in Chitral and the Northern Areas are eligible to apply for award for rooms under the SHSCP. However, the criteria for award which all eligible villages have to meet are:

1. There should be a minimum of 60 students enrolled in the school which is requesting a new building.

2. At least 33 percent of the students should be female.

3. The school requesting a building should have been in existence for at least 3 years.

4. A primary school which meets the criteria is awarded 3 rooms and a middle school 6 rooms. Where there is a very high enrolment in the primary school, a larger number of classrooms is awarded.

In addition, the villagers must donate:

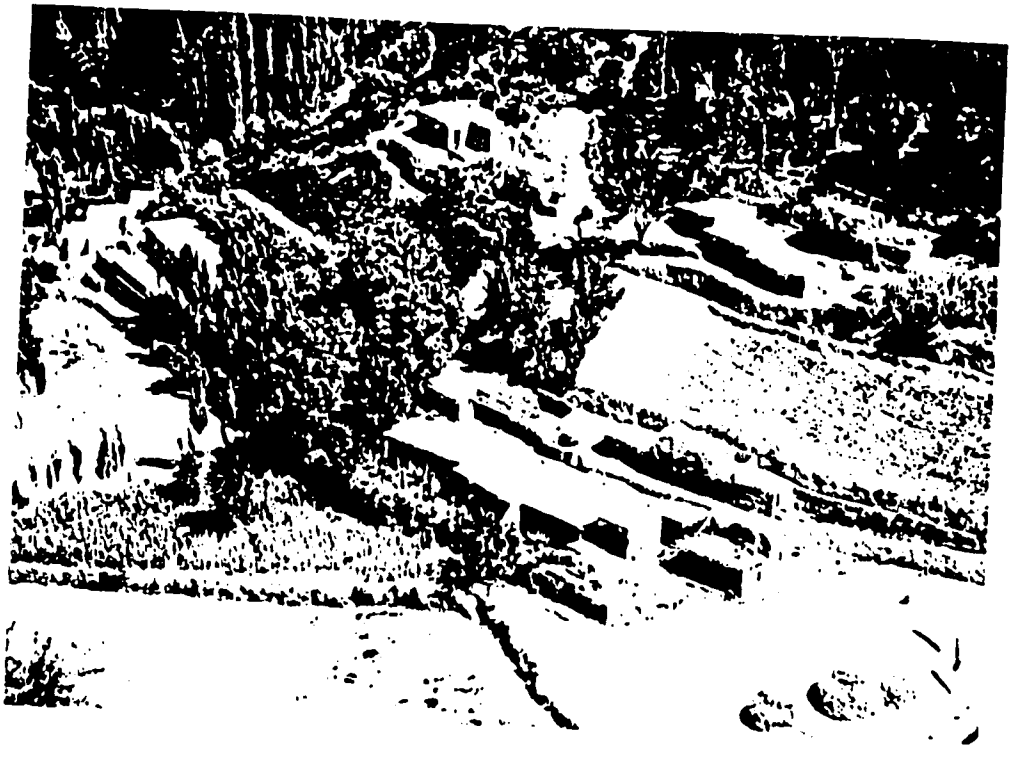
1. A flat piece of land at a suitable location.

2. Unskilled labour for construction of the building.

3. Local materials for construction.

Comments and Observation

The award criteria are basically sound as they help promote the education of girls, which is one of the basic objectives of the Programme. Also, they motivate those villages which do not have a girls' primary school to establish one and run it for 3 years, in order to qualify for a SH school. This develops



the organizational and managerial capacity of the village. Similarly, the management of construction, the organization of unskilled labour, and the supply of local materials and the logistics of their supply, have developed, in most cases considerable self confidence in the villagers and given them an active leadership which can be used for further developmental activities. However, the acquiring of a flat piece of land, poses considerable problems as such land is often simply not available. The land criteria has had an effect on both the quality of educational space potentially available and the effort required from the community. Communities which have lacked suitable land but which otherwise qualify well for an award are in effect penalized because their land does not fit the school layout. This seems to be getting the objectives in the wrong order. Moreover, few villages have a completely flat plot of land, and the result is that land is cut and levelled by the community at considerable cost, in terms of money and time, both of which could be better utilized if smaller or different size rectangular sites were acceptable (see Section D). Most available flat land in the NA has been created in the form of terraces of 20 to 60 feet wide and sometimes of over 100 to 150 feet in length. It is invariably such land that is used for school building and it deprives the community and the environment of a valuable agricultural resource, which in many cases, has taken decades to develop.

2.3 Award Procedure

Announcement

Announcement regarding the programme is made by the PCC in all villages during October/November of the preceding year. This is done through the AKRSP-fostered VOs. The villages desiring to participate in the programme are encouraged to apply through their VOs to the PCC.

First Dialogue

The villages which have applied and meet the criteria for the award are then visited by the PCC. The "first dialogue" then takes place and the terms and conditions of the programme are explained. If the villagers agree to the terms, they are then asked to identify a suitable piece of land for construction.

Second Dialogue

After the villagers have identified a piece of land the PCC visits the villages to judge its suitability. This constitutes the "second dialogue". The land is or is not approved. Sometimes an alternative site acceptable to the PCC has to be found.

PCC's recommendation to PC

After the land has been approved the PCC sends its award recommendation to the PC. The PC, after receipt of grant letter from the AKF, considers PCC recommendations and makes the award.

Third Dialogue

The PC's decision is then communicated to the PCC which in turn contacts the villages and holds the "third dialogue". This dialogue leads to the formation of the Village Tamirati (Construction) Committee (VCC) by the assembly in the village and the signing of an agreement between the village and the AKES(P). The agreement spells out the terms of participation.

Comments and Observations

Two recurring complaints were encountered by the team about the award procedure. First, that the VO leadership in many cases was not able to explain the programme to the community sufficiently well for it to understand the terms of partnership properly. Often it was only when construction began that the community became fully aware of its obligations and what they entailed. This suggests a difficulty to communicate the quantities and effort that is being asked of the villagers, even though they may have been told how much sand, gravel etc. is needed.

The second complaint relates to the question of approval by the PCC of a suitable site for the school. At Geech and Oshikhandas, for example, sites earmarked by the villagers for school construction prior to the SHSC programme proved unacceptable to the PCC. In addition, it is felt that the decisions should take into consideration the strengths and weaknesses of individual villages or their leadership, when making the award. For example, the long standing feud between Geech and Japukey created problems not only during the construction process but also when the school became operative.

2.4 The Agreement

According to the agreement between the AKES(P) and the VCC, the VCC undertakes to provide all local materials and unskilled labour required for construction, and to maintain the building after the school becomes operative. In addition, the community undertakes to assist the teaching staff, albeit in an unspecified manner. On the other hand, the AKES(P), through the HB, undertakes to provide all tools and machinery required for construction, along with cement, steel and other materials that are not locally available. It further undertakes to provide skilled labour and to give construction supervision. Though no time period for completion is stipulated in the agreement, the

"third dialogue" emphasises the necessity for completing the construction within the next building season.

Comments and Observations

The agreement deals with only a minimum of broad issues. It is thus a sound document leaving considerable room for developing or evolving procedures according to local site or social conditions. The buildings visited were clean and well maintained, although in a couple to cases skylight panes were broken. The villagers were not clear as to whether replacing them was their responsibility. However, the community in all cases had given free accommodation to those teachers who had been stationed there but did not belong to their village.

2.5 Criteria for Second Award

The performance of the village in executing the first award becomes an important criterion for determining whether it should or should not receive a second award.

Comments and Observations

The criteria for the second award gives great emphasis to the successful execution of the first award by the Village Community. However, it has been pointed out by the local HB staff that in the case of Jandrote, after the successful completion of the first phase, differences arose amongst the villagers and the entire work for the construction of the second phase of the school was carried out by one family without any assistance from the rest of the village.

3. Implementation Procedure

3.1 Actors in the implementation procedure

Housing Board

i. Structure of the Housing Board in the Northern Areas

The SHSCP is managed by the Programme Manager who is a senior engineer. All local technical and administrative decisions are taken by him. The Hunza, Gizar and Chitral areas are each managed by separate sub-engineers working under the Programme Manager. In addition, the HB has a full-time plumber

for the sites and when necessary a part-time plumber is engaged. Three jeeps take care of the logistics involved in supervising work in this large area, parts of which have almost no communication network.

ii. Role of the HB in the implementation of SHSCP

a) Quantification of inputs required from the villagers:

The HB informs the villagers through charts and tables about the amount of aggregate, sand and unskilled labour they would require per month during the course of construction (Appendix 2, Table 1).

b) Identification of aggregate sources:

The sources which have appropriate aggregate for construction are identified by the HB in consultation with the VCC.

c) Layout:

The engineering staff of the HB lay out the building on site.

d) Supply of materials and tools:

The HB undertakes the supply of steel, cement and timber. Steel is imported from Karachi to Gilgit, and cement is purchased in Gilgit. Timber is purchased in Chilas. All these materials are normally taken to the sites by tractors hired wherever possible from the AKRSP-fostered VOs. This benefits the VOs economically, and as they charge slightly less than market rates it benefits the programme as well. In certain areas, the roads are too narrow for the use of tractors. In such cases, jeeps are used to transfer the materials, from locations accessible to tractors, to the sites. In addition, the HB supplies all tools, machinery, scaffolding and shuttering necessary for construction.

e) Training:

Training is given by the HB master trainers to individuals in the community for steel binding, block-making, precasting of roof elements and laying of concrete blocks. In a couple of weeks the trainees are in a position to take over from the HB. In cases where there is no village mason available for being trained, the HB brings in a trained mason from another village. However, this happens in very rare cases. The villagers provide such a mason with residential accommodation. It often happens that the local assistants of the mason acquire his skills by the time the project is completed. All skilled labour is paid for by the HB.

f) Funding the project:

The HB puts up a monthly demand for finances for the SHSCP to the AKES(P) who in turn puts it up before the AKF. The AKF makes such finances, or part of them, available to the AKES(P) who then passes them onto the HB.

g) Supervision and monitoring:

The HB, through its engineers, supervises the construction of the project, identifies problem areas and advises the community on how to overcome them. In addition, it pressurises the villagers to stick to the construction schedule. In the early stages of the project often two site visits per week are required but towards the end this can be reduced to two per month.

Comments and Observations

The extremely fine quality of construction of the schools and its smooth manner of implementation shows that the structure of the HB in the NA and its manner of functioning are appropriate to the demands of the technology on the one hand, and the social conditions on the other. However, in some of the villages visited, the community claimed that before it undertook construction it had no idea as to what the cost of local materials would work out to (Ovarik, Altit). In one case (Ovarik) the community further felt that had it known it would probably not have undertaken the project at all. Furthermore, it claimed that if the project was functioning then it was only because they had received a grant of Rs 200,000 from their MNA[5] for this purpose.

Although the HB manages to supply materials to the most remote of sites, the cost of doing so has serious implications on the cost of the school. For instance, at Phander, the cost of cement at site is Rs 184 per bag, at Susum Rs 140 and at Altit Rs 130, against the basic Islamabad price of Rs 78.

The training given to the members of the community and the process of school construction, has produced a number of masons, steel binders, and block makers. However, their skills can only very marginally be used for the benefit of the community or the local environment: block construction in much of the NA is non-existent, and even where it is taking place, the blocks are solid and made by hand, and thus have different qualities and cost implications; the roofing techniques are way beyond the reach of the population. In short, skills are not at present adapted to the building methods and needs of the community. Most of the masons and steel binders find jobs with contractors working on government projects in various parts of the NA, or with contractors working on private schemes in Gilgit or in villages directly on the KKH.

The logistics of requests for funds and their release requires the routing of these through AKES(P). These procedures could be streamlined to ensure

that work on site is not delayed because of the required finances not being available on site when required.

Village Communities agree that supervision by the HB is adequate. It has also been observed that the HB staff is generally on good terms with members of the community and is aware of both their problems and potential. The relationship of the two is, by and large, an equal one. It is because of this close relationship between the community and the HB staff that the former's involvement in the programme is ensured. Monitoring reports of the schools prepared by the HB are excellent. Apart from costs, they also deal with various problems encountered during construction and suggest solutions to them.

The community

i. Village Construction Committee (VCC): composition

The VCC represents the village for the SHSCP. It is formed by a consensus of the entire village and consists of important village personalities such as the 'lambardar', an office bearer of the VO, ex-army men and village activists.

ii. VCC: its functions

a) Acquisition and levelling of land:

Land is acquired by cash payment to the owner or is donated by an individual for the school building. In the former case, members of the VCC motivate villagers to contribute for raising money for the purchase of the land. In the latter case, the villagers settle terms with the person making the donation. After the land has been acquired, the members of the VCC organize the members of the community to level and clear the land as necessary.

b) Managing construction:

The VCC manages the construction of the school. For this it has to coordinate its efforts with those of the Housing Board. It motivates the villagers to provide labour for construction by turns or 'bari'. Those who do not provide such labour have to make a payment for every turn they miss. This payment is equivalent to the daily wages for unskilled labour. In certain other cases the VCC raises money from the villagers and then pays the labour working on site.

c) Supplying local material:

Local material is usually free of cost. However, the logistics of bringing it to the site can be considerable. In most cases a tractor is hired for the purpose. In a few cases VOs have their own tractors which makes the availability of transportation more reliable. However, in most cases, the VO is paid at market rates for its tractor and this payment goes into its savings. In other places jeeps have to be hired as the roads are not fit for use by a tractor.

d) Keeping accounts:

The VCC keeps accounts of its inputs in the construction programme along with a daily account of attendance at site.

Comments and Observations

The involvement of the community in the SHSCP is very much the result of its devotion to the Aga Khan. They see it as an act of spiritual devotion. Although formally invited to join in the effort, generally the non-Ismaili members of the village do not participate in the programme. However, a few of them do send their girls to the school when it is completed. When asked if they would participate in a similar manner in a GoP school building programme or that of another agency, the answer was invariably 'no'.

From the villages visited, it seems that in the more developed ones, or the ones on the KKH, land for school-building has not been donated by individuals but purchased against cash payments by the community (Danyore, Sultanabad and Oshikhandas). Again, in such villages the system of paying cash to the people working on site is adopted more often rather than the 'bari' system. It seems plausible to assume that as roads are built, land prices go up and jobs are generated, donations for land and the 'bari' system will cease to function. If this does happen then it may be possible to get the community to invest in cash in the SHSCP and leave the construction entirely to the HB. On certain sites such as Ovarik, jeeps are used by the community for cartage of local materials. The jeep service is unreliable and excessively expensive. In such cases, the loan of a jeep to the community may help it in overcoming these problems and in making the SHSCP affordable to them. In the 1989 Budget, some financial provision for transportation has been made.

AKES(P)

a) The AKES is in charge of planning for and operation of the entire AK education programme in the NA. This includes training of teachers, coordination with the GoP and determining needs and directions.

b) Take over and operation:

The AKES(P) takes over the completed school from the HB and the VCC and takes steps to make it operational.

Comments and Observations

The school teachers and the village communities are satisfied with the role of the AKES, the teachers especially so with their training programme. The general feeling among the villagers is that the education imparted in the AKES(P) schools is far superior to that imparted in the GoP schools.

However, in all the villages visited the AKES(P) took over the schools from the VCC and HB before they were complete (in large part because of the local community's eagerness to move into the building as soon as it is functional). Thus, with two exceptions, none of these schools have mud insulation on the roof, and none have skylights in the passages, or glazing at the corridor openings. The lack of finishing has negative results: the roofs leak and thermal insulation is poor. However, air circulation in summer is probably better in the absence of skylights and glazing in the passages.

It is important that the school be seen as a finished unit at each stage of its development through the various phases that are awarded.

4.Cost of the Construction Programme

4.1Total costs

At the time of the evaluation, the programme had completed 148 rooms inclusive of toilet block. The total cost of this effort works out to Rs 30,666,000. The break-down is given below:

a) Cost to the AKF

- Rs 19,933,000 65% 145.95 per SF (Square foot)

b) Cost of the Community

- Rs 10,733,000 35% 78.59 per SF (This is a stipulated cost)

Total :Rs 30,666,000 100% 224.54 per SF

4.2 Details of AKF costs

a) Cement	18.85 %
b) Steel	9.60 %
c) Other materials not locally available	9.30 %
d) Skilled labour	13.39 %
e) Cartage	23.94 %
f) Overheads for management, supervision, consultancy	23.54 %
g) Capital costs	1.37 %

4.3Cost to community

a) Local material	29.4 %
b) Unskilled labour	23.9 %
c) Land	46.6 %

Comments and Observations

The break-down of cost tables show that a major expense (61.69% of total AKF cost) of the SHSCP is in cement, other non local materials and their cartage (see Appendix 2, Table 3). However, the variation from site to site is

considerable, and at certain locations the cartage of cement actually exceeds its basic cost (see Appendix 2, Table 4). Similarly, the cost to the community of sand and gravel also varies according to the location of the site. It is an unbelievable Rs 17 per cubic foot for sand and Rs 20 for gravel at Ovarik, to a more reasonable, if not cheap, Rs 3 for sand and Rs 6 for gravel at Brep. The price of similar aggregate at site in Karachi is Rs 4 to 8 per cubic foot. With such abnormally high cement and aggregate prices one is forced to question the logic of using concrete in a big way at such sites. In comparison to cement and steel the cost of timber at various sites does not show an appreciable difference (see Appendix 2, Table 4). The above figures do not include the considerable costs incurred by AKES (P)'s staff and volunteers in managing the programme, making field visits to motivate the villagers, etc.

4.4 Increase in costs

There has been an appreciable increase in the unit cost of the programme over the years. In part this is due to an increase in the basic cost of material (see Appendix 2 Table 5) and in part due to the fact that the SHSCP has now expanded into more inaccessible areas. The management cost has also increased considerably (see Appendix 2 Table 6). Rs 928,306 were spent as overheads in 1988 (111 rooms under construction, 23 completed) as against Rs 706,523 in 1987 (57 rooms under construction, 39 completed).

Comments and Observations

Management costs constitute 23.24 percent of the total AKF cost of the programme (16 percent of the overall cost) and they have increased over the years. For the programme to be cost effective the curtailing of this expense is necessary, especially as the programme expands into the more remote areas. However, if the projected building costs can be reduced, the percentage may still appear to be high.

4.5 Comparison with government construction costs

Any comparison always begs the question whether it is fair and whether it is comparing like with like. It will be appreciated that in order to compile the figures for this exercise, considerable converting and manipulation was necessary in order to arrive at 'comparable' costs. Though every attempt was made to arrive at fair figures, the comparison below should be treated more as indicative than as exact. The HB (P) have submitted their own calculation for the cost of hammer dressed stone used in the school under construction at

Jandrote. The HB (P) cost calculation is included for comparison, but it also serves to underline the difficulty which exists in arriving at an exact figure.

Comparison of rates [4]

Item	Unit	GoP Average (Rate in Rs) Rate on KKH	SHSCP Average (Rate in Rs) In other areas
a)Precast concrete masonry in superstructure (minus steel reinforcement)	% CF	1269 + 70% = 2157	+ 127%2448 = 2880
b)Coursed stone rubble in superstructure.	% CF	1500 + 50% = 2250	+ 60% Nil = 2400
c)Reinforcement in columns, slabs and beams (minus steel reinforcement).	% CF	2323 + 100% = 4646	+ 127%4080 = 5273
d)Timber inclusive of working	CF	300	300 + 10% = 330

e) Actual cost of hammer dressed stone masonry to the contractor at the under construction school at Jandrote (calculation by the evaluators).

i) Acquiring of stone:

- 2 Maltoris (stone breakers) at Rs 115 per day = Rs 230
- 4 Jabalias (assistants) at Rs 30 per day = Rs 120
- Tractor per day = Rs 300

Total = Rs 650

- Tractor makes 6 trips per day. Its capacity is 45 CF. If 25 percent of the load is voids then in 6 trips it carries 45 x 6 minus 25 percent = 202.5 CF.
- Cost of acquiring stone at site is therefore Rs 3.20 per CF.

ii) Making of stone:

- Mason makes 25 stones per day. The observed average size of stone is 15" x 6" x 6" or 0.32 CF. In one day he makes 8 CF.
- Wages of a mason are Rs 80 and he has 1 helper at Rs 30 per day. Total cost of making 8 CF of stone is Rs. 80 + 30 = Rs 110 or Rs 13.75 per CF.

iii) Laying of stone:

- Mason Rs 80 + 2 labour at Rs 30 each = Rs 140

lay 25 CF of stone per day = Rs 5.6 per CF

iv) Cost of stone wall = Rs 22.55 per CF.

f) Cost of hammer dressed stone for the school under construction at Jandrote, as calculated by the HB (P).

i) Acquiring stone:

- 2 maltoris (stone breakers) at Rs 115/- = Rs 230.00

- 4 Jabalias (assistants) at Rs 60/-

(double the rate of normal unskilled labour). = Rs 240.00

- Tractor makes 6 trips for this specific site because plenty of stones have been dumped by the Jandrote mud-flow, near the site. For other sites it is between 3 to 3 trips a day. With a capacity of 45 CF and 30% voids, the total volume per day is 189 cf, of which: tractor per day = Rs 300.00

4 labourers, 2 for loading, 2 for unloading and stacking = Rs 120.00

Total cost per day = Rs 890.00

Cost per cubic foot = 890/189 = Rs 4.70

ii) For other sites where blasting is required to break the stone, it adds Rs. 2.4 per cf (actual cost for the academy at Karimabad) and where the tractor makes 3 trips, the cost of stone per cf will be Rs 9.41 + 2.4 = Rs 11.81

iii) Making stones.

Mason making 25 stones. Average size of stone 15 x 6 x 6": cost of making stone per cf = Rs 13.75

(HB note that a 'normal' average is 12 x 6 x 6" with a cf cost of Rs 17.6)

iv) Laying of stone.

- mason Rs 80.00 and 2 labourers Rs 30.00 each = Rs 140.00

(HB note a 'normal' laying rate of 15 cf / day) for 25 cf per day = Rs 5.6

v) Cost of cement/sand mortar per cf = Rs 5.90

Thus the cost of stone wall per cf = Rs 29.95

After the addition of 17.5% management cost the cost of a stone wall = Rs 35.19 per cf

The Government schedule = Rs 43.32 per cf

Comments and Observations

The above rates established by the evaluators indicate that:

a) if the government were to undertake construction of schools with a technology similar to that of the SHSCP then its construction costs would be much higher than that of the AKF funded programme;

b) PWD rates for coursed stone rubble masonry are lower than in precast concrete masonry. Since stone walls are normally 15" thick and the precast concrete masonry walls in SH schools 8" thick, stone walls work out to be considerably more expensive as per these rates. However, the actual cost of hammer dressed stone masonry to the contractor at the Jandrote school works out to Rs 22.55 per CF (Rs 29.95 according to HB) when its rate as per government schedule is Rs 43.32. As such, there is reason to believe that the actual cost of a 15" coursed rubble wall is less than that of a 8" concrete block one.

c) Average quantity of reinforced concrete in a classroom roof of 16 feet x 30 feet would be 240 CF and would cost as per PWD rates Rs 46.46 x 240 = Rs 11,150 plus steel at 7 Lbs per CF at Rs 14,500 per ton = Rs 9,983. Total cost of roof is therefore Rs 21,133. Quantity of timber on the other hand works out to 70 CF. At PWD rates of Rs 300 per square foot of roof area, the cost of a 30' x 16' classroom roof is Rs 21,400. However, PWD rates for timber are exorbitant and about 75 per-cent over and above timber acquisition and working costs as quoted at Deedar Khan's workshop in Sherqilla.

It is thus reasonable to believe that an AKHB-run operation could achieve much lower costs.

4.6 Quality of construction of government schools

The under-construction government school at Jandrote has stone masonry walls and a timber roof. Although the design prescribes a reinforced concrete band at plinth, lintel and roof level and its cost is included in the BOQs, the contractor has not given one. In addition, the 15" stone masonry walls have an outer and inner skin which is not properly bonded together. Due to these reasons the building is not earthquake resistant. In addition, the timber roof trusses are not held together with proper connectors and the joinery details are weak. It is estimated that at an additional 12 per cent cost the following could be done:

a) the two skins of stone masonry could be tied together with larger stones at intervals of 4'-6" horizontally and 3'-0" vertically.

b) plinth, lintel and roof bands in reinforced concrete could be provided along with vertical reinforcements at jambs and corners.

c) joinery details could be improved.

This would increase the cost of the school from Rs 192 to Rs 220, without significantly affecting the profit margin of the contractor.

Notes

1. Worked out by the HB in Karachi

2. Paper on Self Help School Construction Programme prepared by the AKES(P), February 25, 1989

3. Figure quoted by Derwaish Ali, XEN Northern Areas PWD. It tallies with the cost divided by area for the under- construction school at Jandrote and includes the cost of land. For comments on the Jandrote school and government construction costs see item 4.5

4. GoP rates have been taken from the PWD Schedule of Rates 1982. The percentage plus figures have been supplied by the NAPWD Superintendent Engineer Works, Lt. Col. Rashid Ahmed and NAPWD XEN Derwaish Shah. The SHSCP figures have been taken from the 1985 HB's response to Arif Hasan's evaluation of the SHSCP with a 36 percent addition. This addition corresponds to the increase in per square foot cost of construction since that time.

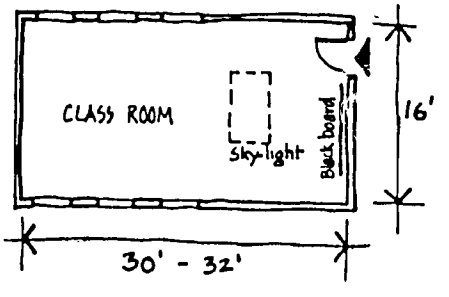
D. THE EXISTING SCHOOLS

1. DESIGN

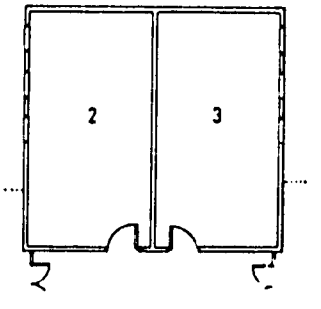
1.1 The Classrooms

One basic oblong format of class-room is used throughout the SHSCP. The classrooms have been designed for 40 children allowing 12 square feet per child, giving a total of at least 480 sq/ft.

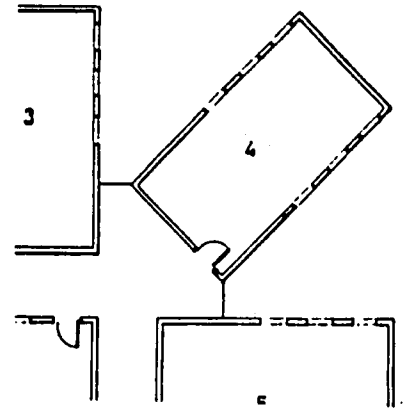
The width of the classroom has been set by the AKES at 16' wide, but, according to the room's location in the school, the classroom is either 32' or 30' long, with a varying number of windows and sky-lights. In all cases the blackboard of cement is on the end wall adjacent to the doorway. A double pitched glazed sky-light illuminates the board and the area just in front of it. None of the sky lights can be opened, although it was apparently intended that they should open in the original concept. Windows are large, can be opened, and have fly netting over them. Heating in winter is provided by a wood burning stove (the stove is supplied by AKES, the wood by the pupils.) The chimney pipe from the stove passes out through a hole in the gable wall of the sky-light adjacent to the blackboard and teacher. There is no storage space (shelves or cupboard), nor pin-up facilities. The walls are of plain cement block, giving a pale grey uniform clean finish to the room.



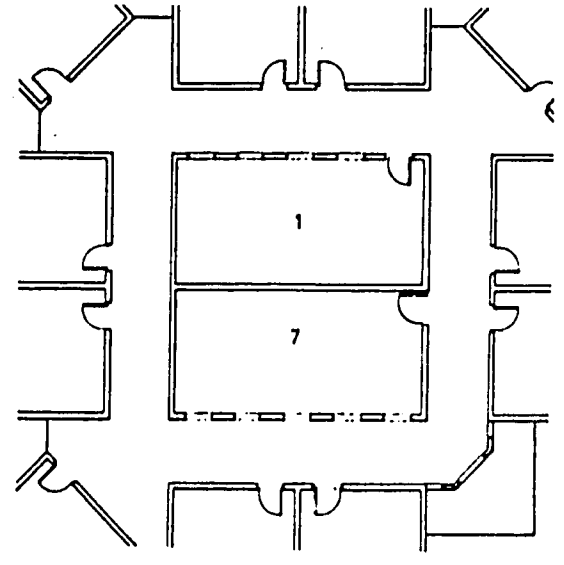
The plan shows the three classroom variants:



1. The main classroom unit, with two rooms side by side. Each room measures 30' long x 16' wide. There are windows on the one side wall in each classroom, (four in earlier schools, only three in more recent schools).



2. The corner classroom unit, consisting of one room on its own measuring 30' long x 16' wide. There are four (earlier schools) or three (recent schools) windows on each side of the classroom.



3. The central block classroom, alongside the staff rooms. The classroom is 32'long by 16' wide. There are four windows on the wall opening onto the circulation corridor, and not directly to the outside. In addition to the sky-light at the board end of the room, there is an identical sky-light at the other end of the classroom, and these provide the main source of day-light into the room.

Comments and observations
Performance of the classroom

The classrooms provide a major improvement in almost all aspects in comparison with the DJ classrooms which they replace. The following comments should be seen in the spirit of trying to further this improvement of quality.

i) Cooling/Ventilation.

Because the sky-lights do not open, classrooms which have windows on one side only tend to be hot and airless in hot weather. The lack of cross ventilation is not the only reason. The sky-lights provide an important source of light, but, with no possibility of shading, the summer sun, high in the sky, shines through the sky-light, raising the room temperature; children have to progressively move round the hot sun-lit area of the classroom to avoid the heat, effectively making part of the classroom difficult to use. The same discomfort is experienced in the staff rooms. To achieve cross-ventilation in the rooms with windows only on one side, leaving the door open at present provides the best solution, but to do so causes noise problems between the classrooms. It has

been suggested that an additional window at the back of the classroom would help the ventilation problem. This would cause problems of glare for the teacher. In future classrooms a reorganization of the roof lights, placing them along the inner side of the room, and orientated to the north, would be preferable, both for light and ventilation.

Benefiting from the cooler night-time air would also make the rooms more comfortable, but out of school time all the openings are normally shut, so that no hot air accumulated during the day can escape, and no cool night-time air enter. It would be better in summer to leave the widows open. Is there a security risk? Probably not.

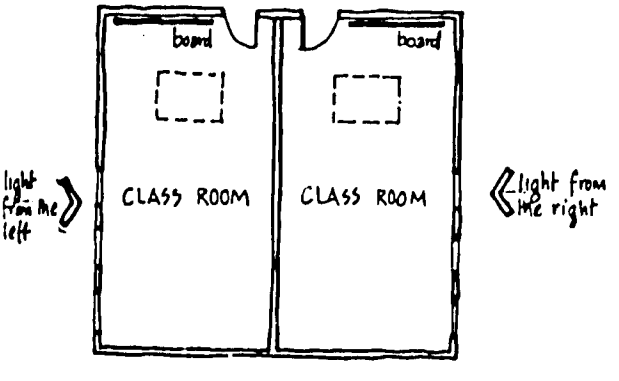
The thermal insulation of the roof is also less than the design plans for, since at present very few of the schools have the layer of earth on top of the concrete roof which is supposed to provide insulation. Heat transfer through the roof adds to the warmth. It is to be hoped that once this earth layer has been added, heat gain during the day will be reduced.

In the Karimabad Academy the sky-lights can be opened, but even here it was observed that all were closed. It is questionable whether sky-lights would in practice be opened and shut on a regular basis.

ii) Heating.

One heater is provided for each classroom. In winter, the children close in to gather round the only source of heat, and the rear of the classroom is apparently left empty. The problem of heat transfer into the room in summer is equally a problem in reverse in the winter (heat loss) , and the future earth insulation should therefore help. Heat will also be lost via the glass of the sky-lights. The staff say that the classrooms are cold in winter, and the classrooms do indeed present a large volume to heat with one wood burning heater. Nor does the answer lie in providing another heater, since the problem of providing fuel still has to be resolved by the children.

iii) Lighting.



The sky-light, drawing from the local tradition, provides a good source of well diffused light, and in general the lighting seems sufficient. The original concept of the sky-light in the Sherqilla school, using a shaded vertical opening instead of the present horizontal opening, provided the light without the inconvenience of direct solar radiation into the room. It would be preferable to return to this form.

Despite the light from the sky-light, the orientation of the rooms and the exposure of the windows do greatly influence the lighting level of the room, especially at the rear of the outer classrooms where light comes only from the windows. In winter, poorly orientated classrooms which have windows on one side only and facing north may not be sufficiently illuminated at the back of the class. The notion of sufficient illumination is relative - in all cases the rooms are much brighter than the previous DJ schools.

It is worth commenting here that the community built schools following the Sherqilla model without technical assistance have classrooms with windows on both sides (and some with no sky-light) and achieve a good lighting level.

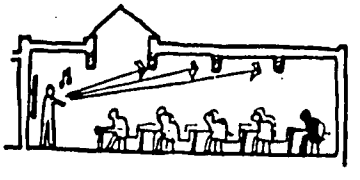
Finally, the fixed position of the blackboard by the entrance has the consequence that, for the two-classroom blocks, one class has windows on the left-hand side, the next door class windows on the right-hand side - when it would be preferable under ideal conditions to have light shining in from the left in both cases to suit (we assume) a predominantly right-handed population.

iv) Blackboard visibility:

In the majority of schools visited, the teachers commented that children sitting right at the back of the room could only just read writing on the blackboard. They felt that the classroom was too long. One suggested option of turning the classroom round (board on the long side wall) is unlikely to work well, given that the angle of view will become very shallow for children at the extreme sides, nor are the windows and skylight arranged to accommodate this layout.

After examining the amount of space required by each child in a 40-child class, (see below "Where children sit") the conclusion is that a shorter classroom depth of 24' would be sufficient, and overcome the distance problem.

v) Acoustics:



Teachers commented that children at the back of the classroom sometimes have difficulty hearing the teacher.

Their suggestion is that once again (see iv above) the classroom is too deep. In addition to this, it is likely that in those classrooms with 18" deep cross beams supporting the roof, the beam is also reducing the amount of sound reaching the rear of the room because it acts as an acoustic baffle. Acoustics may be better in the new classrooms which, using the T beam and block roof, have a flat ceiling.

When the door is open for ventilation, noise from other classrooms (also with their doors open) comes into the classroom.

Use of the classroom.
Grade sizes compared to room capacity:

Observations in the schools visited show that a significant number of grades in many schools have a low enrolment. The low enrolment means that the classrooms are frequently used at well below their capacity, and much of the room is empty. Whilst every community may hope to fill up their enrolment in future years, it is almost certain that some of the smaller villages in non or low growth parts of the project area are unlikely to have much higher enrolment figures than they do at present, and at least not for the foreseeable future. Based on this supposition, it seems important to reconsider the usefulness of having all the classrooms the same size. Not to do so may well imply not making the best use of the available resources.

Two grades in one room:

The number of grades often exceeds the number of classrooms available. This occurs in primary schools with only three classrooms, but also in middle schools with more grades and insufficient classrooms. As a result, there are often two grades in one classroom.

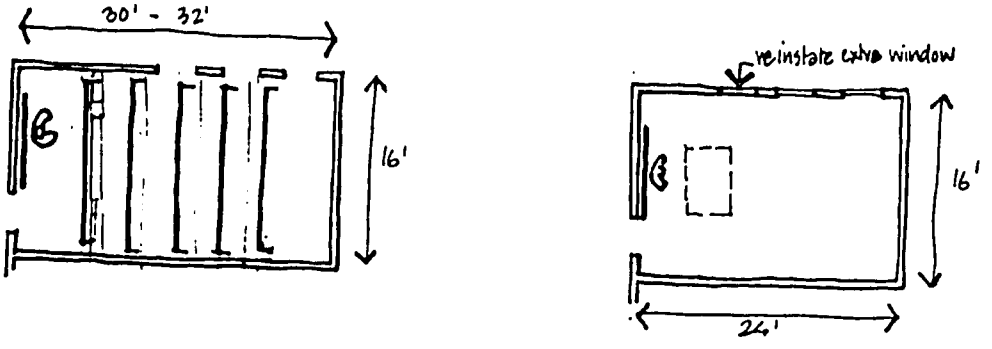
To somewhat overcome this doubling up of room use, grades with a low enrolment are often put into the headmaster's office, which in all the schools visited has no window.

Similar to the observations above regarding enrolment by grade, a re-calculation of the number and size of classrooms in relation to enrolments and the demographic data for the catchment area served by the school seems worthwhile. For a similar overall surface area, a middle school, might, for example, be better served by having more rooms, but of varied dimensions, including some that are significantly smaller than the present classroom.

Where children sit:

In most classrooms observed, no desks were being used at the rear of the room, even though in some cases the enrolment was close to or above the "design enrolment" of 40 children. The acoustic and visual difficulty for children at the rear of the classroom would appear to be one reason for this.

Secondly, it would appear that the desk size for which the classroom was originally designed has been reduced. The present arrangement uses desk/bench sets seating three (in the junior grades up to IV) or two (in the senior grades) children per bench. Each bench measures 3'4"wide x 2'6" deep (measurements were taken in classroom, and may not be totally accurate for all schools). With an average of four desks across the room, a lower grade class of 40 can be accommodated comfortably in four rows, occupying less than 13' from front to back, and upper grade in 5 rows, occupying less than 16'6" from front to back. Starting the desks 6'6" back from the blackboard wall, thus



giving space for the teacher and blackboard visibility, an optimum depth of classroom for one grade of 40 senior pupils would be 23 - 24', without increasing the span above 16'.

As commented above, other length and depth configurations should be investigated where some grade enrolments are almost certainly going to remain low.

In winter, the need to gather closer round the one stove apparently tends to increase the tight clustering of the desks and pupils, within the limits of flexibility of the furniture. The most junior grades in any case appear to sit on rugs on the floor.

In Nasirabad, the majority of classrooms had desks arranged in a "U" shape. This layout tallies more closely with the traditional use of space in schools based on (or using) traditional house forms. This form of organization adapts well to the younger grades, and to the heating arrangements in winter, and should be considered as an alternative layout when planning classrooms.

Fixtures and fittings.

The classrooms have no built-in shelving or storage space, where teaching aids and chalk, dusters, class registers etc. could be kept. Teaching staff and AKES staff have remarked on this absence, and express the opinion that some form of small shelving would be useful in each classroom.

There is no easily used wall space for pinning up display material, and at the moment the best solution is to hammer a nail into the cement block wall, which is not ideal. A wooden rail would facilitate the display of posters and children's work. An exception to the absence of a chalk rail below the blackboard was noted in Altit, where the headmaster is involved in the Tamirati (Building) committee, and insisted during construction that a 3" ledge be put at the bottom of the board.

Criticism has been made of the cement blackboard, that after a few terms it becomes rough and hard to use. Experience of similar cement blackboards in

other countries would suggest that a smooth shiny finish can be achieved with cement, provided that an almost pure cement final finish is put on the surface. Nevertheless, these blackboards still need regular (annual) painting for them to be easy to write on and legible, and wooden blackboards would be no better.

1.2 THE SCHOOL

i. The design concept

The school is a single story building made up of several linked units.

The design aims to be simple, and functional, allowing the school to expand from three classes to a total of 12 with an administrative block and toilets. Each phase should stand by itself architecturally, so that further addition is not necessary. The design of the school aims to be as dense as possible, both to allow the school to fit onto a small site, and to suit the continental mountain climate, minimizing thermal loss in winter. In all the schools visited, the staff rooms and the store have no windows, but get their light from the sky-light above each space. Ventilation comes through the door. Recent drawings of the school show the staff rooms with windows opening onto the corridor. The central classroom has windows opening only onto the corridor, and thus relies on its two sky-lights for direct daylight.

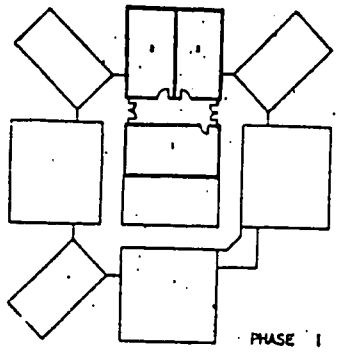
ii. The layout.

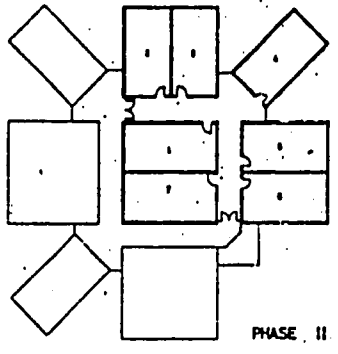
The school is built around a four-sided circulation corridor, intended to be covered by roofs and, in the corners, sky-lights. Classrooms and staff rooms open onto this covered corridor. There are 4 two-classroom blocks, one on each of the four sides of the complete school. In between these main blocks are single-classroom blocks placed diagonally in three of the four corners, behind one of which is the toilet block, built as an independent unit. In the central space and surrounded by the corridor, is one classroom, and beside it, the staff room, a store and the headmaster's office. Access to the school is through a main entrance in the fourth corner, although the gaps between the classroom blocks are also open and used for coming and going.

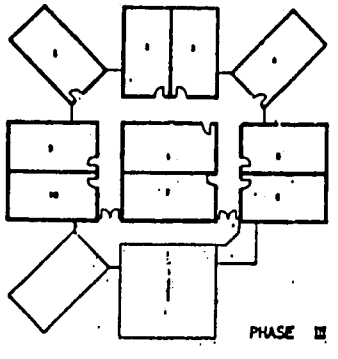
iii. The phased construction.

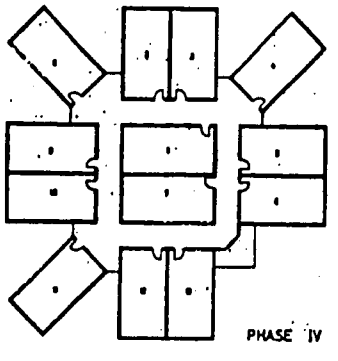
The construction sequence takes place in phases, according to the number of classrooms allocated through an Award. The Award procedure has been discussed in Section C. The construction sequence at present allows for four phases.

Phase One consists of building one of the two-classroom blocks, and, opposite it across the corridor, the one central classroom. Normally the toilet block is built at this stage, situated at an angle to the main block, in position behind a









future corner classroom. This phase with three classrooms corresponds to the basic building awarded to a primary school with an enrolment of less than 150 children.

Phase two adds another two-classroom block, a corner one-classroom block, and the staff rooms. This phase, bringing the classroom total to six, corresponds to a middle school award. A primary school getting a second award would build this second phase.

Phase three adds another two-classroom block and an additional corner classroom.

Phase four adds the final three classrooms to complete the circle of buildings and the internal corridor.

In its final form, the fourth corner of the school, opposite the main entrance, remains open, and serves as a play area and formal entrance.

iv. Siting.

The school concept has assumed that even the small school will grow to achieve the 13 rooms (10 classrooms, laboratory, store and staff- or headmaster's room). This has required a flat piece of land measuring 150' x 150'.

In 1989 it has been recognized that not all schools will grow to achieve the full 13 rooms, and in the cases where the school is likely to remain a smaller unit, a smaller site could accommodate the school. Extension is not possible if the programme continues to use the present plan. The following land plots have been suggested in the paper prepared for the AKES Board of Directors on 25 February 1989:

Ultimate school size	Land requirement
3 classrooms and toilet	106' x 54'
7 rooms and toilet	122' x 94'
10 rooms and toilet	133' x 122'
13 rooms and toilet	150' x 150'

v. The toilet block.

The toilet block is built up on a plinth to the same level as the main building. There are two toilets for boys, two for girls, and one staff toilet with wash basin. There is a long sink for hand washing. Over the toilet block is a water reservoir. Waste goes into a cess pit and then to a soak-away pit beside the block.

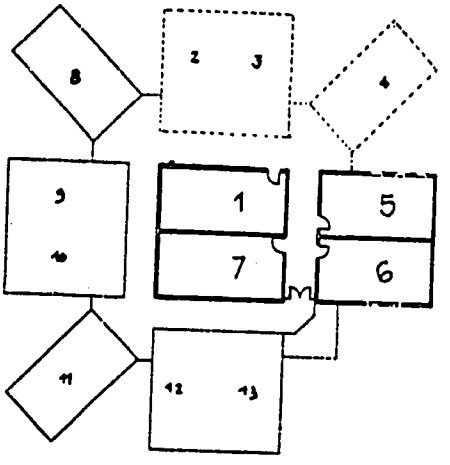
Comments and observations.

The concept of the extendible school is perfectly sound, and with the present layout the school presents a distinct and unified character at each stage of its growth. Nevertheless, the combination of the phased construction and the design concept do raise several problems which merit comment, and which could prompt some changes. The are outlined below.

The basic three class unit.

The starter phase destined for a primary school includes three large classrooms (see above for discussion of classroom space use). The single classroom forming part of a future central block has no windows facing outside - all its windows open onto the covered corridor. This is unsatisfactory. Even as a medium-term solution pending an extension of the school, it would be better to provide external openings when possible, giving better light and ventilation. These openings can be blocked up later if a room is built beside them, and the window frames re-used in the new rooms. Openable sky-lights must also be introduced.

Furthermore, the three classroom starter school does not include the administrative rooms. This means that the basic primary school has no storage space, no shelving, and no staff space. If the present school plan is retained for these small schools, it would be preferable to build three classes and the administrative block, where one of the spaces destined for staff use could be used as additional teaching space (see classroom use above). A suitable plan would include one external two-classroom block, but not opposite the "central" classroom, and the central block, including the staff room. The combination on the following page would seem appropriate (see sketch plan):



classrooms 5 and 6 in combination with spaces 1 and 7. This combination allows all rooms to have external windows. All rooms would be connected by the corridor. The entrance to room 1 could be relocated in the end wall.

The staff rooms and the store.

In all the schools visited, the staff room, the headmaster's room and the store have no windows, and get light only from the sky-light and ventilation through the open door. Whether used as staff rooms or as additional teaching space (common in middle schools) this arrangement is clearly unsatisfactory. Several plans for the schools, including the plans dated August 30th 1989, show a different layout, with windows into each room, and an access corridor at the rear leading to each of the three spaces. The evaluation team did not see a built example of this revision.

Comment on the new plan.

The windows to the staff room and the headmaster's room are an improvement. It is not obvious that the store needs a window, and this could be economized. The access passage-way at the rear of these three rooms appears to waste space and provides no real benefit, and, from an seismic design point of view, unnecessarily complicates the plan and the junction of walls. As an alternative, the staff room could be accessed directly from the corridor to its left (adjacent to classroom 10) and the store room accessed via the staff room. There would be a saving in block work, and the same number of doors. The store and the headmaster's room would be larger.

The extended school.

The process of extending the school, and the overall circular layout, dictate that for any given site, some classrooms will be well orientated, getting maximum benefit from the sun in the winter (exposure of long side facade to low winter sun) and maximum protection from summer sun by presenting the shorter end walls (relative to each class room) to the low morning and afternoon sun when solar gain can be at its greatest, given the long period of exposure. The classrooms at 45 degrees and at right angles to a well-orientated room will increasingly tend to heat up in summer and get less benefit from the sun in the winter. Against this, it would seem necessary to judge the relative benefit that the perimeter rooms gain from being clustered round the closed

corridor. It is clear that the central block is more insulated in winter, but, conversely, less well ventilated in summer. From these observations and the comments in the following two paragraphs, the evaluation team gets the impression that the school has been designed with winter in mind almost to the exclusion of summer conditions. In making this comment, one should bear in mind that the evaluation team only experienced the schools in warm weather; reports from the users were not very favourable about winter conditions, which the evaluation team did not experience. We recommend that more attention is paid to orientation.

Ventilation.

In commenting on the performance of the classroom, it has been noted that the doors need to be left open for ventilation in the summer, allowing noise to go from one room to another. This relates to the dense plan of the school, but would be reduced if there was an alternative opening in the classrooms (open sky-light, or an additional window at the rear of the classroom with louvers to cut glare).

The circulation areas.

The central corridor linking all the rooms provides shelter and will, once the corners are finished, keep the building warmer in winter. Once again, this will be to the detriment of the ventilation of the inner rooms in the summer, and thus it would seem important that at least the spaces between the external blocks of rooms (side classroom blocks and corner rooms) should be openable in summer. No school to date has had the corner area of the corridor covered over, and a design solution for doing this does not seem to have been agreed upon as yet. We would recommend that the design of this corner covering allows light and ventilation to enter into the corridor.

Flexibility in the number of rooms.

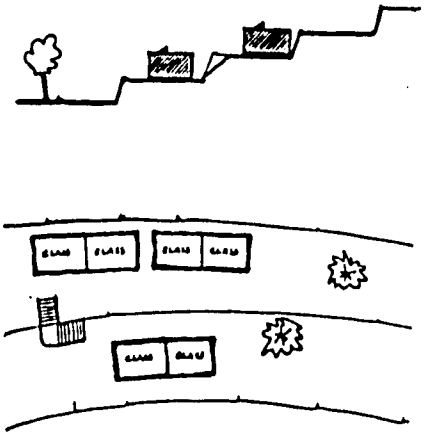
In practice, it would appear that several different combinations of phased development have been applied. This would seem desirable.

Nevertheless, the number of rooms to be awarded should relate more closely to the projected size and number of grades to be accommodated in a specific situation than at present seems the case. The allocation of three classrooms to a primary school and six to a middle school does not tally well with an average of six grades in the primary school (Infant to grade V) and nine in a middle school including a primary school. As commented above (D.1.1 The classroom) the size of the classrooms may also not suit the projected enrolment for a specific school - more classrooms but of varied size seems a realistic option to be considered.

The siting of the schools.

The concept of the school has been that it should be as dense as possible to fit onto small sites. It would seem that in the earlier years of the programme, relatively wide and deep sites which are also sufficiently flat have in general been available. Nevertheless, in the majority of schools visited, significant leveling has been undertaken by the community in order to qualify for the award. In some cases as much as nine feet of earth, rocks and boulders have been removed, filled in at the lower end of the site, and retaining walls built. This all represents a major labour effort, and in many cases, a major cost to the community. In recognition of this problem, in situations where the school is judged unlikely to grow, the programme is suggesting that a smaller site can be used for a smaller school. Whilst this prohibits future growth within the system, it is one solution to the problem.

There remains much difficulty for communities which require a large school, but who do not have a site which corresponds to the shape of the large school layout, and for communities who only require quite a small school, but who have severe land problems. At present any communities which lack the right land would have difficulties in getting a school. It would seem essential that an alternative approach be developed which allows the school design to respond to the realities of the land available in the community. This second plan would provide an alternative where the present layout will not fit. It should, realistically, allow variations in level between rooms, and allow for linear development where the land is better suited to this form. The introduction of a variation in layout does not, on its own, in any way preclude continuing the programme with the same technologies and materials for either plan, should this be considered necessary.



2. THE CONSTRUCTION SYSTEM

2.1 The System

The construction system combines reinforced concrete elements for beams and slabs, with load-bearing hollow reinforced cement blocks. The system is designed so that all the masonry and concrete elements can be manufactured on site by semi-skilled and un-skilled labour, and so that any element can be lifted manually in place.

2.2 The Components

The foundations:

Concrete footing starting at least 2'6" below ground level, supporting cement filled hollow cement blocks up to 6" above ground level. An 18" R.C.C. plinth beam comes up to the floor level. The interior of the plinth is filled in with stone.

The walls:

Load bearing walls built with 8" wide hollow cement blocks, produced on site, with single vertical reinforcing bars at 24" centres. A block making press is use which the AKHB take away once the construction programme is over.

The floor:

The floor is of cement, in two layers.

Joinery:

Joinery for the doors, windows and sky-lights uses deodar (member of cedar family) wood, prefabricated away from the site under the auspices of the AKHB.

The roof structure:

The roof construction process has undergone significant change since the beginning of the programme. Three key types can be identified:

1. The main roof beams and the roof level ring beam

consist of 18" deep and 8" wide in-situ reinforced concrete. The beams support precast hollow core slabs which are laid side by side on the supporting R.C.C. beams. To date this is the most common type of roof. The ring beam doubles as the lintel over openings. 2. In a limited number of schools the hollow core

slab has been replaced by shell vaults resting on the 18" R.C.C. beams. One school visited has this type of roof, Hussainabad.

3. The most recent schools have replaced the heavy 18" beams and ring beam/lintel with two systems. For the ring beam and lintels, one course of half cut hollow blocks are laid to form a U trench, in which reinforcement and concrete are poured. The large roof beams have been replaced by smaller profile T shape beams which are pre-fabricated and then lifted into place by hand. Between the beams, one width of hollow cement blocks are supported on the flange of the inverted T.

Water proofing:

The roof is supposed to be finished off with a 3" to 1.5" screed, laid to drain towards the water spouts, then two coats of bitumen, with gravel and 3" to 4" of earth on top for insulation, which with rare exceptions has not been applied.

Comments and Observations

An analysis of costs and material and technical options are included in (1) Appendix 4, for costs, and (2) in Section F for an analysis of material and technical options. Comments about the supply of materials and the construction procedure have been dealt with more fully in the preceding section C "The Existing Programme".

All the building elements with the exception of the joinery are made on the site by the local labourers, with the help of some skilled inputs to ensure quality and the use of the correct techniques.

The programme has resulted in a substantial amount of on-the-job training (see section E. "Impact").

The school, regardless of phasing or siting, is built at one single plinth level. The plinth is sometimes quite high above the ground level, and the same applies for the toilet block. This single plinth level seems unnecessary, and steps and expansion joints could have been introduced to allow a more economical plinth and foundation. The uniform level appears to have been influenced until now by the manner in which the hollow precast roof slabs have been laid, all at one level, so that variations which could have been introduced in room height or roof parapet have not been used. This is now slightly changed in the most recent design of roof, as applied at Shishkat. Nevertheless, the plinth is still at one level, and the land has to be leveled accordingly, which wastes money, effort and materials.

In both the case of the precast hollow slab and the newer T beams, the effort to lift the heavy elements up to the roof remains considerable. The evaluation team observed the process of lifting short and long T beams into place at Singal: for the 16' beams, at least 16 - 18 men are needed, whilst for the shorter corridor beams which are 8' long (or more in newer schools), at least 12 men.

The men are available, but the risk is that with too many people, nobody is quite sure who is supporting which critical part, and AKHB should seriously take into account the possibility that sooner or later someone is likely to be badly injured in the lifting process. A lifting tripod would make this process safer; a more conscientious use of ropes for lifting (rope passed through iron loops in the beams, etc.) would help safety.

On one site, at Teru, the new T beams were very sub-standard, with broken beam ends and cracking in the middle of the beam. Teru is remote, and supervision may not have been easy, but the unfortunate result is that these beams can at best only be used to cover the septic tank, and are unsafe for the roof. This example is nevertheless an exception to the general rule of extremely high quality workmanship.

The finished roof.

With scarcely any exception, all the schools with 'completed' concrete roofs have bad efflorescence and staining on the underside of the roof and on the walls, due to leaking and damp penetration. This is the one most consistent fault in the building, and will lead to a deterioration of the structure in time. It should be rectified. On examination, two causes can be identified:

1). Only two of the schools visited (Hussainabad and Danyor) have a bitumen and earth coating over most of the concrete roof. The remaining roofs still have work to be done on them, and water can penetrate. The headmasters in most schools believed that work was finished, which is not the case.

This situation needs to be rectified as quickly as possible.

2). The concrete roof, either using the precast hollow beams or the new T beams and blocks, are laid flat, with no fall towards the drain spouts. The specification then requires that the fall is corrected when the overlay roof screed is put on. Given the surface area of the roof and the complexity of the roof form, achieving good falls with a thin screed is both difficult and chancy. On some of the roofs inspected, it was hard to discern any fall, and the impression in some cases was that water would be more likely to collect, or at worse flow away from the drain spouts. It would be preferable to lay the roof structure to a distinct fall to avoid this problem.

Completion of the corridor corners.

Linked to the problem of the unfinished roofs is the lack of a solution/design for completing the corners of the corridor. One attitude noted was that people are waiting to finish the roof when these corners are completed. It would seem important to resolve this dilemma as quickly as possible. In addition, all the schools, at no matter which phase of construction, are supposed, according to the plans, to have doors at the ends of the corridor to close them off. These do not exist.

3. The Building Performance

3.1 Seismic resistance.

The buildings are intended to be earthquake resistant, in order that they can be used as a shelter in the event of a disaster. For "earthquake resistant", the AKHB infer that the buildings should not collapse in an earthquake measuring 6 on the Richter scale, although they recognize that the building or parts of the building may be damaged beyond repair. The structure may be badly cracked, but will not have collapsed. The policy is to avoid loss of life should an earthquake happen whilst the school is occupied, and that the building should be serviceable as a shelter in the immediate post-disaster period.

The concept of seismic design applied for the building appears to be three-fold:

1) to have a symmetrical plan;

2) to have a reinforced plinth and roof level ring beam around each block;

3) to have vertical reinforcement at regular and frequent intervals in all the walls.

To apply these concepts in the design of the school, the building layout combines several small rectangular blocks, assembled in a symmetrical pattern which is itself a combination of rooms at different angles. In reality the building is tied together as one unit, and should be considered as such in terms of earthquake design.

There is a continuous plinth beam at ground level. Each block has a ring beam at roof level, tied in to the vertical reinforcement in the walls.

Doors and windows are at 1'4" from the corners.

Comment and Observation.

The schools are, if anything, probably over-built, and this notably in the earlier versions which have 18" deep ring beams at roof level. It is by no means obvious that this type of massive concrete structure actually helps significantly improve the earthquake resistance of the building; on the contrary, a lighter R.C.C. structure at roof level would be more in harmony with the structure of the walls (blocks and single bar steel vertical reinforcement). Movement is bound to occur during an earthquake - one aim in seismic design is to avoid

major differences in inertia amongst the different elements which make up the building, and significantly between the upper and lower parts of the structure. With this in mind, the recent schools which use a lighter U form ring beam (see above), and inverted T beams for the roof, are more likely to survive an earthquake without major damage, even though cracking will occur in the joints, which could be repaired afterwards. In effect the new construction system represents, to a greater extent, an assembly of small elements which do have the possibility of moving without causing failure. The symmetry of the overall building design is questionable, and particularly in the absence of expansion joints (originally specified) in the floor slab. Whilst the building is symmetrical, it combines into one unit (at floor level, and in most cases at roof level) several large blocks aligned in different directions. Movement in one block is likely to be confronted by movement in an adjacent block at a slightly different speed and direction. The result, similar to that which commonly occurs in corners of rooms, is the risk of cracking as two elements, in effect, either collide or separate. To this end, it would be preferable to completely separate the structure of each block, allowing it to move independently. This concern, at roof level, is now reflected in the revised roof beam design linking the central block to the external classroom blocks. The beams now rest on top of the end wall of the external block, and can slide back and forth if need be - previously the beams butted up against the roof structure of the next block, so that major movement would cause a collision.

In schools started prior to 1989, the amount of vertical reinforcement in the walls is probably in excess of what is needed. It would be sufficient to have vertical reinforcement at the corners, and at either side of the openings. Prior to 1989 horizontal bars have also been provided - 3/8" Ø at every third course. In 1989 the design was revised so that an expanded metal lath of 3.4lbs/sq.yd. 7" wide is laid in a continuous strip at sill level and at window lintel level. This is an improvement.

The doors and windows are sufficiently far away from the corners in the classrooms. Care should be taken in the organization of the staff rooms and store, and the plan kept simple. (See above for comments on the layout of the staff area.). The sky-light presents a major risk, since the glass is almost certain to break and drop out during an earthquake. Glass may fall on the occupants below; the sky-light will no longer be water tight. Wired glass under the circumstances is one option that should be seriously investigated, or the addition of a fine mesh chicken wire below the glass.

3.2 Maintenance needs

The building design aimed to provide a maintenance free school, to the extent that this is ever possible. No annual or regular maintenance should be required.

Comments and Observations

The aim of achieving low or maintenance free buildings appears to have been substantially achieved. The older buildings visited during the evaluation mission show few signs of deterioration or wear, with the exception of damp staining on the upper walls and ceiling. The materials are in overall good condition, and the buildings clean.

One single maintenance need does exist: the wooden framework of the sky-lights shows signs of splitting and deterioration of the varnish finish. Repainting will be necessary to avoid more substantial damage. This is reasonable given the direct exposure to both sun and rain. The glass in the sky-lights is also in a significant number of cases broken; the breakage is probably caused by the glass being held too tightly in the metal clamps, so that no expansion or contraction is possible with temperature changes. The lower clamps on the sky-light should be loosened to allow movement.

Repainting of the blackboards is necessary annually.

It does not seem sufficiently clear to the community that these maintenance tasks are their responsibility.

E. THE IMPACT OF THE EXISTING PROGRAMME

The experience of the last five years is a convenient point at which to take stock and to assess the impact that the programme has made so far, as well as to comment on the likely direction that future impact may take if the present programme continues. Obviously given the limited data available to us and indeed in some cases the relative short experience in some aspects, any such evaluation is more likely to be speculative than based firmly on concrete evidence.

The impact of the SHSCP is assessed:

- firstly on the programme itself: in what ways have the changes and expansions and extensions of the programme affected the internal workings of the existing programme;
- secondly, the impact on education: how has the SHSCP impacted on the quality and the quantity of education and its availability;
- thirdly, the impact on construction: how has the SHSCP impacted on the construction sector, the skills, methods and materials of construction in the area;
- and finally, on other programmes: how has the SHSCP affected other programmes, both other Aga Khan organizations and those of the Government of Pakistan.

1. IMPACT ON PROGRAMME

1.1. Of Expansion

During the period 1983-88, the number of rooms awarded each year increased from 15 to 60. However, largely due to the timing of the introduction of the revised process of awards (see C.2), a number of rooms had to be carried over to 1989. To allow the programme to catch up, in 1989 the number of rooms awarded was reduced to 36. As the table below shows, there has been an expansion of the programme over the years. This has been paralleled by an expansion in the staff of the Housing Board to supervise its implementation. As a result, the number of rooms completed has increased each year. However,

the number of rooms completed in any one year has not increased, and the number of sites under construction remains fairly constant at around 15.

CONSTRUCTION OF CLASSROOMS UNDER SHSCP

CALENDER YEAR	1984	1985	1986	1987	1988	1989	1990
ROOMS AWARDED	15	30	36	45	60	36	-
CUMULATIVE AWARDED	15	45	81	126	186	222	222
UNDER CONSTRUCTION	15	45	75	57	111	104	45
COMPLETED IN YEAR	0	6	57	39	23	52	45
CUMULATIVE BUILT	0	6	63	102	125	177	222

The programme has expanded spatially, extending further up the valleys and away from the main roads. However this is not because of a deliberate policy, but rather reflects the relative abilities of villages to apply and be eligible for the SHSCP. This has had the effect of bringing on board more villages with problems of both transport and resources. The two are to some extent correlated, though not wholly so, and their own motivation and enthusiasm may well compensate for such shortcomings. For example Teru, almost at the head of the Gupis valley carries on cheerfully while Ovarik, similarly remote up the Lotkho valley in Chitral is fairly daunted at the prospect of progressing beyond the first phase, though this has not prevented them from applying for and being awarded a second phase of 3 more classrooms !

However, one positive aspect of the expansion has been that more and more people have seen examples of the schools and therefore it becomes easier for the programme staff to convince prospective communities of both what can be done, and how to do it. At times the successful self-help efforts of small communities have acted as a spur to galvanise larger villages that were previously dubious of their own capabilities. The fact that so many other communities have managed within the rules and regulations set up by the programme has also made it easier to resist demands for their relaxation.

Comments and Observations

Generally speaking the programme has been able to maintain its very high quality of construction despite expanding, and has managed to train and/or retain enough skilled workers to carry on (see below).

SKILL ENHANCEMENT IN SHSCP

Carpenters	23
Masons	150
Precasting Masons	78
Steel Benders	52
Electricians	5

It would appear that by the HB having a larger and more experienced staff, the programme has also been able to maintain its output despite some of the pressures indicated above. However, the larger the programme, the more susceptible it is to fluctuations. Both 1987 and 1988 saw a drop in output that had a knock-on impact on future years. The timing of making awards becomes the more crucial the larger the programme gets, given the short construction period. It is also likely that as the programme expands further, it will be addressing communities that are not as energetic or enthusiastic as those who joined the programme earlier.

1.2 Of Including Non-Ismaili Villages

From very early on the programme had discussed the possibility of and necessity for extending the SHSCP to non-Ismaili villages, and in 1986-87 it was decided to include what have since become designated in the programme as "Non-D.J." villages. Of the 60 rooms awarded in 1987, 15 were intended for Non-D.J. villages. In the event, "in spite of intensive follow up and efforts put in by the PCC", only 6 classrooms have been awarded to two Non-D.J. villages.

Despite their very marginal participation to date, this policy has already led to a change in award procedure (see C.2). If the programme wants to attract more Non-D.J. villages, it is likely that it will have to make further changes in order to make the villagers undertake a programme that requires far more from them than does the government school building programme. In Rabat, for example, a much smaller site was accepted by the PCC than would have been the case with a D.J. village. The smaller site was rationalised on the grounds that no further phases would be required. The same rationalization has now been extended to the rest of the programme where hitherto smaller sites had been rejected. This rationalization brings with it some negative results: the school at Rabat does not easily allow for extension, and the present classrooms do not match the number of classes as well as they could.

The sample is obviously too small to draw firm conclusions, but it would appear that the Non-D.J. villages are more likely to want to treat the construc-

tion of the school in the same way as they would any AKRSP project. For example, Chakarkot wanted to be paid the money that the HB was spending on their school and wanted to contract to do the whole school themselves in the expectation of being able to make some savings for their V.O.

Comments and Observations

Extending the programme to cover Non-D.J. sites is both welcome and essential. However a more flexible approach will have to be developed since the programme will not be able to use the same motivations that it can with Ismaili villages, particularly with regard to women's education, quality control, participation and general acceptance of terms and conditions. The programme will have to operate on terms that compare favourably with other programmes (see below).

2. IMPACT ON EDUCATION

2.1 Enrolment and Motivation

In most schools we visited, the enrolment appeared to have increased since the opening of the SHSCP schools, and this is borne out by the Table below. However, it is not clear to what extent the school-building programme itself is responsible for this and to what extend it is a reflection of a general trend. Nevertheless it is certainly the case that the new schools have at least reinforced such trends as might exist.

There is a general increase in population and therefore of the school going age population as well, and this coupled with the increasing acceptance of education for both boys and girls would in any case have increased enrollment. The fact that enrollment is not higher than it is has been attributed to the two sets of fees increases.

Most headmasters we spoke to suggested that the new schools have had a positive impact on enrolment, while others also pointed to the Women's programmes of the AKRSP. The general realization that educated girls can supplement household incomes through being "in service" has also helped increase enrolment. The suggestion that such employment may mean girls travelling away from their villages and the general shortage of such posts was countered by the knowledge that "these days the real opportunities are for women; it is much easier for them to get jobs".

Apart from boosting enrolment, such views have particularly increased pressures for communities to push for middle and wherever possible, high school

extensions to be added to their schools. They are well aware that in order to be eligible for the next phase they must show high enrollment levels and are doing their best to encourage girls from their own as well as the surrounding communities to enrol.

2.2 Quality of Education

One of the stated objectives of the new schools was to improve the quality of education. To the extent that the new schools have brought with them new, more and more qualified staff, they have helped improve the quality of education. Where the programme has spurred communities to push for middle or high schools (see above), thus providing levels of education not previously available, the impact has obviously been positive. In addition, the new schools have also brought with them new furniture and teaching aids, and this too should have a positive impact on the quality of education.

The small size of the DJ classrooms and the fact that there were not enough rooms in many of the old schools meant that their classes were almost constantly subject to disruption and interference from other groups. One usual recourse was to use the open air, but this could only be done if the weather was fine. By providing all-weather and enough rooms, the new schools have improved upon the educational environment available. The new buildings also have a better level of interior illumination than the existing schools, therefore allowing for a longer working day, particularly during the winter.

Whether the overall environmental conditions are that much better than in the existing schools is not clear: there were mixed comments regarding comfort, both during the summer and the winter (see also Section D).

Comments and Observations

To some extent of course the new school buildings are incidental to the improvement in enrolment, motivation and the quality of education, but they have certainly helped in the process.

However, the scale and character of the school buildings could have attempted to engender more of a community rather than 'public' i.e. 'official' atmosphere thereby bringing education to the people and being a means of bringing rather than taking them away from the community. For example the schools should be designed with more community activities in mind, particularly those connected with women. Perhaps the women should have been consulted if not involved in the location and construction process.

3. IMPACT ON CONSTRUCTION

3.1 Technology

The technology employed by the programme is too far removed from the immediate capabilities of the majority of the people and not surprisingly, there has been virtually no impact as yet. In any case, given the nature of the seismic technology that has been chosen and the type of prefabrication of components, it is perhaps unrealistic to expect housing to use either of them. As yet there have not been many other public buildings built that could allow us to measure the impact of the SHSCP on them, though the GoP has improved their RCC specifications, and now require their contractors to use mixers and vibrators, and also refers them to the SHSCP's good quality construction.

However the programme has trained masons and carpenters and upgraded their skills through a programme of apprenticeship and learning by doing. The discipline of working to specification is probably the most important transfer of technology that has taken place. Though the numbers trained may appear small, for the region they are likely to make an impact. Already the fact of having worked on the programme has enhanced their reputations and therefore the wages they can command. Masons who previously worked for Rs 90 a day are now earning Rs 120 a day as a result, thus there is an economic benefit.

3.2 Materials

For the reasons cited above, the use of reinforced concrete and concrete blocks instead of stone and timber has not had much of an impact on construction in the region as yet, mainly because of the low rate of construction of buildings other than by the PWD (see below), and the high costs and difficulties of transportation.

Comments and Observations

The positive impact on skill enhancement has been noted above, although both that and the opportunities for making an impact would have been greater if the technology and the building materials used by the programme were those used in the region, or at least those that could be replicated in housing. The high quality of construction could have made a significant contribution if the technology were more capable of being appropriated by the people.

More than this lost opportunity is the likely impact the choice of materials is to have on speeding up the introduction of concrete-block construction into the region. As in other parts of Pakistan and indeed elsewhere, cement blocks have followed roads and transport development. Unfortunately, the blocks

used by the people are not the same as those used for the SHSCP and they are of poor quality, thin (6") and solid. Though sometimes faster and cheaper than dressed stone, this is at the expense of insulation and usually strength. Since the seismic resistance in the schools is achieved through considerable inputs of steel, this is unlikely to be emulated.

Finally, the programme is likely to have the impact of hastening the demise of stone working and thus of the indigenous architecture without offering anything positive in its place. Though using stone would not have been much cheaper, at least more of the money spent on the schools would have stayed in the region. Similarly, more efforts could have been made to find a roofing solution for the school that could have contributed to solving the general problem of roofing which constitutes the major problem for construction in the area.

4. IMPACT ON OTHER PROGRAMMES

4.1 The AK Programmes

The effect on education has already been noted above. The programme is having a limited though negative impact on the Health programme in so far as communities are suggesting that they be assisted in a similar way in the construction of their health centres as they are with their schools. The impact is as yet limited and because communities place a high value on getting the health centres, they continue to provide them wholly out of their own resources.

The impact of the SHSCP on the AKRSP is also as yet limited. It is likely that as the programme spreads to more Non-Ismaili villages (see above) and more of the schools are handled through the VOs, the impact will be greater. Teru has used its loan from the AKRSP to buy a tractor, and is paying off the instalments from funds collected for the school building which other villages have paid to private tractor owners. This form of mutually reinforcing activities could be mutually beneficial if properly promoted. At the moment there would appear to be very little real co-operation between the SHSCP and AKRSP, perhaps because both are still in the process of establishing their programmes. It would seem logical that the forward planning should take into account a greater degree of cooperation and harmony in the approach taken.

4.2 Government of Pakistan

The school-building programme of the GOP is not only the most active of the Government's construction programmes, it is also the one most likely to be affected by the SHSCP. At the moment, however, the only impact would appear to be an easing of the burden the Government as far as the provision of schools, particularly for girls is concerned. There is some co-operation, as for instance in Non-D.J. schools where the Government has agreed to take over the building and to provide teachers and furniture, though in practice this has not happened or at least not as promptly as might be hoped.

There appears to be little sharing of technical experience or expertise and certainly the programme seems to be making no impact on the thinking and attitudes of the PWD engineers responsible for the construction of schools. While they may not be able to replicate either the technology or the award and construction process, they could perhaps learn the value of supervision and technical support to the achievement of high quality construction, which is so admirably demonstrated by the HB team.

Comments and Observations

The fact that little or no impact (with the exception noted above) is currently being made by the programme on the programmes of other agencies is cause for concern, particularly in the case of the Government School Building Programme.

F. PROPOSALS

1. INTRODUCTION

In the light of the comments and observations made above, what changes are required to be made to the Self Help Schools Construction programme ? To a certain extent, this depends on what the future expectations are from the programme: the obvious basic options are to either terminate the school building programme, or to continue, either at its current scale and level of operations or to expand it further, particularly into non-Ismaili communities, though not necessarily in its current form.

On the basis that the programme has been largely successful in providing schools, it would seem to us advisable to suggest that the programme be continued. In any case there would be a problem in not extending it at least to the point where all Ismaili communities that wanted and were able to, had school buildings.

That the need for more schools exists in both the Northern Areas and in Chitral was demonstrated by the school mapping exercises carried out for the two areas in November 1986 and July 1988 respectively. That the communities welcome the provision of schools is amply demonstrated by the commitment and hard work put into the construction of the SHSCP schools over the last five years, often under very difficult circumstances.

1.1 Enrolment demand

The two school mapping exercises provide a reasonable guide to the total number of classrooms and schools needed over the next few years. Though the exercise was carried out over a period of four or five days, the simplified technique used was nevertheless sound. Given that the workshop included educationalists who were familiar with the situation on the ground and were able to make adjustments to the statistical data available and to the computed results, the recommendations can be accepted as being fairly realistic.

The figures of some 570 classrooms (405 in N.A. and 162 in Chitral) for Girls' primary and Middle schools can be used as a working figure to estimate the overall size of the programme. Even allowing for the construction to date, and assuming that the GoP builds its share of classrooms, that still leaves some 200+ classrooms to be built by the AKES. Or, as many again as have been built by the SHSCP so far. Of course, if the programme was to be extended to cover non-Ismaili villages, and there was a change in the enrolment pattern for non-Ismaili girls, the number would be even more.

1.2 Classroom allocation and size

While the school mapping exercise was necessary and provided adequate results for global planning purposes, it should be supplemented by similar exercises at the village level. The process can be based on the past exercise, modified in the light of the experience of the workshops, as well as from the information now becoming available about the impact of school-provision and other factors on female enrolment patterns. The primary intention of such an exercise would be to better identify and allocate classrooms and schools in villages. Therefore, as well as overall numbers, the exercise should also try to establish the current and expected future patterns of enrolment *by class*, and particularly to identify *when* extensions will be needed.

As with the past exercises, what is being suggested can be done rapidly without recourse to extensive external expertise except to set the process up which can then be carried out by AKES field staff in association with the community.

2. THE CRITERIA OPTIONS

2.1. Review of criteria and objectives

The preceding sections of this report have indicated that even at the minimum level of intervention, a number of modifications to the present design and implementation process would seem essential, even if the programme objectives were to remain the same. (Section D)

It has also been pointed out (in Section E) that at present the impact on issues broader than the pure construction of educational facilities is limited. There is, for instance, little integration of the school and the techniques it uses into the broader context of regional and community development concerns: although skills in masonry may improve because of the SHSCP, few if any of the techniques used in building the schools are at present usable or appropriate to house building or improvement.

These observations do not imply that the schools are not successful - on the contrary, they can be considered largely successful but according to a limited and specific set of criteria and objectives. For example, the fact that a large number of classrooms have been built in a short period of time to a high and uniform standard under difficult conditions represents success vis vis the criteria of building schools quickly and well. Nevertheless, this success has not been achieved without having a more negative or limited effect on other objectives and criteria, such as the transfer of locally useful technology, which could have been regarded as equally important for the well-being and development of the area.

In making this comment, we are aware that the various people and organizations concerned in the conceptualization, development and implementation of SHSCP and in the development of the Chitral and Northern Areas have different interpretations as to what a school construction programme could achieve and encompass, and therefore what the choice and weighting of criteria and objectives should be for the continuation and planning of the next five-year phase, and beyond. From project memoranda and reports, it is also clear that some of the original objectives have disappeared, or have been regarded with less importance than might originally have been the case. Of these, the most significant has been the issue of transfer of usable technology to the population, which was expressed as an objective in early correspondence, but which has been largely dropped in the execution of the programme, and is not apparently regarded as an objective of the current programme.

At this stage of planning for the future, it is important to raise issues concerned with the interpretation of objectives and criteria, which are shaping the present project.

One should take this opportunity to reconsider the effect of priority being given to certain criteria at the expense of others. Such a review seems essential if one is to assess not only the current programme but also the merits of the three different options which are proposed in this document. It will be noted that progressively from Option 1 through to 3 there is a change in emphasis in the project.

The overall conclusion that emerges from this analysis is that the SHSCP can play a much more important role in the overall development of the project area, and become more responsive to the conditions in each community.

ISSUES THAT INFLUENCE THE PROGRAMME

The precise shape that any future SHSCP takes will be affected by how certain of the above issues are resolved. By their very nature 'issues' are open to subjective interpretation, and their resolution is more a matter of opinion than fact. Some of the issues which need resolving are shown on the following pages along with what we perceive to be the way they are currently resolved in the SHSCP.

Image:

Any project has and acquires an image. This can be interpreted physically, pertaining mainly to the visible components, the design of the buildings for instance. It can also be applied to the invisibles, such as the programme: the processes of selecting and making awards through to implementation. The central issue here is as to what sort of an image should the schools and the programme present ? Should, for example, the project look expensive, regardless of its actual cost ? Will that make potential co-funders feel that costs could be reduced ? Should the image be one of modernity and efficiency or a low-key one of blending in with its environment ?

The school buildings at present have a consistent and uniform image. They also stand out as having a distinct architectural character, different from the village buildings around them.

An integrated image for school building would harmonize the school building into the local environment, making it relate more closely to the local habitat.

Neither of these approaches implies better or worse quality. They are however closely linked to architectural style and choice of materials. Uniformity would to some extent be lost if the schools were to be made to better suit the location, resources and the site where they are built. The schools may still be made distinctive, perhaps through the quality of finishes or the attention to detail.

Education:

A school buildings project has to be able to define the sort of education that is going to be provided by the schools. Not only will the buildings help or hinder the education process by the sort of environment they create, but the buildings and the building processes themselves could be used to provide an education. Or do they form a passive enclosure for classic educational activities, separating them from the rest of a student's life ?

The school buildings at present tend to emphasise the difference between school and the home, and are not as such geared to learning about living in the northern areas. The impression of education "distancing" the children from daily community life emerges clearly in interviews with the parents and village elders. The opposite would of course be possible, using spaces, seating and heating arrangements closer to those used in the house; and making education more closely related to the daily needs of the population.

By extension, the school could also be regarded as being more vocational, with an increased number of practical activities related to the development issues of the region. These different views, whilst clearly concerns of curriculum planning, are also important in the way the building is planned, and in the choice of materials and building methods.

Building Objective:
By intervening in the indigenous construction processes, the project is making a statement about building, and this needs clarification. Why should schools be built by the project ? Is it merely to provide schools or can the buildings say something about other construction forms and building types ?

At present the buildings give a model for public building; the most recently stated objectives do not suggest that the school could use and demonstrate materials and methods which could help people in the way they build and improve their houses. The alternative approach would be to make greater use of local resources, promote skills adapted to house as well as other community building needs, and thus to take advantage of the construction investment to develop communally usable skills, for building and for materials production. Speed of execution has also been cited as an objective, where the assumption is that using local materials is slow; training can profitably be used to redress this drawback.

Technology Transfer:
Should the schools be used to introduce, develop and transfer technology to the region? In any case the introduction of new construction technologies will have an impact, whether positive or negative depends as much on the technologies being introduced as on the way they are handled.

Currently this does not in practice appear to be rated as very important. Skills are being improved for the construction of public buildings similar to the school, for which the demand will remain locally limited. On-the-job training is not communicating skills which are consistently usable in the community. The alternative approach is to place greater importance on technology transfer - or the improvement of local existing technologies. Education thus begins with the start of the building process, and not at the end, and the school itself serves as an education about building to the children that use it.

Self-Help:
Self-help is often taken to be a sine qua non of developmental projects without considering either what it means nor whether it is necessary. What is the reason for using 'self-help' in a project such as the SHSCP: is it merely to reduce costs? Is it getting the community to help the agency? Is it the best way to get the community 'involved'? Is it aimed at helping the community stand on its own feet in the changing conditions of the area ? Or does external funding for a programme kill what local self-help and initiative there may have been ?

Self help in the programme seems to have been scaled down from total involvement (Shishkat, Khyber) to marginal involvement (Jandrote). There has been

some suggestion that on grounds of equity and efficiency, it should not be part of the school building process. In any case, the AKES and the HB rather than the community now play the decisive and leading role.

It would be possible instead, to use the school-building to promote more self reliance, where communal sense of achievement and decision-making is increased. To do so could bring the SHSCP more in line with AKRSP activities.

Participation can, and is, also be used as a method for lowering costs - but for whom?

Extension of Programme:
The original programme was to help replace and repair the DJ Schools. A critical issue in the current programme is whether the programme be extended beyond that objective? How far? Should all Ismaili villages have schools if they want them ? More critically, should the programme not be extended to all villages, Ismaili or not ?

The current model is not suited to extension to the rest of the Ismaili community, notably due to site constraints. A policy of "no extension" of the schools beyond the present room allocation would imply making changes to the existing buildings, such as adding windows and subdividing rooms in many cases. A wider extension of the programme demands a more flexible approach, in physical and managerial terms. The sites, the resources and the motivation of participating communities become increasingly complex and varied.

Building Expansion:
Should the school building be capable of limitless expansion, and should this be the case for every building ? Should the buildings be designed to expand in a predetermined fashion, and should every building be presumed to expand ?

At present school extension is limited, to 12 classrooms and the staff accommodation, in four phases, and following a fixed plan. In some recent cases where the site is too small, complete extension is not possible. At others, a limited population would suggest that expansion is not desirable. Unlimited extension implies a more flexible plan, using smaller units - for example the classroom - which can be laid out to meet different site and enrolment requirements.

Cost:
Finally, the issue of cost, which is not as straightforward as it might appear. For instance, what should be counted as a 'cost'? Should only "real" costs be counted or should costs be imputed and attributed to take into account expenditures in kind ? Should "savings" be treated in the same way, and if so, should they be offset against costs ? Whose costs should be counted ? Should costs include costs-in-use, and should these be discounted ?

Low overall cost may be an objective, but in practice the land choice criteria, the choice of building technique and materials impose differing cost effects on the people involved: low cost to the agency is not in many cases compatible to low cost to the community. Flexibility in material choice and in site criteria would be one way of lowering the cost to the community - but doing so might in some places raise the agency cost because of the necessity of taking into consideration more local variables.

4. CURRENT PROGRAMME CRITERIA AND OBJECTIVES

The Table on the following page presents these issues and gives some of their possible alternative resolutions. Selecting different resolutions gives rise to different sets of criteria. Based on the interpretation discussed above, the current SHSC Programme is depicted using "XXXXXX" to donate selection. Where resolutions appear to have secondary importance, these are marked "2".

Table of criteria and objectives

ISSUE	ALTERNATIVE RESOLUTIONS	CRITERIA & OBJECTIVES OF CURRENT PROGRAMME
IMAGE:	Uniform image:	XXXXXXX
	Distinct image:	2
	Integrate locally:	
	Not important:	
EDUCATION	Integrate locally:	
	Emphasize difference:	2
	Vocational:	
	Basic Literacy:	XXXXXXX
BUILDING OBJECTIVE	Public building style:	XXXXXXX
	Demonstrate for houses:	
	Rapid execution:	2
TECHNOLOGY TRANSFER	Important:	
	Not important:	XXXXXXX
	Secondary:	
SELF HELP OBJECTIVE	Self reliance:	
	Lower costs:	2
	Partnership:	XXXXXXX
	Self management:	
	None:	
PROGRAMME EXPANSION	No expansion:	
	Ismaili villages only:	XXXXXXX
	Non-Ismaili villages too:	2
	Wide replicability:	
BUILDING EXTENSION	None:	
	Fixed No. of phases:	XXXXXXX
	No limit:	
COST OBJECTIVE	Low agency cost:	XXXXXXX
	Low community cost:	
	Low overall cost:	
	Low in-use cost:	2
	Not important:	

4. DEVELOPING OPTIONS

It will be seen that a major implication of the above Table is to suggest that if the way an issue is resolved is changed, or given a different priority, a different set of programme criteria will emerge. Even with the limited number of issues and very few alternative resolutions, a large number of criteria sets are generated. Furthermore, different interpretations of the issues also implies different 'solutions' both in physical design and procedural and other terms.

The Consultants presented some of the choices in the form of charts at the debriefing sessions in Karachi. A simplified version of one of the charts is shown in Appendix 3. Following the discussion that ensued, the alternatives were narrowed down to reflect the more likely interpretation of the issues.

Based on that interpretation, the three options that have been developed and are presented on the following pages are:

Option 1 - To continue the existing SHSCP with some more flexibility to allow better utilization of land

Option 2 -To develop a more suitable and responsive building design and implementation procedures to allow extension of the programme to non-Ismaili villages

Option 3 -To develop a programme of improving and enhancing construction skills and techniques to allow better school and other building and living conditions

4.1 Option 1. Continue Existing Programme

This option is for the continuation of the present programme of providing schools, more or less under the present arrangements. As now, the programme would be available to the non-Ismaili community through the VOs. The key difference from existing practice is to achieve some flexibility and responsiveness to local conditions.

The intention would be to provide a programme that could be put in place for the 1990 building season, without major changes to the procedures currently in use.

Objectives

The primary objective would still be to provide opportunities for furthering the education of girls, but through the provision of schools that provide a better educational environment than the present SHSCP schools and are capable of being more easily constructed in the prevailing physical, economic and social conditions of the Northern Areas and Chitral.

Proposal

The designs of the existing schools should be modified, including the change of the classroom size to 16'x24'.

The plan of the school should also be modified in order to:

- improve the seismic resistance of the school by de-linking the classrooms, (Section D) and...
- permit the school to be built on sloping sites by allowing the plinth levels to be stepped.

The basic construction system can be retained, but to allow for sites where the procurement of sand, gravel and aggregate is difficult, or where the transportation of cement and steel imposes exorbitant costs, an alternative design should be on offer to the community. Such a design should:

- use a RCC column and beam construction instead of the present load-bearing blockwork walls,
- retain the notion of a RCC ground beam (keeping in mind the desirability of separating the classroom blocks) as well as reinforcing around door and window jambs,

- allow for the infill walls to be of rough stone construction with horizontal mesh reinforcement to hold the wall in position following an earthquake.

The overall process of applying for and making awards would remain the same, including the various responsibilities of the community and the HB and AKES. The only differences would be that:

- the PCC would be allowed to make on-site decisions about layout, keeping in mind the possibilities of a stepped construction. This will also mean that level site depths will no longer be a major point of contention. Site selection criteria can thus be slightly relaxed.

- the PCC will discuss with and offer the Villace Construction Committee the option of building in blockwork or in stone. Such an option will be offered where local transport and material availability conditions warrant it in the view of the PCC. All communities will continue to have the option of the present blockwork design. The HB team will have to assess in more detail the specific site and material supply requirements for each village under consideration, and assess the impact of site and material choices on human effort and costs to both the agency and the community.

Implementation

This proposal can be developed and be in place well in time for the 1990 building season. The technology being suggested is understood by the HB field staff and there should be no difficulty in their explaining it to the local communities, training the construction teams and supervising them.

The design modifications required can be worked up within a fortnight. This can be done during the winter months so as to be ready in time for the building season in March 1990. Support could be provided by the consultants should the AKHB feel it necessary.

Costs

The costs of this proposal are very similar to those of the existing system, and therefore all calculations can easily be made regarding budgeting and the like.

The only additional costs would be the relatively small design and development inputs of between three and five man-weeks. Savings are envisaged through the adoption of a smaller class size and the use of a stepped plinth.

4.2 Option 2. Expanding The School Building Programme

This Option suggests that in order to develop a school design that really overcomes all the shortcomings of the present design pointed out in Section D, and to be able to implement it in the non-Ismaili villages would require more than minor modifications. Any new proposals and processes should be field-tested before being offered to the communities on a wide scale. The option involves redesigning the school.

Objectives

The basic objective of providing improved access to education facilities for girls in the Northern Areas and Chitral through the provision of schools remains as at present. The notion of a distinct image and identity of the schools too is retained, however, the image is sought to be created not through a uniform design so much as through a uniform quality and a scale which is different from the surrounding buildings.

Rather than developing a style that is in stark contrast to the indigenous, it is suggested that the school integrate more into the locality through the use of familiar materials and building forms and styles.

Educationally too, the environment, particularly for the younger age-groups should be perceived as an extension of that in the home, and lend itself to a gradual progression that the local community can relate to. The school should provide more opportunities for incorporating practical learning relating to the everyday life and experience of the community.

The construction process should, as now, be capable of quick execution, but this can as well be achieved through more training as through pre-fabrication. Though technology transfer is not of primary concern, nevertheless the skills being imparted should be of a sort that can find application locally in domestic architecture as much as public construction.

The community must continue to be involved in the construction of their school, but they should have more of a say in its design and layout on site. There should therefore be greater flexibility built into the system to take local conditions and aspirations into account. This has already been demonstrated in Rabat.

The cost of the school must of course be kept low, not just for the agencies, but also for the local communities, and therefore the availability of local resources must be a prime consideration.

Finally, the process and procedures must be such as to make them acceptable to and implementable by a variety of communities. This would mean ensuring some correspondence and compatibility with other projects and programmes being carried out in the Region (AK Health; GoP schools).

Proposal

Keeping the above objectives in mind, and taking note of the comments and observations regarding the existing system made earlier, there should be a redesign of both the school and of the project implementation process.

The redesign of the school is not in itself that difficult a task given the experience of the existing system, nor is it a problem suggesting the construction and supervision procedures. The major problem will be to develop a package that will be acceptable to and implementable in non-Ismaili communities.

For instance, there appears amongst all the communities to be a reluctance if not refusal to participate in 'government' schemes. Neither the HB nor the AKES are designed to operate in non-Ismaili communities (or at least not in the same way), therefore who should be the implementing agency, or how should the existing agencies be modified ? A similar problem arises with taking over the school after construction: the GoP finds it difficult to deliver either staff or equipment as promised. What would be required for the schools be run by the community ? What sort of ongoing support should be provided, if any?

The feedback from the existing system and its likely future impact is not sufficient to do any more than hint at the changes that will likely have to be made in the project procedures. These have been indicated in the evaluatory sections. However, in order to suggest a modified system, more information and feedback is required than the consultants currently have.

The first step, in 1990, therefore would be to develop a skeletal outline of the proposed system, which would then be exposed to both the local communities and to other organizations and agencies for their comments and observations. This period would also be used by the consultants to obtain further data and information, particularly regarding the non-Ismaili communities.

The reactions to the outline proposals would then be used to develop a package of physical and procedural proposals in conjunction and consultation with the relevant agencies. These are likely to include the AKF, HB and AKES in Pakistan, but also the GoP Education Departments and the PWD.

The new school design would then be tested through the construction of at least one school. This would test assumptions regarding ease of construction, training, as well as logistics and costing, and most importantly scheduling. Here, it is important to stress that this is not a process of experimentation, but a necessary step in gathering the logistical information needed for the setting up and running of a new large programme.

An evaluation of the prototype would permit the design and the construction system to be finalised. At the same time, the detailed procedures for implementing the programme can be worked out, from application to awards to handover, including the production of the various documents and agreements.

During the time that this is being worked out, it is suggested that no new awards for classrooms are made, and that the existing work in hand is completed. Wide scale application of Option 2 would begin in earnest in 1991.

Implementation

Given the existence of the last five years' experience of the programme and the accumulated expertise locally, the consultants feel that the whole process of developing, testing and finalising an alternative programme will not take more than 8 months, inclusive of building the initial school.

If the work started in March 1990, the new programme would be available for implementation by the end of October, allowing for the possibility of awards to be made between then and the start of the 1991 building season. The consultants suggest the following schedule:

a. Develop sketch design of school units Develop site option examples Develop material options Develop idea of inputs/roles Develop ideas for procedures	3 man weeks	March 1990
b. Discuss with communities, agencies Collect additional facts	4 man weeks	March 1990
c. Select pilot site for school award Produce preliminary package Discuss and develop further	3 man weeks	April 1990
d. Design Details Prototype site, workforce selection	3 man weeks	April 1990
e. Test design: build prototype Monitor process	(6 months)	May/Oct 90
f. Evaluate design	3 man weeks	Oct 1990
g. Revise designs for 1991 start Finalise programme, Report	4 man weeks	Oct 1990

Costs

The main costs involved are:

- some 20 weeks of consultants' time and associated travel and support by AKF, AKES and HB (equivalent to about 3 times the present study).

- the costs of constructing the prototype school, about Rs.800,000 (including the non-cash contribution of the community).

4.3 Option 3. Improving Construction Skills and Techniques

This Option suggests a programme for improving construction skills and techniques in the Region with a view to both improving the standard and costs of buildings, particularly shelter, and to developing construction as an economic activity.

This Option can be selected independently of the other Options. If implemented independently, this Option could provide improved Schools and other public buildings as a by-product. If Option 2 is also selected, much of the exploratory work necessary for this Option would not have to be done.

Objectives

The primary objective would be the improvement of the quality of construction and construction skills in the region, particularly with a view to improving housing and living conditions. School building is nevertheless an important basis for on-the-job training.

Training and technology transfer would be key considerations while the construction of schools would only be secondary to the programme, though improved construction capability will certainly lead to improved local capacity for construction of public buildings as well as dwellings.

The programme would rely on self-help, and promote self-reliance. It follows that it would also be replicable and would lend itself to expansion to all communities in the region.

Proposal

The region abounds in stone, and (at least in the past) timber. These had been used in indigenous construction to produce dwellings suited to the climate and responsive to the local culture. However, changing circumstances have reduced the availability of building timber, and the traditional stone construction techniques are not suited to the changed perception of dwellings and less so to the newer building types such as clinics and schools. Earthquake resistant design should also feature strongly in the public building, from which ideas can reach down to housing. (An important aspect, since the concepts of earthquake resistant design applied in traditional housing in the area are not being carried through into contemporary construction.)

The proposal therefore is to introduce modified techniques of working with stone that reduce the labour content of construction as well as introducing rules to make buildings more seismic resistant. To overcome the shortage of building timber, the use of simple trusses that can be manufactured out of small sections will be explored. Training would also include work with reinforced concrete.

The proposal calls for the development of both appropriate construction techniques and guidelines for building design to be done through a programme of training trainers.

The proposal, which is building technology and materials oriented, will train local builders to use locally available resources more efficiently and effectively.

An initial training workshop will be held to which six or seven two or three man teams will be invited. Each team will come from a village where a public building such as a school (or health facility) is to be built. The team will consist of two skilled builders (a mason and a carpenter) and one unskilled but aspiring builder.

The teams will come together for a three-week workshop during which they will learn and develop building skills as well as designs for the buildings they will erect back in their own village.

After the workshop they will return and undertake the construction of their building, using unskilled labour to assist them. Wherever possible, other local masons and carpenters will also be asked and participate in the construction in order to learn the new skills and techniques.

Once the buildings have been completed, they will be evaluated by the builders and the community as well as by the consultants. The evaluation will help make further refinements and improvements.

The process of skills and knowledge transfer started in the initial construction will be continued with support from a field based unit from the HB. They will also monitor developments, passing on innovations to other village groups.

It is anticipated that little additional external funding will be required for this programme after the initial training since the construction programme thereafter will consist of buildings that would in any case have to be built, as in the case of the AKES (P) school construction programme. However it is expected that the demand for improved shelter would be considerably increased if there were a parallel project to establish a small home-loans programme, perhaps within the frame-work of the AKRSP.

In the longer term the programme could also be supported by income-generating activities based around the construction and building materials sectors.

Implementation

The initial programme, leading to the development of improved skills and construction techniques is expected to take one building season. The developments thereafter, including the subsequent training by the trainers, are independent of this proposal and are not considered here.

It is assumed that Option 2, above, will be taken up, and that therefore much of the preliminary preparatory work of site, building project and participant selection can be done as part of Option 2 in 1990, and the Option 3 programme proper will be launched in 1991 as follows:

a. Detail programming		
Selection of sites		
Selection of demonstration buildings		
Selection of training building and site		
Selection of participants/trainers	2 weeks	1990
b. Run training workshop	2 weeks	April 91
c. Design demo buildings	1 week	April 91
d. Construct demo buildings in villages	3 months	May 91
e. Evaluate		
Discuss/Review/Revise techniques	2 weeks	Sept 91

Costs

The main costs involved are some 21 weeks of consultants' time and associated travel and support by AKF, AKES and HB (equivalent to about 3 times the present study).

Additionally, there will be the costs of constructing the training building, about Rs.500,000, which will include the payments made to the participants/trainers during the training workshop.

For the construction of the demonstration buildings in the villages, funds will have been provided through existing sources, and not necessarily as part of this proposal.

5. RECOMMENDATIONS

1. Since we see the extension of the SHSCP to the rest of the region as an important consideration and one which cannot be met merely by a continuation of the existing programme (option 1), we recommend that option 2 be taken up in 1990 and option 3 in 1991. This would achieve all the objectives of both the AKES(P) and the HB for the region in terms of improved education and building and living conditions.

2. The extension of classrooms and other remedial work to those DJ schools that will not be replaced by SHSCP buildings should be deferred till 1992 when improved construction techniques and better trained and equipped building personnel will become available.

3. In order to make good some of the shortcomings in the existing buildings of the SHSCP, the programme of work described below should be started immediately.

6. PROGRAMME FOR IMPROVING EXISTING SCHOOLS

We suggest that this programme should be taken up regardless of what other course is followed and which of the suggested options is selected.

Objectives

The primary objective is to rectify some of the more obvious shortcomings of the existing SHCP schools of the sort indicated in the comments and observations made in section D. "The Existing Schools".

roposal

Many of the problems of the SHSCP schools built so far stem from the fact that they have been designed and built as the first phase (first two in the case of middle schools) of a four-phase programme. As such, some aspects do not make sense currently, while others are left 'unfinished' till such time as the other phases are completed.

In reality, for many schools the construction of the next phase(s) may be a long way off, and in some places may never materialise. The 'extra expense' argument regarding doing work that may later have to be undone therefore does not apply if the consequence is five years or more of an unsatisfactory teaching environment. In some cases, without such 'extra expense' the buildings could suffer major damage through leaking roofs.

In addition it would appear that about half the middle schools and all the primary schools have an average class size of 20 or less. Since the rooms have

been generously designed for 40 (see also Section D. above), it is unlikely that many will need extension in the immediate future, particularly if the smaller classes are housed two to a room and share a teacher.

The first step, therefore, is to clarify the picture regarding the timing of future extensions, if any. For this the sort of school mapping exercise indicated above would be particularly helpful.

To immediately rectify some of the problems faced, the following should also be done in all schools:

- Lay bitumen waterproofing and earth insulation to roofing as specified. Check roof drainage falls before-hand and rectify run off as necessary by laying a supplementary screed.

- Enclose corridors as indicated on drawings. This will need to be agreed by the architects and may also need designing and detailing. A solution that could be opened in the summer for ventilation would seem desirable.

- Devise a way to open existing skylights. This could be done by modifications to the short sides of the skylights either by introducing an openable leaf in a subframe, or by incorporating hit-or-miss baffles. Any such solution is likely to be second-best unless the opening and closing operation can be such that it can be performed easily and from within the room without recourse to tools that can get misplaced. For example, it would appear that the skylights in the Karimabad Academy are not opened regularly, nor are the solar-heating panels in the clinic at Singal operated even though the effect is known to be beneficial, presumably because of the difficulty or awkwardness of doing so. These latter are now actually jammed.

- It should certainly be possible to develop a completely new skylight design that is both openable and minimises solar heat gains during the summer (see section D.) which could be introduced into those rooms that have not yet been completed. A north facing orientation would be desirable. The Sherqilla roof lights could provide a model.

- The skylights should also have wired-glass glazing to prevent injury from falling panes. Alternatively a horizontally fixed chicken-wire net will provide protection and may be cheaper.

Trees such as poplars should be planted along the boundary of the school. Apart from providing a better environment, these can then be cropped so as to provide a constant supply of firewood and perhaps even act as a source of income for the maintenance of the school.

The planting and maintenance of the trees can obviously also form part of a useful pedagogic project as well as a source for propagating knowledge to the community.

For all those schools that are not likely to be extended within the next five years, the following should also be done:

- In the basic three classroom school, provision should be made for a staff-room and the headmaster's office and a store. If this is not done there is a likelihood that one of the classrooms may be taken over for this function, as is the case with the existing DJ School in Japukey.

  In design terms it may be simplest if the 16'x32' room currently designated as No 1 is converted into staff use along the lines indicated for room 7, but without the internal corridor. The headmaster's office could be entered through the existing door and a new door to the staff room could be made by extending one of the existing windows. The store room could either be entered internally, or alternatively another window could be converted into a door. The two staff rooms could be made better environmentally by punching through two narrow new windows in each room in the wall opposite the door. If these are kept one foot wide, they need not disturb the vertical reinforcing bars.

  To compensate for the loss of classroom space, one of the rooms designated as 4, 5, 8 or 9 should be constructed. Whichever is chosen, it should have windows along both walls, as in rooms 4, 8 and 11. This could be done as an 'interim award' for 1990.

- Where the foundations for classrooms have not yet been started, we recommend that the room could be reduced in size to 16'x 24' instead of 30' (see Section D.). The rest of the details would remain the same.

Implementation

All the actions recommended in this proposal can be undertaken straightaway and are within the existing capacity and capability of the AKES and HB.

The major task, of building the extra classroom would increase the work-load for 1990 by about 50% for the HB assuming that no new classrooms awards are sanctioned in 1990 until the existing work on the classrooms already awarded is completed.

Costs

The major costs of the programme would be that of building between 15 and 20 extra classrooms, which at Rs 100,000 each works out to between Rs 1.5 to 2 million.

Appendices

Appendix-1 : Terms of Reference

1. AKF's objective in commissioning an external evaluation of SHSC at this time is to produce a two-part report, the first part of which reviews critically the progress to date, the second part of which charts a new five-year programme of construction activity.

2. The review of progress to date should include description/discussion of:

2.1 The number of rooms completed and under construction, by location (geographical, Ismaili/non-Ismaili village).

2.2 The technology and design: its appropriateness (with respect to (a) aesthetic & architectural principles, (b) seismic stability (c) ease of construction & maintenance, (d) average class-size and number of teachers posted to an average school).

2.3 The costs of the programme as a whole and of its sub-components; how these costs have evolved over the life of SHSCP; how SHSCP unit costs compare with those of GoP's school-building programmes in the Northern Areas.

2.4 The history of the programme (earlier buildings, desire to imitate new construction style seen at Sherqilla, whether alternative technologies were considered, modifications in the technology since SHSC formally started, extent of local variation allowed, impact on the programme of including non-Ismaili villages etc).

2.5 The self-help components (land, labour, local materials, ongoing commitment of villagers to their new school): how these were originally envisaged, and how they have evolved in practice (e.g. time which villagers can give for labour versus need to complete buildings as soon as possible, impact on villagers' time of using alternative technologies).

2.6 The successive steps of the SHSC process itself: AKES(P)'s analysis of need, requests from villages through Village Organisations, the award-making machinery of dialogues with villages, HBP's decision-making, accounting and construction processes, handover of completed rooms to villages.

2.7 The impact of the SHSC programme on (a) school enrolments (notably of females?), (b) attitudes of teachers to their work, (c) attitudes of the community towards education.

2.8 The impact of the SHSC programme on (a) villagers' skills (building skills, reading site construction plans etc), as evidenced by a transfer of such skills to villagers' construction activities in their villages; and on (b) villagers' attitudes to community participation programmes.

2.9 The impact on the SHSC programme of the Aga Khan Rural Support Programme's establishment of Village Organisations and its somewhat different procedures for funding and implementing Productive Physical Infrastructure (PPI) projects.

3. The charting of a new five-year SHSC programme should include a description/discussion of:

3.1 The need for new school buildings, as identified by AKES(P) for both Northern Areas and Chitral, by the Government Education Departments for both Northern Areas and Chitral, and by the School-Mapping exercises conducted under AKF's auspices in both Northern Areas and Chitral. A description of 'need' should take account of a realistic assessment of GoP's own previous and intended school-building programme.

3.2 Recommendations for continuation or modification of (a) the present design and technology, (b) the present award-making process, (c) the present construction process, with the implications for costs and implementation spelled out for each recommendation.

3.3 Recommendations for those sites which only need 1-2 new rooms or which do not meet the present criteria for size/location.

3.4 The possibility (and implications) of extending the SHSC concept and principles to projects for housing rural teachers or health workers.

4. Both sections of the full evaluation report (critical review of progress to date, charting of new five-year programme) should be prefaced by an executive summary, drafted in such a way that it accurately reflects the full text but can be forwarded subsequently by the Foundation, without further editing, to other interested agencies.

Appendix 2 : Tables

Table 1

AGA KHAN HOUSING BOARD FOR PAKISTAN

SELF HELP SCHOOL CONSTRUCTION PROGRAMME

UNSKILLED/SKILLED MANPOWER CHART 1988 TO 1989

Manpower/ Material	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Unskilled/Man-days														
Planned	350	400	250				250	180	130	65				
Revised	200	225	250	200			350	350	350	300	300	250	250	50
Actual	40	80					-	-	7	187	639	344	-	
Skilled/Man-days														
Planned	150	175	90				90	67	38	20				
Revised	50	85	150				175	100	100	100	100	100	70	50
Actual		15												
Cement								100	150	100	150	100	100	100
Steel									0.50	0.75	0.50	1.25	0.284	-
Gravel								500	750	500	750	500	500	555
Sand								350	475	350	475	350	350	297
Wood													113	
Hollow block								112	3000	1000	800			
C.C. slab										90				
Stone soling										400	580			

Table 2

AGA KHAN HOUSING BOARD FOR PAKISTAN

SELF HELP SCHOOL CONSTRUCTION PROGRAMME

SKILLED/UNSKILLED MANPOWER CHART 1989

NAME OF PROJECT: KHAIRABAD

Manpower/ Material	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Unskilled M/Day														
Planned	350	400	250				250	180	130	65				
evised	200	225	250				350	350	350	300	300	250	250	50
Actual	40	80	-				-	-	7	187	639	344	-	
Skilled M/Day														
Planned	150	175	90				90	67	38	20				
Revised	80	85	150				175	100	100	100	100	100	70	50
Actual	-	15	-					-	7	54	150	107		
Cement														
Planned	40	46						100	150	100	150	100	100	100
Revised														
Actual	-	60						-	20	125	355	75		
Steel														
Planned	0.47	1.00												
Revised									0.50	0.75	0.50	1.25	0.284	
ctual										.861	0.758	0.58		
Gravel														
Planned	200	230												
Revised								500	750	500	750	300	500	555
Actual	-	450							150	625	1775	375		
Sand														
Planned	100	115												
Revised								350	475	350	475	350	350	297
Actual	-	225							75	375	900	188		
Hollow Block														
Planned														
Revised								112	3000	1000	800			
Actual										125	4632	1164		

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Table 2 continued

Manpower/ Material	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
C.C. Slab														
Planned														
Revised									30	60	6			
Actual											20	30		
Wood														
Planned														
Revised														
Actual													160	

Table 3

AGA KHAN HOUSING BOARD FOR PAKISTAN

SELF HELP SCHOOL CONSTRUCTION PROGRAMME (1989)

NORTHERN AREAS

SUMMARY OF COSTS

For 30 rooms + 5 toilets, a total covered area of 20,940 sq.ft

1. Project funding	**Actual cost (Rs.)**
1.1 Skilled labour (459,000 + 97,800)	556,800
1.2 Outside material (2,121,000 + 443,000)	564,000
1.3 Execution/management/technical input	978,600
1.4 Capital cost	57,000
Total budget 1989 :	4,156,400
2. Community participation	
2.1 Local material (570,000 + 60,000)	630,000
2.2 Unskilled labour (432,000 + 80,000)	512,000
2.3 Land	1,000,000
Total community participation:	2,142,000
3. Total cost for 1989 Award	
30 rooms + 5 toilet blocks	6,298,400
3.1 Total cost of construction except the price of land	5,298,400
	Approximate cost per SFT = @ Rs 253

Basic primary school cost

Cost for 3 rooms + toilet block 2200 sq/ft @ Rs 253 = 556,600

Table 4

AGA KHAN HOUSING BOARD FOR PAKISTAN

SELF HELP SCHOOL CONSTRUCTION PROGRAMME

Name of Site	Cost of cement per bag (Rs)	Cost of steel at site per ton (Rs)	Cost of timber at site (Deodar) (Rs)	Skilled labour per day (Rs)	Land per sq.yd (Rs)	Unskilled per day (Rs)	Sand per CF (Rs)	Gravel per CF (Rs)
DANYORE								
Gilgit	117	14,100	105	85	50	40	3	3
ALTIT								
Hunza - Gilgit	130	14,500	110	69	100	40	2.75	3
OVARIK								
G. Chasma Chitral	140	15,500	120	85	37	30	17	20
SUSUM								
Chitral	140	15,500	120	80	32	30	5	12
BREP								
Mustang-Chitral	145	15,600	122	90	24	30	3	6
PHANDER								
Gupis - Gilgit	184	16,350	118	80	25	40	1.75	2.5
BARKUTT								
Yasin - Gilgit	152	15,192	108	60	39	40	1.75	2.25
KHAIRABAD								
Hunza - Gilgit	152	15,134	110	75	20	40	6.75	6.75
KUCHDEH								
Ishkoman - Gilgit	137	14,680	103	85	50	40	3	4
HATOON								
Ishkoman - Gilgit	132	14,670	102	85	46	40	2	2.75
TERU								
Gupis - Gilgit	189	16,500	120	74	20	40	2	2.25

Table 5

AGA KHAN HOUSING BOARD FOR PAKISTAN

SHSCP NAs

RATES

	Award 1984	Award 1985	Award 1986	Award 1987	Award 1988	Award 1989
Cement bag + cartage	100	105	120	120	122	159
Steel + cartage per ton	7500	8000	9000	9500	12500	15000
Bitumen per kg	2	2	2.50	3	5.50	6.50
Timber per CF	55	60	80	100	110	120
Hardware & glass per R/T	-	-	2000	2200	5500	6500
Plumbing per R/T	20000	20000	23000	24000	18000	20000
Polyesterene sheet per SF	10	10	10	10	10	12
Electrical work per room + TB	7000	7600	9000	10000	11000	12000

Table 6

AGA KHAN HOUSING BOARD FOR PAKISTAN

SELF HELP SCHOOL CONSTRUCTION PROGRAMME NAs

Status August 1989
(Pakistani Rupees)

Construction & Executive & Management xpences	Award 1984	Award 1985	Award 1986	Award 1987	Award 1988	Award 1989
Salaries & Benefits	205,099	269,130	277,134	456,693	635,215	600,176
Travelling	35,502	59,567	61,418	94,001	50,226	76,252
Rent	10,076	14,496	18,051	37,656	58,298	52,188
Misc. Exp.	62,369	90,524	93,400	118,173	184,567	141,047
TOTAL	313,046	433,717	450,003	706,523	928,306	869,663

Appendix-3 : ISSUES AND OPTIONS

Table of implications

The Table below is a simplified version of the Table presented for discussion at the meeting in September 1989 in Karachi, with representatives of the AKF, AKES(P) and the AKHB(P), and shows the implications of opting for a particular resolution of the various issues. The implications considered are Physical (relating to the building form, materials etc), Other (administrative and management, procedures etc) and Impact (on the community, the programme, etc).

ISSUE	OPTION	IMPLICATION			
		PHYSICAL	OTHER	IMPACT	COST
IMAGE	UNIFORM	DESIGN MATERIALS	AGENCY CONTROLLED	AGENCY IDENTIFIABLE "INVISIBLE" SYMBOLIC	SAME
	DISTINCT	DIFFERENT FROM ENVIRONMENT	ARCHITECT CONTROLLED	ALIENATION DISTANCE SYMBOLIC	HIGHER/ SAME
	INTEGRATED/ BLENDED	USE SAME MATERIALS	CONTROLLED BY LOCAL CONDITIONS	LIKELY TO INFLUENCE CONSTRUCTION	LOWER
	NOT PERTINENT	ANY OF THE ABOVE	.	.	.
EDUCATION	INTEGRATION WITH LOCAL/ VARIATION ENVIRONMENT	USE LOCAL MATERIALS; LINK TO LOCAL HOUSE FORM	TEACHING IN THE ROUND	TRADITIONAL: CULTURAL IDENTITY, COMMUNITY. ISOLATION	LOWER
	"MODERNISATION (ALIENATION)	USE IMPORTED MATERIALS; FORMALISE; EDUCATIONAL SPACE	SEPARATE TEACHERS FROM STUDENTS	SAME AS ABOVE	SAME
	VOCATIONAL	MORE STORAGE SPACE; MORE LINKS TO OUTSIDE SPACE	PRACTICAL TEACHING ECONOMIC ACTIVITIES; CLOSER LINKS TO AKRSP	MORE CHILDREN IN CONSTRUCTION;- CONTACT WITH MATERIALS; MORE DIRECTLY USEFUL. ECONOMIC & DEVELOPMENT BENEFITS	LOWER (LONG TERM)

CONSTRUCTION	DEVELOP DISTINCT STYLE FOR PUBLIC BUILDING	DIFFERENT SCALE DIFFERENT ECONOMICS & MAINTENANCE		RESTRICTED TO PUBLIC BUILDING ONLY LOST OPPORTUNITY FOR INFLUENCING OTHER CONST-RUCTION	SAME
	DEVELOP/ IMPROVE SUITABLE CONSTRUCTION, SERVICES	HARMONISE MATERIALS TECHNIQUES WITH DOMESTIC REQUIREMENTS		IMPROVED STD. OF LIVING CONDITIONS. STIMULATE LOCAL ECONOMY	LOWER
	FAST EFFICIENT BUILDING	STANDARDISATION PREFABRICATION		SCHOOL BECOMES AVAILABLE & USEABLE EARLIER; LIMITS COMMUNITY PARTICIPATION	LOWER
SELF-HELP	SELF RELIANCE, ACHIEVEMENT, POSSESSION, MAINTENANCE	AFFORDABLE & OBTAINABLE SOURCES	INVOLVEMENT OF COMMUNITY PARTICIPATION-IN ALL STAGES	-LIMITS RAPID EXECUTION.; ENCOURAGE REPLICABILITY; IMPROVES LOCAL CAPACITY	HIGHER IN LONG TERM)
	LOWER COSTS	DEMONETARISED VOLUNTARY/ LABOUR FREE MATERIALS	MAXIMISE USE OF LOCAL/ COMMUNITY AVAILABLE SKILLS, MATERIALS	INCLUDE NON MOTI-VATED COMMUNITY LOWER PRODUCTION IN OTHER SECTORS DIVISION	SAME
	PARTNERSHIP WITH AGENCY	SAME AS THE ABOVE	DEFINE THE TERMS OF PARTNERSHIP	PROMOTES MUTUAL TRUST	SAME
	NONE	NONE OF THE ABOVE		CREATES DEPENDANCE LIMITS SELF RELIANCE	
	SELF MANAGEMENT	LOCALLYAGREED/ DETERMINED	MOTIVATION; SUPPORT TO THE COMMUNITY	PROMOTE SUSTAINABLE SELF RELIANCE QUALITY MAY SUFFER POSITIVE IMPACT ON OTHER SECTORS	LOWER

EXPAN-SION	NONE (SCHOOL)	REVISE PLANS TO ACTION NON-EXPANSION		IMPROVED SCHOOLS ON LIMITED SITES	SAME
	NONE (PROGRAMME)	SAME AS ABOVE		INEQUALITY WITH OTHER COMMUNITIES	SAME
	LIMITED TO ISMAILI (PROGRAMME)	MODIFY PLANS TO ACCOMMODATE REAL SITES & SIZES	ANALYSE CONDITIONS AND NEEDS	ENCOURAGES DISPARITY/ RESENTMENT WITH OTHER COMMUNITIES	SAME
	LIMITED/PRE DETERMINED (SCHOOL)	PHASED DEVE-LOPMENT WITH SELF SUFFIC-IENCY AT EACH STAGE		LACKS FLEXIBILITY TO COPE WITH ALL SITUATIONS	SAME
	OPEN ENDED ARCHITECTURE (SCHOOL)	DESIGN ELE-MENTS AND A SYSTEM FOR THEIR RELA-TIONSHIP	REVISED DESIGN ANALYSE CONDITIONS	RESPONSIVE; DIFFICULT TO PROGRAMME/ CONTROL;, INCREASES AGENCY WORK LOAD	LOWER
	TO NON ISMAILI (PROGRAMME)	PLANS TO ACCOMMODATE RANGE OF SITES,SIZES	REVIEW PARTNER-SHIP	WILL REQUIRE MOTIVATION, TRUST, IMPROVES OVERALL QUALITY OF LIFE, IMPROVES PROJECT IMAGE	SAME

COST	MINIMISE AGENCY COSTS		MAXIMISE AGENCY CONTROL	PROGRAMME CAN HAVE GREATER COVERAGE	LOWER
	MINIMISE COMMUNITY COSTS	ALSO MAXIMISE USE OF "FREELY" AVAILABLE RESOURCES	MAXIMISE AGENCY CONSTRUC-TION	ENCOURAGE DEMAND/ PRESSURES	SAME/ HIGHER
	LOWER OVERALL COSTS	USE LOCALLY AVAILABLE MATERIALS		AS ABOVE 2	LOWER
	LOWER COSTS IN-USE MATERIALS ENVIRONMENT FOR LONGER	USE MAINTEN-ANCE FREE EDUCATION	MAINTAIN	LOWER COSTS	SAME
	-NOT PERTINENT				

Appendix - 4 : Pre SHSCP Schools

Schools built by the village communities on the Sherqilla model

Three schools, whose construction was entirely managed and financed by the Village Communities, were visited at Nazimabad, Passu and Khyber. They were built from a line drawing prepared by Architect Amir Ali Mulji in Karachi. All the three schools have a similar plan and have stone masonry walls and timber roofs. The internal walls are plastered with cement sand plaster in Nazimabad and Passu, and with lime sand plaster in Khyber. Lime was extracted by the community from the vicinity of the school.

All three schools have a few weaknesses because of which they will not perform well in an earthquake. These weaknesses are:

- the windows are too close together and too near the corners for real structural safety
- the various components of the building are not tied together at the roof and/or the plinth level
- stone masonry at the Nazimabad school has a number of cracks because the two skins of the wall are not properly tied together
- all the classrooms are connected together to at least 3 others at one corner only.

All these defects, however, can be overcome and the schools do not need to be demolished as has been suggested. Stone buttresses can be provided at the corners so as to strengthen them; a concrete or timber tie can be introduced at roof or lintel level and where necessary stone masonry can be tied at regular intervals, both horizontally and vertically with either cross stones or galvanized iron bars. This may necessitate the removal of the roof but it can be done one classroom at a time. The roofs of the schools also leak. This is not only because of poor water proofing but also due to bad detailing.

When reconstructing the roof this problem can also be taken care of. On the whole the schools are well designed and well constructed. If technical advice had been given to the communities, before and during construction, then the defects they suffer from could have been overcome at no extra cost.

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Appendix-5 : Notes on Seismic Resistance Construction

Mechanism:

Buildings as a whole and all their components and contents are badly shaken during severe earthquakes by the ground motion referred to in section 2.6. Since earthquakes are earth movements (which, in effect cause the ground to move from under a building), the forces which occur in the buildings come from the inertia of its masses. Inertia force caused on any mass (m) can be described by the formula F = ma where a = acceleration effectively acting on mass m (Figure 3.1).

The force is proportional to mass. Hence the less the mass, the less is the inertia force caused by the earthquake on the building.

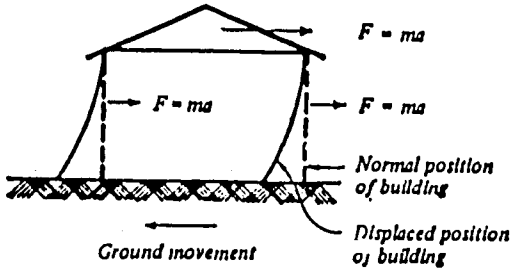

Figure 3.1 Ground motion inertia force

Arya, A.S.
Protection of educational buildings against earthquakes, a manual for designers and builders. Bangkok, Unesco, 1987.

Appendix - 6 : Places visited, persons met

Date	Time	Place	Met with
11-9-89	1430	Rawalpindi Pearl Continental Hotel	AKHB(P) and AKF representatives - Abdul Karim: Asstt. Executive Officer, AKF - Shaikh Rashid Mohammad: Executive Construction Manager HB - Kamil Tharani: Member HB(P)
	1930	-do-	AKES(P), HB(P) and AKF representatives - Abdul Karim: Asst. Executive Officer AKF - Asif Fancy: Chairman AKES(P) - Habibullah Madhani: Manager Personnel, Admin & Projects AKE - Sadrudin Pardhan: Executive Officer AKES(P) - Shaikh Rashid Mohammad, Kamil Tharani, Rahmat Ali, HB(P)
12-9-89	1100	Gilgit	- Rahmat Ali: Programme manager, SHSCP
		Danyore Self Help School	- Rahmat Ali: Headmaster
	1830	Oshikhandas	- Amir Ali: Teacher and Secretary to VCC - Shamsher Khan: Chairman VCC - Tawalud Shal: mason who worked on the school - Ghulam Hussain: donated land to the school
13-9-89	1000	Ovarik Self Help School	- Sultan Mehmood: Teacher - Shamshuddin: president VCC
	1230	Susum Self Help School	- Hakim Khan: donated land for the school - Wali Jan: member of the community
	1530	Phandar Self Help School	- Mir Wali Khan: President VCC Members of the community
	1715	Teru Self Help School	- Ibrahim Khan: President of VCC and Chairman of VO - Mohd. Yasim: mason at the site Community members
14-9-89	1040	Jandrote GoP school	- Akbar Khan: mason at the site under construction Clerk of works of the contractor
	1120	Gupis old DJ School	- Mohd. Nawaz & other school teachers
	1330	Sumal Self Help School	Community members
	1610	Damas	- Sawab Khan: President VCC Self Help School
	1710	Bubar Self Help School	- Azoor Khan: Secretary VCC Community members
	1820	Singal Self Help School	Community members
15-9-89	0700	Singal Medical centre & Self Help School	Community members
	0900	Geech Self Help School	- Subedar Rahman Shah: Teacher - Deedar Shah: Headmaster Community members
	0945	Jakopay DJ School	Community members
	1100	Sherqila	Carpenter of Deedar Khan's workshop

		GoP School	
		AK School	
		Deedar Khan's Workshop	
	1330	Gilgit	
16-9-89	0930	Rabat	- Shahban Ali: Headmaster
		Self Help School	School teachers
			- Mohammad: Member of VCC
	1100	Hussainabad	- Jan Alam: Teacher
		Self Help School	Members of the VCC
	1320	Nasirabad	- Ali Ahmed Jan: Headmaster
		Self Help School	- Naib Khan: Teacher
			- Gul-i-Lala: Teacher
	1520	Nazimabad	- Ali Ahmed Jan: Caretaker
		Community built school	
	1620	Passu	- Gulban Mohammad: Lambardar
		Community built school	
	1715	Khyber	- Mohd. Afzal: Board member
		Community built school	Community members
	1900	Gulmit	
17-9-89	0815	Shiskat	- Mohd. Shah: President VCC
		Self Help School	- Sufaid Gul: mason at site
			Members of the VCC
	1000	Baltit visit to the fort	
	1200	Altit	- Ghulam Mustafa: President of VCC
		Self Help School	
		Fort	- Ali Madad: mason at site
		visit to the Academy	Ali: Secretary VCC
	1745	Gilgit	
18-9-89	0830	Gilgit	Meeting with Education Dept. GoP
	1230		- Col. K. Abdul Aziz: Director
			AKRSP
			- Anis Dani: DGM
			- Ameneh Azad Ali:
			Coordinator, Women's Programme
			AKES(P)
			- Dadu Khan: Manager Operation
			- Davar Shah: Senior Education Officer
			- Sadruddin Jooma: Asstt. Executive Officer (North)
			- Bulbul Jan Shams: Senior Education Officer
			- Reza Beg: Director AKES(P)
			NAPWD
			- Lt. Col. Rashid Ahmed:
			SE (works)
			- Derwaish Ali: XCN
	1300	Gilgit	Meeting with
	1700	Serena Hotel & Housing Board office	
			- Didier Lefort: architect of the SHSCP
			- Shaikh Rashid: Executive Construction Manager HB(P)
			- Rahmat Ali: Programme Manager SHSCP
19-9-89		Gilgit	
		at the HB(P) office (report writing)	
20-9-89	1130	Islamabad	Meeting with
		Hotel Holiday Inn	
			- Jeremy Greenland: Director Education Programme
			- Abdul Karim: Asstt. Education Officer AKF
	1430	Norwegian Embassy	Meeting with
			NORAD representative
21-9-89	1330	Karachi	Debriefing meeting with

			AKF, AKES(P) & HB(P) - Hakim Feerasta: Chief Executive Officer HB (P) Jr. Tajuddin Manji: Chairman - A. Ali Panjawani: Hon. Sect. - Kamil Tharani: Member - Salim Rajan: Manager Projects AKES (P) - Asif Fancy: Chairman - Sadrudin Pardhan, Executive Officer - Habibulla A. Madhani: Manager Personnel, Admin & Projects - Sadrudin Juma: Asstt. Executive Officer (North)
22-9-89	Senator Room Hotel Holiday Inn	Debriefing meeting with representatives of AKES (P) & HB (P)	Members present at the 21-9-89 meeting at the AKES (P) office were present in this meeting as well.
23-9-89	AKF office	Meeting with AKF representatives	- Hakim Feerasta: Chief Executive Officer - Abdul Karim: Asstt. Executive Officer - Jeremy Greenland