Tonga Education Support Programme

School Infrastructure Survey 2006

Infrastructure Advisor for School Mapping Report

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BACKGROUND

The Kingdom of Tonga

Tonga is an independent kingdom consisting of an archipelago of 129 islands, of which only 39 are inhabited. It is unique in the Pacific as it is the only country with a constitutional monarchy. It has a population of 102,000 with 39% of its population aged 14 or under. Approximately 70% of the population resides on the main island of Tongatapu. Tonga has a per capital GDP of USD1,595. Its human development outcomes, including under-five mortality rate, life expectancy, and literacy, are among the best in the Pacific, and on a par with its Middle Income Country status. It has a narrow economic base and material reliance is placed on inwards remittances from relatives living overseas. A number of reform efforts have enjoyed limited success and the overall economic position continues to deteriorate. In 2005, a civil service strike was settled with pay rise commitments that cannot be financed within a business as usual framework.

Education

The country has a long-standing tradition of providing virtually universal access to six years of compulsory, free primary education. Despite its relatively strong human development indicators and commendable strides in achieving universal primary education, the Government of Tonga (GoT) recognizes the need to improve the quality of education it is delivering in order to meet the challenges of a globalised market economy as well as the aspirations of its large proportion of unemployed youth. Accordingly, the Government has recently developed, through a three year long consultative process, an Education Policy Framework 2004-2019 (EPF) to provide a vision and strategy for undertaking comprehensive reform and improvement of its education system over the medium to longer term.

Development partner assistance

NZAID and the World Bank have jointly entered into contractual arrangements with the Government of Tonga (GoT) to partly finance the Ministry of Education (MoE) annual and rolling three year plans. These arrangements are known as the Tonga Education Support Program (TESP). Annual Joint Reviews (AJR) of the TESP will agree the activities to be financed by the donor partners.

THE ASSIGNMENT

A component of TESP involves the development of Minimum Service Standards for schools (MSS) these standards will provide a benchmark for schools to identify possible deficiencies in service delivery. Each school will develop a rolling three year development plan which will outline the measures required to attain or supersede the MSS. Through the Tonga School Grants Program (TSGP), TESP will provide grants to schools to finance the inputs necessary to improve the quality of services they provide so that the standards are achieved. Aside from creating an environment in which

resources available to a school can be used to finance locally (school and community) determined needs, the Program provides the Government with the opportunity to establish a 'level playing field' particularly across government and non-government schools, by providing a disproportionate amount of funds and project support to disadvantaged or underserved schools.

It is expected that school rehabilitation will be an important feature of many schools' three year development plans and it is intended that specific guidelines for rehabilitation will be developed for schools so that they are able to expend grants wisely, ensuring that civil works undertaken meet all required standards.

TERMS OF REFERENCE

The Infrastructure Advisor for School Mapping's terms of reference were to co-ordinate the gathering and analysis of data related to schools' infrastructure from the 124 primary schools and 38 secondary schools in Tonga so that the Ministry of Education and school communities are enabled to determine and prioritize the interventions required to improve schools' infrastructure. See Annex 1 for the detailed terms of reference for the assignment.

MEETINGS

The Infrastructure Advisor met with members of staff of the Ministry of Education and of the TESP management team, with the World Bank School Grants Adviser and two consultants working on TESP, with the manager of the civil engineering firm selected to carry out the school infrastructure survey and with the Deputy Director of Works in the Ministry of Works.

Meetings were also held with the manager of Jaimi Associates, a local firm of architects who carry out school building projects for the Church of the Latter Day Saints and with a member of staff of the Central Planning Unit and a Japanese volunteer to discuss the Japanese government funded school renovation programme.

VISITS

Visits were made to six primary schools on Tongatapu Island to inspect the infrastructure and assess the amount of work necessary to renovate the schools. Visits to three of the schools were made in the company of the manager and two members of staff of the civil works firm selected to carry out the infrastructure survey. See Annex 2 for details of the school visits.

SUMMARY OF REPORT

School Grants and School Renovation

From the visits to six schools on Tongatapu Island it became obvious that few if any school buildings will not require either:

1) Upgrading to meet current building standards for protection against cyclones and earthquakes;

2) Renovation or even replacement because of poor initial construction and/or lack of maintenance;

3) Additional facilities such as classrooms, stores and offices or combinations of all three.

All of the school buildings seen during the school visits required upgrading to some degree in order to meet current standards of protection against cyclones and/or earthquakes and many if not most are in danger of damage or destruction in case or a severe cyclone or earthquake.

The cost of upgrading all school buildings in the country is however likely to be very high and certainly more than the budget available under the school grants programme.

All of the buildings seen during the school visits suffer from a more or less complete lack of maintenance and some were poorly constructed in the first place. At least one building has been so poorly constructed that it constitutes a danger to the children and teachers at the school and should be closed and demolished

The cost of repair and replacement is again likely to be very high and certainly more than the budget available under the school grants programme.

None of the schools visited had a store, a principal's office or a staff rooms. All schools should have at least one store and an office for the principal and larger schools should have staff rooms (see Annex 4) but again the cost of providing these to all schools in the country will be very high.

When the school facilities survey is complete, it should be possible to rank all existing schools in terms of the number and condition of their existing facilities. However, as has been indicated above, it is highly unlikely that the funds available under the school grants programme will be sufficient to bring all schools up to standard in terms of upgrading, improving, replacing or adding facilities.

Difficult decisions will have to be made therefore as to how the school grants are to be distributed. It is likely that not all of the grants will be spent on facilities; some will probably be spent on operational grants for instance thus

further reducing the likelihood that the remaining funds will be sufficient for the construction work that will be required. See Annex 3 for more details.

It is proposed to carry the renovation or replacement of school facilities under the school grants programme through the schools themselves. At present the only mechanism available at the school level to do this are the Parent/Teacher Associations (PTAs).

Given the fact that the education system is at present very centralised, the move to funding and managing improvements to school facilities through the PTAs will not be easy. It has to be remembered that school facilities in Tonga, if they are to have long useful lives, have to be constructed to a very high standard in order to withstand cyclones and earthquakes and at present this certainly is not the case.

It is recommended therefore that if the PTAs are to be used to carry out the management of the renovation or construction of school facilities probably using small local contractors, then they should receive a great deal of technical assistance in managing and supervising the process. See Annex 3 for more details.

If it is intended that responsibility for running schools and school facilities is going to be handed over to the school or PTA through the school grants programme then it has to be made clear to the school and PTA that they will increasingly be responsible for maintaining the school facilities. There is at present very little if any culture of maintenance in Tonga and if the capital investment that will be required to upgrade the schools is not to be wasted then the schools and PTAs have to be made more aware of their responsibilities for maintaining these facilities and for raising funds for doing so.

Preliminary Proposals for Design and Construction Standards for Primary Schools

There seem to be few if any standards at present for primary schools in Tonga either in terms of class size, classroom area, number and type of facilities, type of construction or what other services such as drinking water and toilets should be provided.

It is proposed therefore that as part of the school grants programme, standards are set for maximum class and minimum classroom sizes and the type and number of facilities and services to be provided for various sizes of schools. Minimum standards should also be set for the construction of the buildings and for school furniture.

When the schools survey is complete, these standards will provide a basis for assessing the present condition of all schools in the country and make it easier to determine what if any additional facilities are required at all schools.

Preliminary proposals are made in Annex 4 for these standards. It should be noted that these proposals are for discussion purposes and will be modified as necessary after discussions with the Ministry of Education and other interested parties.

School Infrastructure Survey

A draft school infrastructure survey questionnaire was prepared by the Infrastructure Advisor in UK before his visit to Tonga for comment by the MoE. Comments by MoE staff and by the two consultants working for MoE were incorporated into the document at the beginning of the Advisor's visit and the document was revised accordingly.

After a short bidding process, a local firm of engineers was selected to carry out the infrastructure survey of all schools in the country and meetings were held with them to familiarise them with the documents and prepare them for a pilot survey of schools in Tongatapu Island.

A pilot survey was then conducted in three schools with the manager of the firm of engineers and two of his staff who would be carrying out the main survey. The survey documents were completed by the engineers and submitted to the Technical Advisor for comment. Several further amendments to the survey documents were also agreed.

The final survey document is shown in Annex 5 together with guidelines for carrying out the surveys. The surveys will be carried during the months of June, July and August and should be completed and all documentation should be ready for the Infrastructure Adviser's next visit in September 2006.

ANNEX 1: INFRASTRUCTURE ADVISOR FOR SCHOOL MAPPING TERMS OF REFERENCE

Introduction to the assignment

A component of TESP involves the development of Minimum Service Standards for schools (MSS) these standards will provide a benchmark for schools to identify possible deficiencies in service delivery. Each school will develop a rolling three year development plan which will outline the measures required to attain or supersede the MSS. Through the Tonga School Grants Program (TSGP), TESP will provide grants to schools to finance the inputs necessary to improve the quality of services they provide so that the standards are achieved. Aside from creating an environment in which resources available to a school can be used to finance locally (school and community) determined needs, the Program provides the Government with the opportunity to establish a 'level playing field' particularly across government and non government schools, by providing a disproportionate amount of funds and project support to disadvantaged or underserved schools.

It is expected that school rehabilitation will be an important feature of many schools' three year development plans and it is intended that specific guidelines for rehabilitation will be developed for schools so that they are able to expend grants wisely, ensuring that civil works undertaken meet all required standards.

The Technical Advisor will co-ordinate the gathering and analysis of data related to schools' infrastructure from the 124 primary schools and 38 secondary schools in Tonga so that the Ministry of Education and school communities are enabled to determine and prioritize the interventions required to improve schools' infrastructure.

Outcome: A report presenting an analysis of information generated from a survey instrument that informs the Ministry of Education, school principals and school communities about the status of schools' infrastructure.

Review of previous work

A brief report titled Advisory Note on the Preparation of the Tonga School Grants Program (TSGP) was prepared in December 2005 by two consultants to the World Bank1.

Scope of work:

1. Design a draft survey instrument to be used by civil engineers to collect information on schools' infrastructure. The survey instrument will also

[1] [1] Document prepared as an Annex to the Aide Memoire of the Annual Joint Review of TESP (December 2005). Written by Robert Scouller, World Bank infrastructure engineer and Stephen Baines, World Bank school grants specialist.

incorporate simple data pertaining to the schools' teacher population and student enrolment.

2. Ensure the survey instrument incorporates the infrastructure needs of those schools providing Year 7 and Year 8 education and include this as a variable in reporting procedures.
3. Incorporate changes to the draft survey instrument resulting from discussions between the MoE and civil engineers charged with carrying out the schools survey.
4. Provide a briefing to the key personnel within the Policy and Planning and Administration Directorates of the Ministry of Education regarding the import of each of the sections included in the survey instrument, the target questions used to illicit information and the implications of possible findings for the MoE.
5. Conduct a pilot test of the survey instrument with 15 selected schools on the island of Tongatapu and amend the survey instrument where necessary as a result of the pilot.
6. From the sample findings illustrate for the MoE how data from the finalised survey might be used to develop complete school profiles and illustrate how the information forthcoming from the pilot survey might also be used individually and collectively for planning and resourcing purposes.
7. Develop a survey manual for use by the civil engineers during visits to schools. The short manual will include basic information about TESP and explain the rationale for the research being conducted and it will also provide instructions on how to complete each questionnaire.
8. Liaise with the civil engineers responsible for completing the survey instrument to ensure that there is a common understanding regarding the expected outcomes of the survey.
9. Following completion of the data collection and entry, liaise with the national Education Management and Information System (EMIS) staff at the MoE to assist with the processing and analysis of the data and lead the generation of a report that will present findings and analysis of the information gathered as a result of the survey. As a component of this task oversee the production od school profiles and confirm that these are produced in the format that will be most useful for schools.
10. Prepare a short advisory note for the MoE on how best the information generated from the report should be conveyed to individual schools and their communities so that school principals and others may indentify and prioritise infrastructure refurbishment needs.
11. Throughout the survey design and analysis phases of the work, maintain a close relationship with the Chief Education Officer, Property Management in the expectation that there will be a transfer of knowledge with the aim of improving the capacity of the MoE to conduct similar work in the future.

Reporting

As the questionnaire is developed and as the data is analysed the Consultant reports to the Deputy Director of Education, Policy and Planning, whilst maintaining close interaction with the Deputy Director of Education, Administration.

Deliverables

1. A survey instrument for the collection of schools infrastructure data.
2. An interview manual for the civil engineers who will undertake the survey.
3. A brief report (approximately 20 pages) indicating the significant findings of the survey analysis including a generalised overview of the priority areas to be addressed in order to improve the teaching and learning environment as well as an identification of infrastructure deficiencies according to categories of schools.
4. A short note advising the MoE how the information gathered could be shared with individual schools and their communities so that, where necessary, schools will incorporate school infrastructure requirements into their three year rolling development plans.
5. The preparation and delivery of individual school profiles to the MoE.
6. A brief report indicating the transfer of knowledge that has been acquired by the Technical Advisor's national counterpart, the Chief Education Officer, Property Management, during the period of time when the survey instrument was developed and as data was analysed.

Data and reports available

1. Report of the Ministry of Education for the Year 2004. Ministry of Education. Kingdom of Tonga (2005).
2. Education Policy Framework 2004-2019. Ministry of Education. Kingdom of Tonga (2004).
3. Ministry of Education Corporate Plan 2005/2006 –2007/2008. Ministry of Education. Kingdom of Tonga.
4. Project Appraisal Document for a Tonga Education Support Project. World Bank. (2005).
5. Advisory Note on the Preparation of the Tonga School Grants Program (TSGP). Unpublished document World Bank (2006).

Location

The Consultant will undertake the assignment based at an MoE facility in Nuku'alofa on the island of Tongatapu.

ANNEX 2: SCHOOL VISITS

General

A number of schools on Tongatapu Island were visited; the first three together with the MoE CEO Property Management on May 23rd 2006 and the last three together with the CEO and the civil works consultants who will be carrying out the school infrastructure survey on May 25th 2006.

The visits to the last three schools were an opportunity for the civil works consultants to try out the survey instruments that are to be used for the main infrastructure survey and some changes were later made to these instruments.

School Visits

The following schools were visited:

Government Primary School: Folaha

The school is situated on a large slightly sloping site and has two classroom buildings, a staff house and a toilet building. There is space for a playing field and there are a number of large trees. There is no store or office accommodation for teaching staff or the principal.

Classroom Building 1: The building has three classrooms (7.0 x 7.0 metres) and is constructed of timber framing with plywood cladding on a concrete floor slab. The roof over the classrooms is double pitched with the centre of the roof off-set from the centre of the classrooms so that the wall to the veranda side is higher than that to the rear. Roof construction is of corrugated steel roof sheets fixed with nails to timber purlins on timber trusses (5 per classroom) fixed with cyclone straps with sisalation under the roof sheets but no ceiling. Windows are steel louvre carriers with glass blades in timber frames and doors are solid-core flush doors. The roof over the veranda is a single-pitch lean-to roof with corrugated steel roof sheets on timber purlins and rafters fixed to the wall and to timber posts. The building has plastic gutters feeding a GRP water tank.

The building was constructed by the Department for Natural Disasters and is quite well built. There are however a number of problems. The roof while being quite well constructed does not now meet the requirements of the new building code: the purlins are too far apart, the joints to the trusses probably need reinforcement and the roof sheets require fixing with cyclone screws and washers not nails as at present. The walls will also require bracing and it was not clear how well the timber framing is connected to the floor slab/foundation. The building also requires some minor repairs and maintenance: repairs to the wall cladding; repair and replacement of louvre blades; painting and repairs or replacement of gutters.

Classroom Building 2: This is the original school building constructed by the PTA and has five classrooms (6.7 x 6.8 metres wide). One classroom is not being used as the windows require replacement. The building has a concrete floor slab, concrete block end and cross walls, and concrete block window walls up to 120cm high with timber framing and plastic louvre carriers with glass blades in timber frames. The roof consists of corrugated steel roof sheets on timber purlins on timber trusses (5 per classroom) with no ceiling.

Plate 1: Classroom in Classroom Building 1

The building is quite well constructed but there are a number of problems. The construction of the roof trusses and the fixing of the purlins are quite inadequate as there is no bracing or any cyclone fixings whatever and the purlins are too far apart. The roof sheets are fixed with nails and not with cyclone screws and washers. The timber framing to the window walls is not adequately fixed to the up-stand block walls and the trusses are not properly secured to the timber framing. It was also not clear whether the block walls were reinforced or filled. The building also requires some repairs and maintenance: all door hardware requires replacement, some louvre blades require replacement and the building needs painting.

Staff Quarters: This is a semi-permanent building which is a t present unoccupied. It is very badly built of timber framing on a concrete floor slab with plywood cladding and should be demolished.

Toilets: The toilets are in a standard building that was seen at other schools and has a concrete floor slab, concrete block walls up to 150cm high with timber framing and timber cladding above up to roof level, louvre windows in

timber frames, a very low pitched double pitch timber roof with steel corrugated roof sheets and flush toilets: 4 girls WCs and 3 boys WCs and a urinal. The walls between toilets are only 120cm high.

Plate 2: Classroom Building 2

The building seems to have been quite well constructed (apart from the roof) originally but is now in need of major repairs. The whole of the roof structure needs replacement (including the timber framing to the walls); taps to basins and louvres need replacement; some WCs need replacement; there are a number of leaks that require repair; doors need to be re-hung and the building needs painting. It would probably be more cost-effective to demolish the building and construct a new one.

Recommendations: The school requires additional facilities such as a store and an office for the principal and teachers in order that all classrooms can be used efficiently. The staff quarters should be demolished and replaced if necessary. The existing classrooms require a lot of work to bring them up to current standards in terms of cyclone resistance as well as general repairs and maintenance. The toilets require major works to the roof as well as repairs and maintenance and it might be more economic to replace them with new toilets.

Plate 3: Toilet Building

Government Middle School: Vaini

This school is situated on a large flat site with space for a playing field. It has classes 1 to 6 and Forms 1 and 2. There are six classroom buildings with a total of 18 classrooms and three toilet buildings. There is no store and no separate office accommodation for teaching staff or the principal and one classroom is therefore used as an office.

Classroom Building 1: This building, constructed in 1962 has five classrooms (7.33 x 7.5 metres wide) and is constructed of a concrete floor, with fair-face concrete block walls, steel lattice portal frames and timber purlins with corrugated steel roof sheets, steel louvre carriers in timber frames and a lean-to veranda roof. There are high-level louvres to the veranda side and sliding doors between all classrooms which are no longer used as the sliding gear is broken in all cases. Plastic gutters feed a water tank.

The building was originally very well constructed but has had very little maintenance and now has some major problems. It is doubtful if the roof structure meets the new building code as the purlins are probably too small for the span between portal frames and are too widely spaced. The roof sheets are also fixed with nails not cyclone screws and washers. The sliding doors should be taken out and replaced with solid walls; a lot of the louvre carriers require replacement; all the hardware to the doors requires replacement together with the gutters and the building needs painting.

Plate 4: Toilet Building; note low pitched and poorly constructed roof

Classroom Building 2: This building, probably constructed in the 1980s has two classrooms (7.15 x 7.0 metres wide; one used as an office) and is constructed of a concrete floor, block walls end, cross and window walls, 120cm high with steel louvre carriers in timber frames above, a low-pitched, mono-pitch roof with steel lattice trusses, timber purlins and corrugated steel roof sheets, and gutters feeding a water tank. There is no veranda; no ceilings and the roof overhangs are small.

The building was originally quite well constructed but has had little maintenance and now has some major problems. It is again doubtful whether the roof structure meets the new building code as the purlins are probably too small and too widely spaced. The roof sheets are also fixed with nails not cyclone screws and washers. The louvres need maintenance and the eaves and verge boards are rotten in paces and need replacement together with the gutters.

Classroom Building 3: This building has two classrooms (approximately 7.0 x 7.0 metres) and was constructed using New Zealand government funds in 1999. It is a timber-framed building raised off the ground on short block columns. It has a timber floor and veranda with plywood faced walls, plastic louvre carriers in timber frames, flush timber doors, flat masonite ceilings, corrugated steel roof sheets on timber purlins and trusses and plastic gutters feeding a water tank.

The building seems quite well constructed (but it was not possible to see the roof trusses or how the walls are constructed) but the roof sheets are fixed

Plate 5: Classroom in Classroom Building 2; note wide spacing of purlins

with nails and not cyclone screws and washers, the block columns are not braced and the fixing of the floor joists to the bearers seems inadequate. The building needs painting.

Classroom Building 4: This building has two classrooms (6.5 x 7.0 metres wide) and has a concrete floor, fair-face block end and cross walls with steel louvre carriers in timber frames along the window walls from 120cm upwards. It has a double-pitch roof of steel corrugated sheets on timber purlins and trusses and no ceilings and no veranda.

The building was quite well constructed but the roof trusses, purlins and fixings and fixing of wall timbers to block walls are totally inadequate and will not meet the new building code requirements. The roof sheets are fixed with nails and not cyclone screws and washers, the roof sheets have been changed on one side of the building but need to be changed on the other side where they are rusty, some doors and louvres need changing and the building needs painting.

Classroom Building 5: This building was constructed using Japanese government funds in 2002 and has four classrooms (approximately 7.0 x 7.0 metres). It has a concrete floor, fair-face block walls, a double-pitch roof with corrugated steel roof sheets on timber purlins and trusses, flat masonite ceilings, steel louvre carriers in timber frames, a concrete veranda with timber posts and gutters supplying a water storage tank.

The building is quite well constructed but there are a few problems. The roof sheets are fixed with nails not cyclone screws and washers and it should be

Plate 6: Classroom in Classroom Building 2 being used as an office; note wide spacing of purlins

noted that it was not possible to see and check the construction and fixings of the purlins and trusses. The doors and gutters also require minor repairs.

Classroom 6: This building was constructed in 1967 using funds donated by Peace Corps. It has two classrooms (approximately 5.4 x 7.0 metres wide) and has a concrete floor, block walls, steel louvre carriers, corrugated steel roof sheets on timber purlins and trusses and no veranda.

The building was not very well constructed initially and now requires new roof sheets and probably a complete new roof structure, new louvre windows, new doors, etc. It would probably be more cost-effective, as the classrooms are very small to demolish it and build a new classroom.

Toilet Building 1: This is a standard building similar to that at the last school and has a concrete floor slab, concrete block walls up to 150cm high with timber framing and timber cladding above up to roof level, louvre windows in timber frames, a very low pitched double pitch timber roof with steel corrugated roof sheets and flush toilets: 4 girls WCs and 3 boys WCs and a urinal. The walls between toilets are only 120cm high.

The building is in very poor condition and it would probably be more cost-effective to demolish it and construct a new one.

Toilet Building 2: This building is similar to the last building but is derelict and should be demolished.

Plate 7: Foundation columns to Classroom Building 3 showing lack of bracing

Toilet Building 3: This building is fairly new and is a standard design that was seen at other schools. It is constructed of fair-face blocks with a concrete floor, steel louvre carriers in timber frames, steel corrugated roof sheets on timber purlins and timber trusses. There are four WCs for girls and three WCs and a urinal for boys.

It seems well constructed but the roof sheets are fixed with nails not cyclone screws and washers and it was not possible to get in to the building to see how well the trusses are built or if there are any plumbing problems.

Plate 8: Classroom Building 4 showing poor condition and inadequate fixings to timber framing to walls

Recommendations: The school requires additional facilities such as a store, an office for the principal and a staffroom in order that all classrooms can be used efficiently. The single classroom should be demolished and replaced and the two old toilet buildings should also be demolished and replaced as the current numbers of toilets are inadequate. The older classrooms require a lot of work to bring them up to current standards in terms of cyclone resistance as well as general repairs and maintenance and even the newer classrooms need cyclone screws and washers to the roofs and other works such as bracing of the foundations and possibly bracing of walls.

Government Primary School: Haveluloto

The school is situated on a fairly large sloping site next to a main road. There is room for a play space but not for a sports field. There is an administration building with two offices, six classroom buildings and a toilet building.

Administration: This building has a concrete floor; timber framed walls faced with plywood; steel louvre carriers in timber frames and corrugated steel roof sheets fixed to timber purlins and trusses.

The building seems quite well constructed but the roof sheets are fixed with nails and not cyclone screws and washers and it was not possible to see the roof trusses or the construction of the walls. It was suspected however that the construction of both would not meet the requirements of the new building code.

Plate 9: Classroom Building 2 and 1 showing generally poor condition

Classroom Building 1: The building has four classrooms (7.0 x 7.0 metres) and is constructed of timber framing with plywood cladding on a concrete floor slab. The roof over the classrooms is double pitched with the centre of the roof off-set from the centre of the classrooms so that the wall to the veranda side is higher than that to the rear. Roof construction is of corrugated steel roof sheets fixed with nails to timber purlins on timber trusses (5 per classroom) fixed with cyclone straps with sisalation under the roof sheets but no ceiling. Windows are steel louvre carriers with glass blades in timber frames and doors are solid-core flush doors. The roof over the veranda is a single-pitch lean-to roof with corrugated steel roof sheets on timber purlins and rafters fixed to the wall and to timber posts. The building has plastic gutters feeding a GRP water tank.

The building was constructed by the Department for Natural Disasters and is quite well built. There are however a number of problems. The roof while being quite well constructed does not now meet the requirements of the new building code: the purlins are too far apart, the joints to the trusses probably need reinforcement and the roof sheets require fixing with cyclone screws and washers not nails as at present. The walls will also require bracing and it was not clear how well the timber framing is connected to the floor slab/foundation. The building also requires some minor repairs and maintenance: repairs to the wall cladding; repair and replacement of louvre blades; painting and repairs or replacement of gutters.

Classroom Building 2: This building is similar in all respects to the previous building but has three classrooms. It is in a similar condition and requires similar upgrading work.

Plate 10: Classroom Building 4 showing generally poor condition and inadequate fixing of timber framing to walls.

Classroom Buildings 3 and 6: These buildings have two classrooms (7.0 x 7.0 metres) each and have concrete floors, timber framed walls with plywood cladding, steel louvre carriers, corrugated steel roof sheets on timber purlins and trusses, flat masonite ceilings and concrete verandas with timber posts.

The buildings are quite well constructed but have roofing nails instead of cyclone screws and washers. It was not possible to inspect the construction of the roof and wall structures and it is suspected that they will not meet the requirements of the new building code in terms of cyclone protection. The gutters and some louvres need replacing and the buildings need some other small repairs and maintenance including painting. There are also some roof leaks

Classroom Buildings 4 and 5: These building are very similar and both have three classrooms (approximate size 6.8 x 7.0 metres wide). They have concrete floors and fair face block cross and end walls with steel louvre carriers in timber frames along the window walls above the blockwork from 100cm upwards. The roof has corrugated steel sheets fixed with roofing nails on timber purlins and trusses. There are no ceilings and no verandas.

The buildings were originally quite well constructed but are now in very poor condition and need major repairs. The roof sheet fixings and the roof purlins and trusses and the connections between the roof trusses and the timber framing on top of the walls will not meet the requirements of the new building code. The timber framing is also not adequately fixed to the top of the block walls. It would probably best therefore to completely re-build the roofs together with the timber wall framing. All doors and windows will also have to be replaced.

Plate 11: Toilet Building

Toilet Building: This building is fairly new and is the same standard design that was seen at the last school. It is constructed of fair-face blocks with a concrete floor, steel louvre carriers in timber frames, steel corrugated roof sheets on timber purlins and timber trusses. There are four WCs for girls and three WCs and a urinal for boys.

It seems well constructed but the roof sheets are fixed with nails not cyclone screws and washers. The trusses are well made but require additional cyclone fixings. Although there was a stand pipe with a water supply about 50 metres away the toilets do not have a water supply and they are very dirty and smelly. The two wash basins are both broken.

Recommendations: The existing toilets require repairs and maintenance and the school probably needs another toilet building to cope with the number of students. All buildings require a lot of work to them to bring them up to current standards in terms of cyclone resistance as well as general repairs and maintenance especially Classroom Buildings 4 and 5 which require

complete replacement of the roof and roof structure and the wall framing, windows and doors.

Plate 12: Inadequate bracing, purlin spacing and connections to roof timbers to Classroom Building 1

Government Primary School: Puke

The school is situated on a large flat site that has lots of coconut trees. The school has two classroom buildings, a small assembly hall, a staff house and two toilet buildings. The school has an electricity supply, a town water supply and two large water storage tanks. There are 80 students; 40 boys and 40 girls and 5 teachers. There is no store, office for the principal or staff room for the teachers.

Classroom Building 1: This building has two classrooms (approximately 7.0 x 7.0 metres) and was constructed using New Zealand government funds in 1999. It is a timber-framed building raised off the ground on short block columns. It has a timber floor and veranda with plywood faced walls, plastic louvre carriers in timber frames, flush timber doors, flat masonite ceilings, corrugated steel roof sheets on timber purlins and trusses and plastic gutters feeding a water tank.

Plate 13: Classroom Building 1

The building seems quite well constructed (but it was not possible to see the roof trusses or how the walls are constructed) but the roof sheets are fixed with nails and not cyclone screws and washers and the block columns are not braced. The building needs painting and some louvre carriers need replacing.

Classroom Building 2: This building, which was built by the PTA has three small classrooms (4.6 x 5.8 metres wide) one of which is used as an office and is an extension to the original building. It has a concrete floor and un-filled (and probably un-reinforced) block walls with corrugated steel roof sheets on coconut timber purlins and trusses, steel louvre windows in timber frames, a concrete veranda and no ceilings.

The building is very badly constructed; the trusses and purlins are poor quality with no cyclone connectors and they are not tied down to the walls, the roof sheets are fixed with roofing nails and not cyclone screws and washers and there is no bracing. Given that the classrooms are very small, it would

probably be more economic to demolish and replace the building rather than try and upgrade it.

Plate 14: New Toilet Building with Staff House behind

Assembly Hall: This is a temporary building constructed of timber framing with corrugated steel sheet walls and roof. It would not be economic to upgrade it but rather it should be demolished.

Staff House: This building has a concrete floor, timber framed, timber clad walls, steel louvre windows in timber frames, corrugated steel roof sheets on timber purlins and trusses and no ceiling. Internal walls are of timber framing faced in places with masonite. It has two bedrooms, a sitting area and a kitchen but no toilet, shower or kitchen sink.

The building is not very well constructed and it is debatable whether it is worth renovating. If it was it would need new roof sheets with cyclone fixings; the purlins and trusses would have to be up-graded or replaced; the walls would have to be properly braced and tied down to the foundations; it require a ceiling and general repairs and maintenance. A service unit would also have to be built with a bathroom, toilet and kitchen facilities.

Toilet Building 1: This building is fairly new and is the same standard design as at the last school but it is smaller. It is constructed of fair-face blocks with a concrete floor, steel louvre carriers in timber frames, steel corrugated roof sheets on timber purlins and timber trusses. There are two WCs for girls (one used for staff) and one WC and a urinal for boys.

It seems well constructed but the roof sheets are fixed with nails not cyclone screws and washers. The trusses are well made but require additional cyclone fixings especially to the purlins. The taps to the basins are loose but apart from that the toilets are clean and well looked after.

Plate 15: Assembly Hall

Plate 16: Inadequate roof structure and fixings to Classroom Building 2

Toilet Building 2: These were the original toilets; there is one WC for boys and one for girls. The building is not very well constructed and should probably be demolished and replaced.

Recommendations: The school requires additional facilities such as a store, an office/staffroom in order that all classrooms can be used efficiently. The old toilet building should be demolished and replaced together with Classroom Building 2 and the Assembly Building. Classroom Building 1 and the new toilets both need cyclone screws and washers to the roofs, cyclone fixings to purlins and trusses and other works such as bracing of the foundations and possibly bracing of walls.

Government Primary School: Ha'alalo

The school is situated on a large gently sloping site with a playing field and a vegetable garden. It has an electricity supply a reliable town water supply and a large water tank. The site is fenced and has a lot of coconut trees, large mangos, etc. There are electricity cables strung between buildings at low levels. There are 150 pupils, two classroom buildings, two toilet buildings and a staff house. There is no store, office for the principal or staff room for the teachers. One classroom is used as an office.

Plate 17: Classroom Building 1 showing large window area and lack of bracing in walls

Classroom Building 1: The building has three classrooms (7.1 x 7.0 metres wide) and no veranda. It has a concrete floor, fair-face concrete block walls, corrugated steel roof sheets on timber purlins fixed to steel lattice portal

frames, large windows with steel louvre carriers in timber frames and no ceiling.

The building was originally very well constructed but now needs major repairs and upgrading. The purlins are too far apart and so additional purlins are required together with cyclone screws and washers to the roof sheets; doors, louvre units and gutters need replacing and the classrooms need ceilings. The walls require additional bracing and the whole building requires painting.

Plate 18: Rotting roof structure to veranda of Classroom Building 2

Classroom Building 2: This building was constructed by the PTA and has two small classrooms (7.4 x 4.7 metres wide), a small extension that is used as a library and a veranda. The building was very badly constructed initially and the roof is now in a very bad state with a lot of rotten members (the roofs over the library and veranda are particularly dangerous). The building should not be used and should be closed and demolished.

Toilet Building 1: This building is derelict and should be demolished.

Toilet Building 2: This building was constructed last year using Japanese Government funds and is a standard design that was seen at other schools. It is constructed of fair-face blocks with a concrete floor, steel louvre carriers in timber frames, steel corrugated roof sheets on timber purlins and timber trusses. There are two staff WCs, two WCs for girls and one WC and a urinal for boys.

It seems well constructed but the roof sheets are fixed with nails not cyclone screws and washers and there are some cyclone fixings missing to the roof trusses and purlins. Otherwise it is clean and in good condition.

Plate 19: New Staff House

Staff House: This building was constructed last year to a standard MoW design using Japanese government funds. It was supervised by MoW architects. It has two bedrooms, a bathroom, kitchen and sitting room. It has a concrete floor, timber framed walls with plywood cladding, corrugated steel roof sheets on timber purlins and trusses, plastic louvre carriers in timber frames and masonite ceilings. The roof is hipped and there are a lot of roof leaks. The louvre windows are also leaking at the bottom (the roof overhangs are not large enough).

The building is quite well constructed but there are some problems. Roof sheets are fixed with nails not cyclone screws and washers and the tying down of the roof structure to the walls is totally inadequate. It was not possible to see how well the roof trusses are constructed or if the walls are properly braced and tied down to the foundations.

Recommendations: The school requires additional facilities such as a store, an office and a staffroom in order that all classrooms can be used efficiently. The old toilet building should be demolished and replaced together with Classroom Building 2 which should be closed immediately, demolished and replaced. Classroom Building 1, the new toilets and the Staff House need cyclone screws and washers to the roofs, cyclone fixings to purlins and

trusses and other works listed above such as additional purlins and possibly bracing of walls.

Government Primary School: Matahau

The school is situated on a large flat site that has just been fenced using New Zealand Government funds. There is space for a playing and there are lots of large trees. The school has electricity and a village water supply (which is not very reliable; the school has to close sometimes because there is no water) and a water tank. There are 89 students and five teachers, three classroom buildings, two staff houses and a toilet building. There is no office for the principal, no store or staff room.

Plate 20: Inadequate fixings to roof timbers and wide spacing of purlins to Classroom Building 1

Classroom Building 1: The building has two classrooms (7.0 x 7.0 metres) and is constructed of timber framing with plywood cladding on a concrete floor slab. The roof over the classrooms is double pitched with the centre of the roof off-set from the centre of the classrooms so that the wall to the veranda side is higher than that to the rear. Roof construction is of corrugated steel roof sheets fixed with roofing nails to timber purlins on timber trusses (5 per classroom) with sisalation under the roof sheets but no ceiling. Windows are steel louvre carriers with glass blades in timber frames and doors are solid-core flush doors. There is a large opening between the classrooms with large doors that do not fully close off the rooms from one another. The roof over the veranda is a single-pitch lean-to roof with corrugated steel roof sheets on

timber purlins and rafters fixed to the wall and to timber posts. The building has plastic gutters feeding a GRP water tank.

Plate 21: Classroom Building 1 showing close proximity of trees

The building was constructed by the Department for Natural Disasters in the 1980s and was quite well built. There are however a number of problems. The roof while being quite well constructed does not now meet the requirements of the new building code: the purlins are too small and too far apart, the joints to the trusses require reinforcement, the roof sheets require fixing with cyclone screws and washers, the trusses and purlins require cyclone fixings and the roof needs bracing. The opening between the classrooms should be closed off and braced, the other walls will also require bracing and it was not clear how well the timber framing is connected to the floor slab/foundation. The building also requires some other repairs and maintenance: repairs to the wall cladding; repair and replacement of louvre blades; painting and repairs or replacement of gutters. There is a bread fruit tree at the rear of the building that should be removed and the branches of another large tree overhanging the building should be cut back.

Classroom Building 2: This building has two classrooms and is similar in most respects to the building above but it is slightly better constructed in that the purlins are larger and are fixed with cyclone straps and the trusses are better constructed. It will however require a lot of work to upgrade it: it requires cyclone screws and washers to the roof, additional purlins and strengthening to the roof structure, the roof sheets need changing and the external cladding (which is coated masonite) is rotting in places and needs changing. The louvre carriers need to be changed and there is a hole in the rear wall that

requires repair. The building sits very low on the ground and the floor slab should probably have been built 30cm higher than it is as the ground slopes towards it at the rear.

Plate 22: Classroom Building 3 that should be demolished

Classroom Building 3: This building has one classroom, is constructed in the middle of the playing field, is very badly constructed of concrete blocks and is in a very bad condition. It should be demolished and replaced.

Staff House 1: This is a semi-permanent building with a concrete floor and timber-framed walls and roof both clad in corrugated steel sheets. It is very poorly constructed, is in bad condition and should probably be demolished and replaced.

Staff House 2: This building was constructed last year to a standard MoW design using Japanese Government funds. It was supervised by MoW architects. It has two bedrooms, a bathroom, kitchen and sitting room. It has a concrete floor, timber framed walls with plywood cladding, corrugated steel roof sheets on timber purlins and trusses, plastic louvre carriers in timber frames and masonite ceilings. The roof is hipped and there are a lot of roof leaks. The louvre windows are also leaking at the bottom (the roof overhangs are not large enough).

The building is quite well constructed but there are some problems. Roof sheets are fixed with nails not cyclone screws and washers and the tying down of the roof structure to the walls is totally inadequate. It was not

possible to see how well the roof trusses are constructed or if the walls are properly braced and tied down to the foundations.

Plate 23: New Toilet Building

Toilet Building 1: This building is derelict and should be demolished.

Toilet Building 2: This building was constructed last year using Japanese Government funds and is a standard design that was seen at other schools. It is constructed of fair-face blocks with a concrete floor, steel louvre carriers in timber frames, steel corrugated roof sheets on timber purlins and timber trusses. There are two staff WCs, two WCs for girls and one WC and a urinal for boys.

It seems well constructed but the roof sheets are fixed with nails not cyclone screws and washers and there are some cyclone fixings missing to the roof trusses and purlins. Two toilets are not working and there a bad leak in the boys toilets. Otherwise it is clean and in good condition.

Recommendations: The school requires additional facilities such as a store, an office/staffroom in order that all classrooms can be used efficiently. The old toilet building should be demolished together with Classroom Building 3 which should be replaced. The school also require one more classroom. Classroom Buildings 1 and 2, the new toilets and the Staff House need cyclone screws and washers to the roofs, cyclone fixings to purlins and trusses and other works listed above such as additional purlins and possibly bracing of walls.

ANNEX 3: SCHOOL GRANTS & SCHOOL RENOVATION

GENERAL

From the visits to six schools on Tongatapu Island (see Annex 2) it became obvious that few if any school buildings will not require either: 1) upgrading to meet current building standards for protection against cyclones and earthquakes; 2) renovation or even replacement because of poor initial construction and/or lack of maintenance; 3) additional facilities such as classrooms, stores and offices or combinations of all three.

UPGRADING OF SCHOOL FACILITIES FOR PROTECTION AGAINST CYCLONES AND EARTHQUAKES

All of the school buildings seen during the school visits required upgrading to some degree in order to meet current standards of protection against cyclones and/or earthquakes and many if not most are in danger of damage or destruction in case or a severe cyclone or earthquake.

Roof sheets on all of the school buildings inspected were fixed with inadequate numbers of roofing nails rather than the correct numbers of cyclone screws and washers and most sheets would be torn off in a cyclone. The roof timbers in many schools were under-sized; roof bracing was inadequate or missing altogether; purlins were too widely spaced and had inadequate or no cyclone straps and roof truss members had inadequate fixings both to each other and to the wall structure.

Timber-framed walls at most schools were inadequately braced and fixings to foundations or floor slabs were also inadequate. Even some of those school buildings constructed of blockwork had windows that were too large and thus inadequate areas of blockwork to brace the building.

Foundations to those timber-framed buildings that were raised off the ground were generally inadequately braced to withstand earthquakes and there was doubt about the adequacy of the fixing down of the floor structures to the foundations in order to resist uplift.

All or most of these faults and inadequacies could be remedied but the cost in some cases would outweigh the benefits; it might well be more cost-effective to demolish the building and construct a new one. Even if the buildings are retained and upgraded, the cost of upgrading all school buildings in the country is likely to be very high and certainly more than the budget available under the school grants programme.

RENOVATION OR REPLACEMENT OF POORLY CONSTRUCTED AND/OR MAINTAINED BUILDINGS

All of the buildings seen during the school visits suffer from a more or less complete lack of maintenance and some were poorly constructed in the first place. At least one building has been so poorly constructed that it constitutes

a danger to the children and teachers at the school and should be closed and demolished (see Annex 2).

Maintenance will probably be an issue therefore at most schools in the country and poor initial construction will be a problem at some. Many schools will require minor or even major repairs to buildings because of lack of maintenance: windows and doors will require repair or replacement, wall boards will require repairs, roof fascia and eaves boards will require replacement, most buildings will require redecoration, etc and some buildings will require demolition and replacement.

The cost of repair and replacement is again likely to be very high and certainly more than the budget available under the school grants programme.

ADDITIONAL FACILITIES

None of the schools visited had a store, a principal's office or a staff rooms. All schools should have at least one store and an office for the principal and larger schools should have staff rooms (see Annex 4) but again the cost of providing these to all schools in the country will be very high.

RANKING SCHOOLS FOR GRANTS FOR RENOVATION OR UPGRADING WORKS

When the school facilities survey is complete, it should be possible to rank all existing schools in terms of the number and condition of their existing facilities. However, as has been indicated above, it is highly unlikely that the funds available under the school grants programme will be sufficient to bring all schools up to standard in terms of upgrading, improving, replacing or adding facilities.

Difficult decisions will have to be made therefore as to how the school grants are to be distributed. It is likely that not all of the grants will be spent on facilities; some will probably be spent on operational grants for instance thus further reducing the likelihood that the remaining funds will be sufficient for the construction work that will be required.

The funds for construction could be distributed in a number of ways: all schools could get a standard grant; the grants could be based on the numbers of students with over-crowded schools getting larger grants; the grants could be based on the number and condition of the existing facilities with schools with the least facilities or those in the worst condition getting grants; the grants could be based on the location of schools with the more remote schools getting proportionately larger grants, etc.

As has been pointed out above, it is probable that all school buildings will require upgrading in order to meet current standards of protection against cyclones and/or earthquakes and it will be difficult therefore to use this as a means of ranking the schools. All that it will be possible to do is to do this

upgrading at the schools selected to receive grants along with the other work that is required.

If however the condition of or the lack of school facilities (compared to the proposed minimum standards) are going to be used as the most important parameters then the ranking could be done using one or more of the following alternatives:

- Over-crowded schools ie those with too many students for the number of existing classrooms.

- Schools with poor quality ie badly constructed or poorly maintained buildings that are in bad condition and require major upgrading works or replacement.

- Schools with traditional or semi-permanent buildings that require replacement with permanent buildings.

- Schools with poor quality or non-existent water supplies and/or toilets.

- Remote schools or schools on isolated islands with poor quality facilities or a lack of facilities and with no alternative schools available to student.

It has to be recognised that if schools are going to be renovated and/or upgraded to an acceptable quality with all the facilities that they should have then the number of schools that it will be possible to renovate and/or upgrade with the funds available through the school grants programme will be quite small.

SCHOOL-BASED RENOVATION OR REPLACEMENT OF SCHOOL FACILITIES

It is proposed to carry the renovation or replacement of school facilities under the school grants programme through the schools themselves. At present the only mechanism available at the school level to do this are the Parent/Teacher Associations (PTAs). From discussions with staff at the schools visited it would appear that some PTAs already provide some funds or labour for school maintenance or even the construction of school buildings. This is happening on a very much ad-hoc basis however and the quality of the buildings seen that have been constructed by PTAs has been generally very poor.

Given the fact that the education system is at present very centralised, the move to funding and managing improvements to school facilities through the PTAs will not be easy. It has to be remembered that school facilities in Tonga, if they are to have long useful lives, have to be constructed to a very high standard in order to withstand cyclones and earthquakes and at present this certainly is not the case.

It is recommended therefore that if the PTAs are to be used to carry out the management of the renovation or construction of school facilities probably using small local contractors, then they should receive a great deal of technical assistance in managing and supervising the process.

From discussions with the Ministry of Works it would appear that they do not have the capacity to provide any meaningful level of technical assistance and management and the Ministry of Education does not have either the expertise or the capacity.

In other countries in S E Asia where similar projects have been implemented, firms of civil works consultants have been employed to provide this technical assistance to assist with the management and to carry out the supervision of the renovation and construction work. In this case it is proposed that the consultants employed to manage the implementation of the school grants programme also provide the technical assistance required by the schools and PTAs for managing and supervising the renovation and construction of the schools.

MAINTENANCE OF SCHOOL FACILITIES

If it is intended that responsibility for running schools and school facilities is going to be handed over to the school or PTA through the school grants programme then it has to be made clear to the school and PTA that they will increasingly be responsible for maintaining the school facilities. From the school visits, it became apparent that little or no funding is available to schools for maintenance of facilities and therefore if facilities are to be properly maintained the school and PTA will have to provide the funds. There is at present very little if any culture of maintenance in Tonga and if the capital investment that will be required to upgrade the schools is not to be wasted then the schools and PTAs have to be made more aware of their responsibilities for maintaining these facilities and for raising funds for doing so.

In order to do this, schools and PTAs will require training in both the necessity for basic maintenance, in how to carry out simple maintenance tasks and possibly in raising funds for maintenance. It is proposed that the consultants engaged to manage the implementation of the school grants programme also carry out training workshops in maintaining school facilities for the recipient schools and prepare maintenance guidelines and handbooks for the use of schools and PTAs in the maintenance of their schools.

ANNEX 4: PRELIMINARY PROPOSALS FOR DESIGN & CONSTRUCTION STANDARDS FOR PRIMARY SCHOOLS

GENERAL

There seem to be few if any standards at present for primary schools in Tonga either in terms of class size, classroom area, number and type of facilities, type of construction or what other services such as drinking water and toilets should be provided.

It is proposed therefore that as part of the school grants programme, standards are set for maximum class and minimum classroom sizes and the type and number of facilities and services to be provided for various sizes of schools. Minimum standards should also be set for the construction of the buildings including the lighting and ventilation of classrooms and for school furniture.

When the schools survey is complete, these standards will provide a basis for assessing the present condition of all schools in the country and make it easier to determine what if any additional facilities are required at all schools.

Preliminary proposals are made below for these standards. It should be noted that these proposals are for discussion purposes and will be modified as necessary after discussions with the Ministry of Education and other interested parties.

PRIMARY SCHOOL CLASS AND CLASSROOM SIZES

Class sizes, classroom sizes and areas per student within classrooms in primary schools in developing countries and within the Pacific region vary widely as can be seen from Table 1 below.

Country/Region	Maximum number of students	Minimum classroom size M²	Area per student M²
S E Asia			
Thailand	32	35.7	1.17
Indonesia	44	56.0	1.27
East Timor	36	54.6	1.52
Philippines	48	56.0	1.17
Pacific			
Vanuatu	36	54.6	1.52
PNG	40	64.0	1.60
Kiribati	30	48.0	1.60
Africa			
Sierra Leone	44	53.5	1.22
Nigeria	40	50.6	1.27
Eritrea	42	46.5	1.11

Table 1: Comparative primary school classroom sizes and areas per student

The areas per student in African and most S E Asian countries are much lower than in the Pacific countries probably because population densities are much higher and therefore the demand for primary school places is much higher while education budgets are comparatively low.

The sizes of classrooms built by government or aid agencies at the schools visited in Tonga range from 6.8 x 7.0 metres (47.6M²), 7.0 x 7.0 metres (49M²), 7.15 x 7.0 metres (50M²) and 7.3 x 7.5 metres (54.75M²) and class sizes while much smaller than those seen in other developing countries also vary widely. The demand for primary school places in Tonga especially in the outlying islands is likely to be much lower than in other developing countries as the population density is much lower though there could be higher demand in the few urban areas.

It does not seem practicable to vary classroom sizes especially as they have to be able to deal with the possibility of increased demand over their hopefully long and useful lives. It is proposed therefore that the standard classroom should be able to cater comfortably with a student population of up to 40 with out loss of comfort.

A standard classroom size is proposed therefore that will accommodate between 30 and 40 students sitting at double desks with loose chairs. The proposed size is 7.8 long x 6.2 metres wide which gives a classroom area of 48.36M² and an area per student of 1.61M² with 30 students (similar to other Pacific countries) and 1.2M² with 40 students (similar to African and some S E Asian countries) which is still acceptable. See Drawing 1.

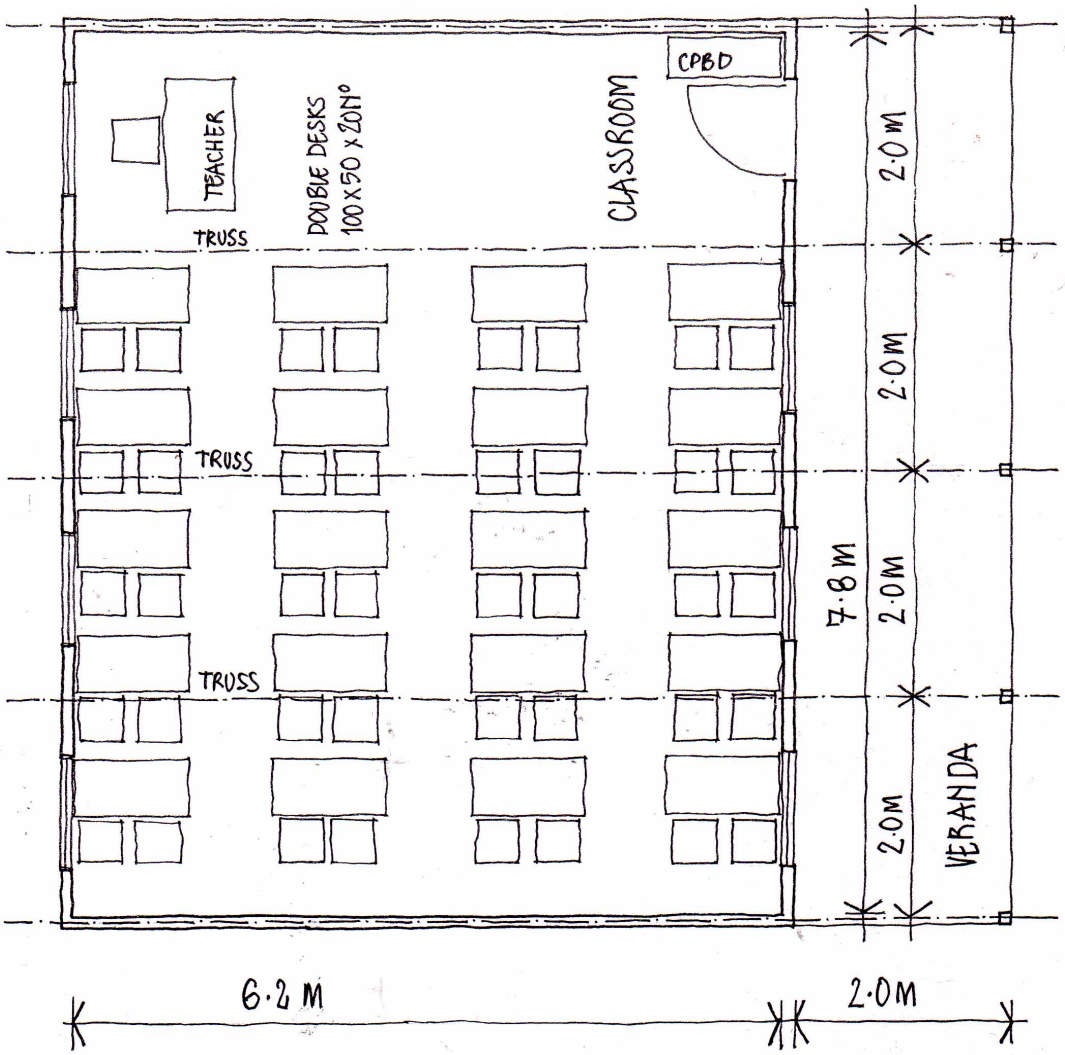
CLASSROOM CONSTRUCTION

Construction of permanent classroom buildings in Tonga is of two main types: reinforced hollow concrete block walls on a concrete floor slab on ground or timber framed construction with various wall linings on raised columns, usually of blockwork with timber floors. All buildings have corrugated steel roof sheets supported by timber purlins and timber roof trusses with or without ceilings.

Given Tonga's geographical position, there are inherent problems with both types of construction. If the concrete block buildings are not constructed to the correct specification with the right size reinforcement at the right intervals both vertically and horizontally and the blocks are not properly filled with concrete then the buildings will be vulnerable in an earthquake and because of the heavy construction could be dangerous.

Similarly, timber framed buildings if not designed and constructed with adequate bracing to all walls and foundations will be vulnerable in earthquakes and in cyclones.

The roof structure to both types of building will also be at risk in cyclones if the roof structures are not constructed with the correct quality of timber properly



Drawing 1: Typical Primary School Classroom

fixed with cyclone fixings as will the roof sheets if they are not fixed with adequate numbers of cyclone screws and washers.

Proposed construction: Given the scattered nature of Tonga's islands, the problems and cost of transport and even more importantly the difficulty of supervising the construction of buildings to ensure that they are constructed properly, it is proposed that in future, certainly on islands other than Tongatapu Island, school buildings are constructed of timber framed walls, lined with plywood externally, with timber floors raised above the ground on blockwork, steel or timber foundations with timber roof structures and corrugated steel roof sheets. Construction and supervision of this type of building should be easier than for buildings constructed of concrete blockwork.

Structural module: A 2 metre structural module is proposed with cross-walls and trusses on this module (see drawing). This will give a number of advantages: it will reduce the number of roof trusses to three per classroom rather than the five seen in most existing classroom buildings thus reducing costs; it will also enable the provision of a half-classroom sized room (6.2 x 3.8 metres; see drawing) that can be used as a principal's office, store or staff room. The reduction of the width of the building from 7 metres to 6.2 metres will also simplify construction of the roof trusses and reduce costs.

Roof construction: The pitch of the roof should be as high as economically possible (22½º minimum) to reduce uplift in high winds. Trusses as stated above should be at 2 metre centres and roof overhangs should be as large as possible (within the constraints of designing for cyclones) to give protection to windows from solar and rain penetration. Roof sheets should be fixed with cyclone screws and washers with additional fixings in a zone around all edges of the roof. Purlins should be at maximum centres again within the constraints of designing for cyclones.

Light and ventilation: Classrooms should be designed to have adequate light and ventilation: windows should be a minimum of 15% of the floor area and openings for ventilation should be a minimum of 15% of the floor area. Windows and other openings will have to be carefully designed because the windows walls will require bracing to withstand cyclones; it might be found that external bracing will be required. Consideration should also be given to either hinged or removable shutters to protect windows against cyclones.

Orientation: All new buildings should if at all possible, be oriented so that the long axis of the building runs east/west. This, together with large roof overhangs, will give maximum protection to windows from solar penetration and help keep the buildings cool.

FACILITIES

All of the schools visited had some basic facilities missing such as stores, principals' offices and staff rooms and in most schools this was leading to valuable classroom space being used for at least some of these functions.

It is proposed therefore that all primary schools should have a range of facilities depending upon their size. These would be as follows:

A small primary school with up to 90 should have three classrooms and an office/store (the size of half a classroom or 23.56M²). This would mean that each classroom would have two classes which of course has implications for teacher training in that teachers would have to be able to cope with multi-class teaching. See Drawing 2 for layout of typical building.

A medium size primary school with up to 180 pupils in rural areas and possibly 240 pupils in urban areas would have six classrooms, an office/store and a staffroom (both the size of half a classroom or 23.56M²) in two standard buildings.

Larger primary schools would have additional multiples of three classrooms and an office/store or staff room as necessary.

Basic or middle schools would have at least one additional two classroom building for Forms 1 and 2 with an attached library the same size as a classroom. Larger middle schools would require additional two or three classroom units.

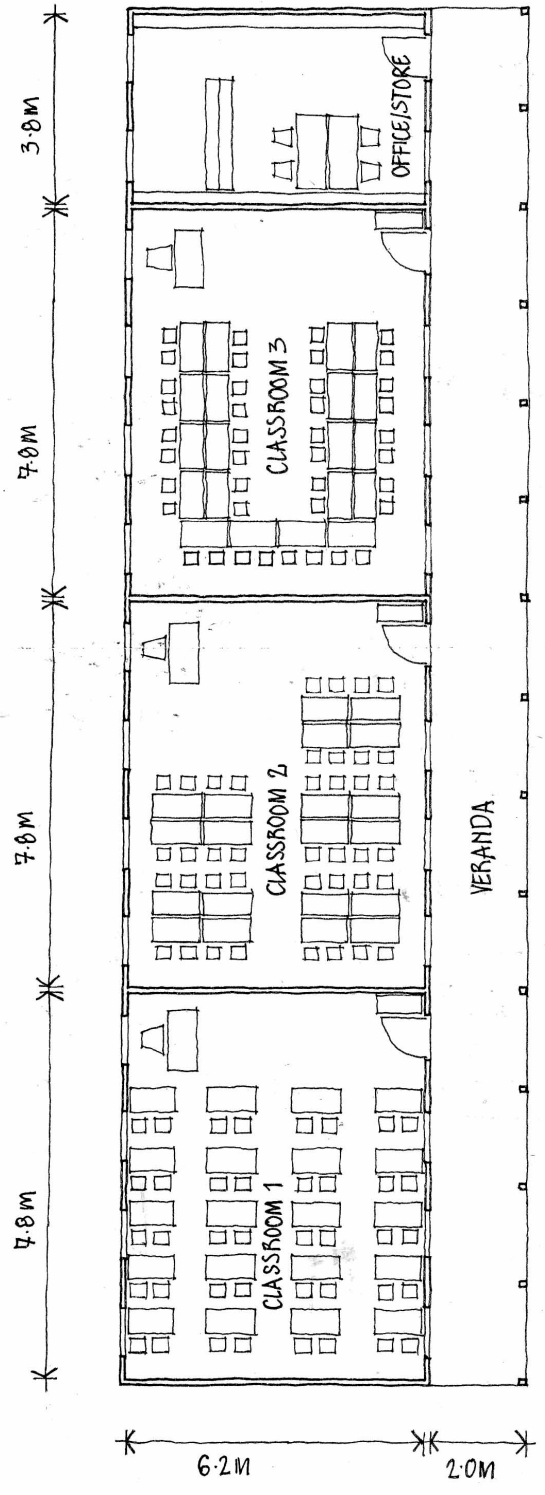
SERVICES

All primary schools should have a source of drinking water and adequate numbers of toilets for boys, girls and staff.

Even in areas where there is a town or village water supply it seems that there are quite often problems because the supply is not dependable or because it is so alkaline that it is unpleasant to drink. It is proposed therefore that all new and renovated buildings are supplied with rainwater gutters to the roofs which will supply water storage tanks, one per building. The gutters should be the best quality available because, as seen during the school visits, the cheaper ones do not last very long.

Very few schools visited had adequate numbers of fully functioning toilets. There are several projects constructing new toilets but these are not without problems in that the numbers of toilets are usually not sufficient for the numbers of students, there are no separate staff toilets so that staff are taking one or tow toilets for their own use thus reducing even more the numbers available to students, urinals are being built in boys' toilets, water supplies to some toilets are not working or are not available and the quality of the sanitaryware is not very good with the result that the toilets do not have a very long useful life.

It is proposed that toilets should be supplied in a ratio of at least one toilet to 40 students (1 to 20 students would be the ideal but this is unlikely to be achieved) with at least two separate toilets for staff, one male and one female. Urinals should not be used in boys toilets as they are virtually impossible to keep clean (especially if made of tiles or concrete) and the supply pipes are



Drawing 2: Typical 3-Classroom Building with Office/Store

very vulnerable to damage. The best quality sanitaryware should be used as these will have the longest life. Stainless steel fittings would be the best but it is recognised that these are difficult to keep clean where the water is very alkaline.

In areas where a dependable water supply is not available then the use of VIP latrines (ventilated, improved pit latrines) is recommended. These will have a longer life than normal pit latrines, will not smell if properly constructed and do not require a water supply. Water should however be supplied (from water tanks) for hand washing.

FURNITURE

None of the schools visited had sufficient numbers of furniture for the students and what furniture there is, is not really appropriate especially if teaching methods are to be improved.

The furniture seen was usually a double bench (sometimes used by more than two students) with an attached fixed bench for seating. This sort of furniture while cheap to make is not appropriate for modern teaching methods in that it is very inflexible. It more or less forces the teacher to adopt the 'chalk and talk' method of teaching. If more moderns methods are to be introduced than furniture that is more flexible in use must be supplied to schools.

It is proposed therefore that double desks of a modular size with separate chairs are used. These can then be arranged in different ways in the classroom to suit different teaching modes. See drawings.

It was also noted that there were no different sizes of furniture being used in the schools visited. Children at a primary school range in age from 6 years to 12 years or even older if children start late or repeat classes. The children therefore vary greatly in size and primary schools should probably have at least three different sizes of furniture to accommodate this range of sizes. If children are not comfortable then it will be difficult for them to concentrate and the learning process will be impeded.

The only way to establish the correct range of sizes of furniture required in schools in Tonga will be to carry out an anthropometric survey of a sample of children of school going age. This is not difficult and UNESCO have published a number of publications setting out how this should be done and how the results can be used to determine the sizes of furniture required.

All classrooms should also have a teacher's desk and chair and a lockable cupboard for books.

ANNEX 5: SCHOOL INFRASTRUCTURE SURVEY DOCUMENTATION

A. GENERAL

A draft school infrastructure survey questionnaire was prepared by the Infrastructure Advisor in UK before his visit to Tonga for comment by the MoE. Comments by MoE staff and by the two consultants working for MoE were incorporated into the document at the beginning of the Advisor's visit and the document was revised accordingly.

After a short bidding process, a local firm of engineers was selected to carry out the infrastructure survey and meetings were held with them to familiarise them with the documents and prepare them for a pilot survey of schools in Tongatapu Island.

A pilot survey was then conducted in three schools with the manager of the firm of engineers and two of his staff who would be carrying out the main survey. The survey documents were completed by the engineers and submitted to the Technical Advisor for comment. Several further amendments to the survey documents were also agreed. The final survey document is shown below in Section B. See Annex 2 for notes on the schools inspected.

Before his departure from Tonga, the Technical Advisor had a final meeting with the manager of the firm of engineers where he commented on the completed survey documents and asked for more detailed information to be collected in order that preliminary costings can be made at a later date for any of the schools selected to be included in the school grants programme and that the schools can be more easily ranked in terms of priority.

It was agreed at this meeting that the full survey of all the schools in the country would be completed by the end of August 2006 in time for the Technical Advisors next visit in September 2006.

Guidelines for completing the survey forms were prepared by the Technical Advisor for use by the engineers and these are shown below in Section C.

SCHOOL PROFILES

It is proposed that the school profiles, which are to be developed for every school in the country once the infrastructure survey is completed, should be in two parts: Part A should cover general school data which will be picked up in part from the survey but mainly from data that the Ministry of Education collects on a regular basis and Part B which will cover the existing infrastructure at each school and which will be generated from the data collected during the infrastructure survey.

C. SCHOOL INFRASTRUCTURE SURVEY QUESTIONNAIRES

School Infrastructure Survey 2006

Identification Details

Questionnaire Identification	
Name of School	
School Code	
Village	
Island	
Telephone no	
Email address	

Surveyor Identification	
Date of interview	
Surveyor name	
Date checked	
Respondent Identification	
Contact name	
Job title	

Introduction

We are conducting a nationwide survey of school infrastructure on behalf of the Ministry of Education and we are here today to ask you some questions about your school's infrastructure, facilities and equipment. The survey is split into two components, with the first dealing with basic information about the school, and the second component involving completing school building inspection reports.

The questions in the survey take one of two forms. Some questions will require quantitative data and clear definitions are provided for what is required. Other questions are subjective and the enumerator, who is a trained engineer, will select the best answer from a choice of possible responses to each of these questions. Section 1 should be completed by the School Principal and Sections 2 to 11 by the enumerator with help as required from the principal.

The purpose of the survey is to 1) obtain an overall picture of the current state of school infrastructure and equipment in Tonga and 2) to build up a profile of each school as part of the process of developing minimum services standards for schools. Once the survey is complete and results aggregated you will be able to compare the current status of your school against the average for similar schools in Tonga and ascertain any areas where your school may not be meeting the minimum service standard for schools in Tonga.

It should be pointed out that the undertaking of this survey is in itself not an indication that the Ministry of Education will be undertaking a construction program. Your co-operation is greatly appreciated and I thank you for taking the time to answer the questions.

Would you like to receive a copy of the final profile of your school? Yes No

Surveyor Comments Regarding this Interview

Section 1: School Data

1. Basic Information

1.1 What year was the school established? **Year** ☐

1.2 Does the school have boarding accommodation? *(circle yes or no)* **yes no**

Number of boys boarding: ……..…….

Number of girls boarding: ……..…….

1.3 Does the school have a Parent/Teacher Association? *(circle yes or no)* **yes no**

If yes, state the number of times the PTA meet last year ☐

1.4 Do the students pay fees? *(circle yes or no)* **yes no**

If yes, how much are the fees per student per year? ☐

1.5 How much money did the school receive for maintenance of school facilities in 2005?

	Cash 2005
PTA	
Ex Students	
Other	

Please specify other funds:…….

1.6 How much money did the school receive for other uses in 2005?

	Cash 2005
PTA	
Ex Students	
Other	

Please specify other funds:…….

2: Site and Land

2.1 Please state the land ownership *(circle number below)*

1. Crown land **2. Noble's Estate** **3. Private**

2.2 Are there any play grounds or sports fields? **Yes** **No**

If yes, please describe: ……

……..

2.3 Are there any vegetable gardens? **Yes** **No**

2.4 Is the school fenced? **Yes** **No**

2.5 If no, is a fence required? **Yes** **No**

2.6 What is the travel time to the nearest supply of building materials? **hrs** ☐

2.7 What is the means of transport for building materials? *(circle number below)*

1. Road **2. Boat**

2.8 What is the cost of materials transport? **$** ☐ **/kg**

2.9 What services are available on the site?

			Is this service reliable?	
	Yes	**No**	**Yes**	**No**
Town power	☐	☐	☐	☐
Generator	☐	☐	☐	☐
Solar power	☐	☐	☐	☐
Telephone	☐	☐	☐	☐

2.10 Has the school got a reliable radio that can receive schoo broadcast programs? **Yes** **No**

3. Water Supply & Sanitation

3.1 Where does the school get most of its water? *(circle number below)*

1. Rainwater tanks **2. Stream** **3. Well** **4. Town supply**

If tanks, state number and total capacity **Number** ☐ **litres** ☐

3.2 Is there a reliable working pump? **Yes** **No**

If yes, state type: …….

3.3 Is there a reliable water supply all year? **Yes** **No**

If no, when do shortages occur? *(tick boxes below)*

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

3.4 What type of toilets does the school have? *(circle number below)*

1. Flush toilets **2. VIP latrines** **3. Pit latrines** **4. Other**

3.5 How many toilets are in working order?

	Male	**Female**
Students		
Teachers		

3.6 Are girls toilets located away from boys toilets? **Yes** **No**

3.7 Are there functioning washing facilities?

	Yes	**No**
For boys		
For girls		

3.8 Has the school been closed in the last 12 months due t sanitation problems? **Yes** **No**

If yes, please describe: ……

4. School facilities *(to be completed by school principal and surveyor)*

4.1 Please indicate the number of existing classrooms ☐

4.2 Does the school require additional classrooms? **Yes** **No**

If yes, how many …….

4.3 Does the school require additional classrooms for class 7 & 8? **Yes** **No**

If yes, how many …….

4.4 Please indicate the number of other facilities:

Administration rooms	☐	**Staffrooms**	☐	**Library**	☐
Science laboratories	☐	**Prep rooms**	☐	**Workshops**	☐
Dining room	☐	**Kitchen**	☐	**Staff houses**	☐
Gym	☐	**Hall**	☐	**Church**	☐
Medical clinic	☐	**Industrial arts**	☐	**Home economics**	☐
Boarding accommodation:		**For boys**	☐	**Girls**	☐
Computer lab	☐	**Other**	☐		

4.5 Does the school require additional facilities? **Yes** **No**

If yes, what facilities ……..

Section 2: Inspection Reports

School code | |

1. Sketch plan *(to be prepared by surveyor)*

1.1 Please draw a sketch plan of the school site showing all buildings, services, roads, paths, drains, large trees, beaches, adjoining buildings, and any other notable features (show north point).

2. Site information

2.1 Please indicate the size of the site ☐ **Square metres**

2.2 Is the site size adequate? **Yes** **No**

2.3 Please describe the site? *(circle number below)*

1. Flat **2. Gently sloping** **3. Steeply sloping** **4. Undulating**

2.4 Please describe the condition of the site? *(circle number below)*

1. Dry **2. Muddy** **3. Danger of flooding**

2.5 Is there any danger of earth slips, landslides, etc? **Yes** **No**

If yes, please describe ……..

2.6 Are there any large or dangerous trees? **Yes** **No**

2.7 Are there any power cables crossing the site? **Yes** **No**

Please comment on any other factors affecting the site ……..

……

3. Site Works *(to be completed by surveyor)*

Element	Construction & quality	Defects/ work required
Access roads		
Paths & steps		
Retaining walls		
Water reticulation		
Electrical reticulation		
Storm drains		
Soil & waste installation		
Septic tanks & soak-ways		
Well		
Pump		
Water tank		
Perimeter fence and gate		

0 = not applicable, 1 = good, 2 = average, 3 = poor, 4 = requires demolition,

Any further comments on this site ……..

……

4: Buildings: External Structure and Finishes

School code [ ]

BUILDING NAME OR NUMBER *(as shown on site drawing)*		*(ie administration building or classroom building 1)*
Basic construction type:		
Constructed/funded by:		
Element	**Material & quality**	**Defects/ work required**
Roof finish		
Roof structure		
Fascias, eaves & verge boards		
Paint: fascias, eaves, etc.		
Gutters & flashings		
Foundations		
Walls		
Wall columns & beams		
Paint: walls & external ceilings		
Windows & fittings		
Doors & fittings		
Paint: Doors & windows		
Veranda floor		
Veranda columns & beams		
Veranda ceilings		
Foundations		
External paving		
Storm drains		
Water installation		
Soil & waste installation		
Electrical installation		
Other		

0 = not applicable, 1 = good, 2 = average, 3 = poor, 4 = requires demolition,

Any further comments on the exterior

……

5. Buildings: Internal Structure and Finishes *(to be completed by surveyor)*

School code | |

BUILDING NAME OR NUMBER *(as shown on site drawing)*		*(ie administration or classroom building 1)*
Area of building *(external dimensions)*		*X x Y metres = ……square metres*
Number of rooms		*(ie 4 classrooms 7 x 8 metres internally)*
Element	**Material & quality**	**Defects/ work required**
Ceiling		
Walls		
Wall tiles		
Wall columns & beams		
Paint: walls & ceilings		
Internal doors		
Paint: Doors, windows & fittings		
Floor		
Floor tiles		
Chalk boards		
Sinks & sanitary fittings		
WCs		
Water installation		
Soil & waste installation		
Science labs		
workshop		
Home economics		
Information technology		
Shelves & cupboards		
Teacher's desk & chair *(no and type)*		
Students' desks and chairs *(no and type)*		
Electrical installation		
Other		

0 = not applicable, 1 = good, 2 = average, 3 = poor, 4 = requires demolition,

Any further comments on the interior

……..

……

D. GUIDELINES FOR COMPLETING SCHOOL INSPECTION REPORTS

1. Methodology for Carrying Out Inspections

1.1 The surveyors should visit each school to be surveyed and carry out a detailed inspection of the site and the existing buildings.

1.2 The surveyors should complete Section 1: Basic Information that will provide basic data for the school with the assistance if necessary of the School Principal.

1.3 The surveyors should then complete Section 2: Inspection Reports which will provide detailed information on the school site and buildings, an assessment of the quality of the facilities and list work that is required for each building, service or facility.

2. Notes on Completing the Survey Forms

Section 1: Basic Information

1. Identification Details

1.1 The surveyor should enter the name and number of the school and the other school details on the front page of the survey document. He should also identify the school principal or other school official with whom he has worked and who has provided the information on the school. The surveyor should also provide his name and the date of the survey.

2. Basic School Data

2.1 The basic and current school data required in this section in parts 1 and 2 should be provided and entered on the forms by the school principal or his/her representative.

3. Site and Land

3.1 The surveyor should estimate the size of the site and its area ie 50 x 100 metres giving an area of 5,000 square metres.

3.2 The surveyor should also ascertain the ownership of the land, whether there are any play grounds or sports fields (and if so describe these) and whether there are any vegetable gardens.

3.2 The surveyor should also state whether the site is fenced and if not whether it should be fenced.

3.3 This should be completed by the surveyor with the assistance of the school principal. Assess the travel time to the nearest supplier of building materials. State what transport is required for transporting materials and the cost of transporting materials. These details will be important when

assessing how much the transport of building materials will cost for any extensions or repairs to the school buildings.

3.4 The surveyor should state what services are available on the site and whether they are reliable or not.

3.5 The surveyor should also establish whether the school has a reliable radio that can receive school broadcasts.

4. Water Supply and Sanitation

4.1 The surveyor should state where the school obtains most of its water. If there are water storage tanks the number and capacity of the tanks should also be stated.

4.2 The surveyor should also ascertain whether there are any pumps for pumping water and if so the type of pump and whether they are working and reliable should be stated.

4.3 The surveyor should establish whether the school has a reliable water supply and if not when shortages occur.

4.4 The surveyor should state what sort of toilets the school has; whether they are in working order; whether the girls' toilets are situated away from the boys' toilets and whether there are washing facilities in working order for both boys and girls. Note: a VIP toilet is a pit latrine with a ventilated pit.

4.5 The surveyor should also establish whether the school has been closed in the last 12 months because of problems with the toilets.

5. School Facilities

5.1 The inspector should indicate the number of existing classrooms and state whether the school requires additional classrooms to accommodate the existing number of students. The surveyor should also establish whether additional classrooms will be required in the near future for Classes 7 and 8 (ie Forms 1 and 2). This will only be necessary if a primary school is being upgraded to a middle school. This should be done with the assistance of the school principal.

5.2 All other facilities at the school should also be listed and the surveyor should establish, with assistance of the principal whether any additional facilities are required.

5.3 The condition of the facilities will be assessed using the Inspection Reports (see below).

Section 2: Inspection Reports

Note: The inspection of the buildings should cover all the elements including the roof, ceiling, walls, floors, doors, windows and verandas, both internally and externally and should be carried out systematically.

The type of construction materials used for the various elements should be listed and an assessment made of the quality of the material or workmanship for each element. The quality should be defined as follows:

- 0: Not applicable.
- 1: Good: only routine maintenance required ie painting.
- 2: Average: only minor repairs required ie replacement of louvre blades or door handles, etc.
- 3: Poor: major or urgent repairs required ie roof sheets or roof timbers require replacement, etc.
- 4: Dangerous: requires immediate replacement or demolition ie roof structure dangerous and requires replacement; block walls cracked by earthquake and require demolition, etc.

Any defects should be listed together with the work required to make the defects good or to replace an element. *The description should be sufficient to enable a cost to be estimated for this work at a later date if required.*

Guidelines to assist the surveyors in making objective assessments of the quality of the work are given in Section 3.

1. Site Plan

1.1 State the school code to identify the school.

1.2 Draw sketch plan (with approximate dimensions) of the site showing all buildings, services, roads, paths, drains, large trees, streams, rivers, beaches, adjoining buildings and any other notable features. Indicate north with a north point.

2. Site Information

2.1 State the school code to identify the school.

2.2 State (or estimate) the size of site in square metres.

2.3 Assess whether the size of the site is adequate for the school; is there room for play areas for all students for instance.

2.4 Is there an access road leading to the school.

2.5 General formation: is the site flat, steeply/gently sloping, undulating, etc.

2.6 Condition: is the site dry, muddy, water-logged; is there any standing water.

2.7 Is there any danger of earth slips, landslides, flooding, etc.

2.8 Are there any large or dangerous trees; are there any power cables crossing the site, etc.

2.9 Comments: comment on any other factors affecting the site.

3. Site Works

3.1 State the school code to identify the school.

3.2 Access road: if there is an entrance road; is it in good condition; are there any defects.

3.3 Site paths/steps: are they complete; are there any visible defects.

3.4 Retaining walls: are they properly built and complete; are there any cracks or other visible defects or reasons to suspect that there might be defects; are there any parts of the site that require retaining walls that do not have them.

3.5 Water reticulation: are water pipes of an adequate size and to the correct specification; do they appear to be buried at the correct depth, etc.

3.6 Electrical reticulation: are any overhead cables high enough; are the cables of an adequate size; are they properly fixed to buildings; are any underground cables armoured cables or in proper conduits; do they appear to be buried at the correct depth, etc.

3.7 Storm-water drains: are there any surface water drains; are they functioning; do they drain adequately; is there an outflow; are there any defects; what is the general condition.

3.8 Soil and waste installation: are they functioning; are there any visible defects.

3.9 Septic tanks/soakaways: are there any visible defects, such as leaks or broken covers, etc.

3.10 Well: if there is a well(s); is there any water in the well(s); is the well deep enough to contain water at the end of the dry season; is the well covered; is the well clean or dirty; is the well at least 30 metres from the nearest septic tank or soakaway.

3.11 Pump: is there a hand or electric pump; if so, is the pump functioning.

3.12 Water tanks: are there any water tanks; are they covered, leaking, connected and functioning.

3.13 Perimeter fences, walls and gates: are they complete; are there any visible defects.

3.14 Comments: comment on any defects, unfinished work, etc that is not covered above.

4. Buildings: External Structure and Finishes

Note: Separate report to be completed for each building; state the school code to identify the school.

4.1 State the building name or number as shown on the site plan ie administration or classroom building 1, etc.

4.2 State who the building was constructed or funded by ie PTA, Japanese Government, New Zealand Government, etc.

4.3 Describe basic construction of building ie timber-framed or blockwork walls, timber roof structure with corrugated steel roof sheets, etc. Comment here on any asbestos roof sheets or wall panels; note any damage.

4.4 Roof finish: comment on construction, materials, finish, laying, any visible defects, etc.

4.5 Roof structure: comment on visible roof timbers and on quality of timber, joints, cyclone fixings, etc.

4.6 Fascias, eaves and verge boards: comment on quality of timber, jointing and painting.

4.7 Fascias, eaves and verge boards: comment on paint finish.

4.8 Gutters and flashings: comment on construction and finish; any visible leaks.

4.9 Foundations: any visible defects; any cracks, subsidence or undermining. Are concrete foundations large and deep enough. Are foundation posts structurally sound, properly braced, etc. Are floor bearers properly fixed to foundation posts with cyclone fixings.

4.10 Walls: comment on construction, rendering and finish; are there any visible defects.

4.11 Walls and external ceilings: comment on paint finish.

4.12 Wall columns and beams: comment on construction, finish; are there any visible defects.

4.13 Windows and fittings: comment on construction, finish, fittings, ironmongery; are there any visible defects.

4.14 Doors and fittings: comment on construction, finish, fittings, ironmongery; any visible defects.

4.15 Windows and doors: comment on paint finish.

4.16 Veranda floors: are they complete; in good condition; are there any visible defects.

4.17 Veranda columns and beams: comment on construction; finish; are there any visible defects.

4.18 Veranda ceiling and soffits: comment on construction and finish of any soffit or ceiling boards; any visible leaks.

4.19 Paving around building: is the paving complete; in good condition; are there any visible defects.

4.20 Storm-drains: are they complete; in good condition; are there any visible defects.

4.21 Water installation: is the installation complete with fittings; is the installation adequate for its purpose; are there any visible defects.

4.22 Soil and waste installation: is the installation complete with fittings; is the installation adequate for its purpose; are there any visible defects.

4.23 Electricity installation: is the installation complete with fittings; is the installation adequate for its purpose; are there any visible defects.

4.24 Other: comment on any other finishes or features, etc.

5. Building: Internal Structure and Finishes

Note: Separate report to be completed for each building; state the school code to identify the school.

5.1 State the building name or number as shown on the site plan ie administration or classroom building 1, etc.

5.2 Ceiling: construction, finish, condition, any visible leaks from roof or other defects.

5.3 Walls: finish; any visible defects.

5.4 Wall tiling: any wall tiling; finish; any defects.

5.5 Wall columns and beams: construction, finish; any visible defects.

5.6 Paint: walls and ceilings: comment on finish and quality.

5.7 Internal doors: type, construction, finish, fittings, ironmongery; any visible defects.

5.8 Paint: doors, windows and fittings: comment on finish and quality.

5.9 Floors: finish, condition; any visible defects such as rotten boards.

5.10 Floor tiles: comment on quality of tiles and laying; any defects such as subsidence.

5.11 Chalk-boards: if fitted, comment on finish, any defects.

5.12 Sinks and sanitary fittings: any sinks, taps, etc; are installations complete; are installations functioning; any defects visible.

5.13 WCs: any WCs fitted; what type; are they functioning.

5.14 Water installation: is the water installation connected; is it functioning.

5.15 Shelves and cupboards: any fitted; finish; any defects.

5.16 Teacher's desk and chair: are they in place; do they require repair or replacement.

5.17 Students' desks and chairs: are there any; if so what type; do they require repair or replacement.

5.18 Electricity installation: is installation complete with fittings; is installation adequate; any visible defects.

5.19 Other: comment on any other fittings, fixtures, finishes, etc.

Section 3. Guidelines for Assessing the Quality of Construction

1. Roof

1.1 Roof timbers: If visible do they meet specifications; are they straight or twisted, solid or split; are roof trusses well made and well fixed; are purlins straight, well lapped and properly connected to trusses and rafters. Are they treated with wood preservative? Do any timbers require replacement?

1.2 Roof covering: Is the ridge straight and level; are the roof tiles/roof sheets laid straight; are there any sags in the roof; are the roof tiles/roof sheets of good quality and do they meet the specification; are any gutters well made and fixed; are the fascias and bargeboards good quality timber, well fixed and well painted. Do they require any repairs, replacement or repainting.

Note: any asbestos roof sheets that might require replacement should be noted.

1.3 Cyclone resistance: Are the roof timbers properly secured to the walls or wall framing (with bolts or strapping or hurricane bolts); are purlins adequately secured to roof trusses, rafters, etc (with bolts, strapping, etc); are roof sheets adequately fixed especially at the eaves, verges and ridges (corrugated steel roof sheets should be fixed at each corrugation in a zone around the perimeter of the roof); is the roof structure adequately braced with timber or steel bracing.

Note: particular care should be taken in assessing the adequacy of cyclone fixings and bracing in the roof structure.

2. Ceiling

2.1 Are any roof leaks evident; are the ceilings fixed level and true or are there any sags; are there any cover strips and if so are they good quality and well fixed; are the ceiling panels and cover strips well painted. Do any panels or cover strips require replacement or repainting?

Note: any asbestos ceiling panels that might require replacement should be noted.

3. Foundations

3.1 Elevated floors: do foundation posts have adequate foundations; are foundation posts properly braced; are floor bearers adequately secured to foundation posts with cyclone fixings; are timber or steel foundation posts in good condition and adequately braced.

3.2 Concrete foundations: are concrete foundations deep enough and protected from erosion; are timber walls tied down to foundations.

Note: particular care should be taken in assessing the adequacy of cyclone fixings between foundations, floors and walls.

4. Floor

4.1 Is the floor level; if screed finish is this solid or are there any cracks or deterioration in the surface; if tiled are these well laid, flat with even joints. Do they require any repairs or replacement of tiles?

4.2 For timber floors are any boards or floor joists rotten and requiring replacement.

5. Walls

5.1 Are blockwork walls plumb and well built; is the render flat and well finished; are any cracks evident; is the paint good quality and the painting well finished; are any wall tiles properly fixed, flat and square with even joints and the correct grout. Do the walls or tiles require any repairs? Do the walls require repainting?

5.2 For timber-framed walls is any framework rotten and requiring replacement; is any internal or external wall panelling or boarding damaged or requiring replacement; are walls adequately braced with strap bracing, boarding etc; are wall framing timbers properly secured to floor bearers or foundation posts and to roof timbers.

5.3 Note any asbestos wall panels that might require replacement.

Note: particular care should be taken in assessing the adequacy of cyclone fixings between timber wall framing and roof framing and between concrete block walls and roof framing.

6. Columns & Beams

6.1 Are any columns and beams of adequate size, plumb, level and well built; is the concrete if visible, of good quality; are any cracks evident. Do they require any repairs or repainting?

7. Windows

7.1 Timber windows: is the timber good quality, any splits or cracks; is the timber properly planed and finished; are the windows well made with the correct joints; is there any twisting in the frames; are the windows properly painted or varnished with good quality paint or varnish; are the frames properly fixed. Do they require any repairs, replacement or repainting. Does any glass require replacement.

7.2 Steel or aluminium louvres: are they functioning properly; are they rusted; do they require replacement; do any louver blades require replacement.

7.3 If windows are glazed are they adequately protected against damage during cyclones.

7.4 If there are protective grilles or mesh over the windows are they in good condition; do they require replacement.

8. Doors

8.1 Hardwood doors: Is the timber good quality, any splits or cracks; is the timber properly planed and finished; are the doors well made with the correct joints; is there any twisting in the doors; are the doors properly painted or varnished with good quality paint or varnish; are the frames properly fixed. Do they require any repairs, replacement or repainting.

8.2 Flush doors: Are the doors well made; are they finished with good quality plywood or metal sheet of the correct thickness; are the door skins properly glued and fixed; is there any damage to the door skins; is there any twisting in the doors; are the doors properly painted or varnished with good quality paint or varnish; are the frames properly fixed. Do they require any repairs, replacement or repainting.

9. Hardware

9.1 Are there sufficient door and window hinges; are the door and window hinges, window stays, door handles and locks, of good quality; do they meet the specifications; are they properly fixed with the correct number of the right size screws. Do any fittings require replacement.

10. Chalkboards

10.1 Are the chalkboards properly made; are they framed and adequately fixed to the walls; are they smooth and properly finished; are they painted with chalkboard paint. Do they require replacement or repainting.

11. Electrical Installation

11.1 Does the electrical installation meet the required specification; is it properly earthed; are all fixtures and fittings properly fixed. Is the installation safe; does it require any repairs.

12. Water Installation

12.1 Does the installation meet the required specification; are there any leaks; are there sufficient stop-cocks; are all fittings properly fixed to or let into walls. Does the installation require any repairs or replacement of any parts.

13. Soil & Waste Installation

13.1 Does the installation meet the required specification; are there any leaks; are all pipes properly buried; do all manhole covers fit properly; do septic tnaks or soakaways require emptying or replacement. Does the installation require any repairs or replacement of any parts.

14. Veranda Floor

14.1 Is the floor level; if screed finish is this solid or are there any cracks or deterioration in the surface; if tiled are these well laid, flat with even joints. Does the floor require any repairs or replacement of tiles.

14.2 If the veranda is raised, does the timber floor require any repairs; do stairs and handrails require repairs or replacement.

15. Veranda Ceiling

15.1 Are any roof leaks evident; are the ceilings fixed level and true or are there any sags; are the cover strips good quality and well fixed; are the ceiling panels and cover strips well painted. Do any panels or cover strips require replacement or re-painting.

16. Veranda Columns & Beams

16.1 Are RC columns and beams of adequate size, plumb, level and well built; is the concrete if visible, of good quality; are any cracks evident. Do they require any repairs or re-painting. Are timber columns and beams in good condition; do any require repair or replacement.

17. External Paving

17.1 If the is any external paving is it in good condition; are there any cracks or breakages; is any paving undermined; does any paving require replacement.

18. Storm Drains

18.1 Are the drains built to adequate falls to outlets; are the drains well constructed; are they rendered internally; is the rendering smooth and well finished; are any cracks visible; are any drains broken or undermined; do any drains require any repairs or replacement.