



USP TONGA CAMPUS EXTENSION PROJECT

TONGA USP CONCEPT DESIGN REPORT

Prepared for:

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1 Introduction

1.1 BACKGROUND

The University of the South Pacific (USP) is the largest university in the South Pacific, which caters for all Pacific island countries. The USP is planning the development of a new campus in the Kingdom of Tonga. The New USP Campus Development will occur on a 14-acre site known as 'Atele Lot 2 Tafua'ahau Road which is adjacent to the existing 5-acre campus in Tongatapu, Tonga.

The USP development is an integral part of the Tonga Campus Academic Plan (2013-18) and the University Strategic Plan. The existing USP Tonga Campus (Adjacent to the new site) will factor into the concept for the new site and continue to be an integral part of the campus master plan.



MORDEN TONGAN FALE - ROUNDED ENDS

As part of this campus development process, Quality Design Ltd

(QDL) has been appointed to undertake a two-stage design commission. The first stage of the commission comprises the preparation of a New USP Campus Development - Master Plan and Concept Design report together with **preliminary estimate of the project cost**. The second stage, which will only commence on instruction from the USP, will be to prepare the develop and detailed design phases / drawings and the tender documentation for the new USP Campus Development project (the Works).

1.2 SCOPE OF WORKS

The Terms Of Reference (TOR) detailed the scope of works for the New USP **Campus Tonga - Concept Design are to include** for the following buildings, facilities and services:

- Teaching and Tutorial Rooms;
- Lecture Theatres;
- Science and Computer Laboratories;
- Library;
- Administration Centre;
- Student Services facilities;
- Recreational Area(s) and Health facilities;

- Infrastructure Network and Services/Utilities system;
- Student Residential Accommodation; and
- Staff Accommodation.

1.3 ARCHITECTURAL DESIGN CONSIDERATION

The TOR set out specific architectural design consideration for the new Campus including;

- design to be within an overall project budget of TOP\$14.5M;
- allow for staging of the project with essential facilities to be accommodated for initially;
- take into consideration the inclusion of the existing campus facilities and to be



complementary to the overall design and space requirements;

- prepare a preliminary cost estimates for the project including stages costs from a Registered Quantity Surveyor; and
- include concepts / characteristics that reflects Tongan architecture and landscaping.

1.4 OBJECTIVE

The main objective of the professional consultancy services is to prepare the New USP Campus Tonga - Master Plan and this



TYPICAL TONGAN MEETING FALE

TRADITIONAL ROPE-LASHINGS ON JOINTS

Concept Design Report for the 14-acre site.

The Design Report includes cost estimates would enable the USP in its efforts to secure additional financing for the development.

2 Master Plan & Concept Design

2.1 CONCEPT DESIGN REPORT

This Concept Design report details the outcome of the first stage of the commission only. The second stage, which will only commence on instruction from the USP, will be to prepare the detailed design drawings and the tender documentation for the selected work program. The various tasks that have been undertaken can be summarized as:

- Site visits and meetings with USP delegation and various stakeholders to obtain their vision and recommendation for the new Campus;
- Site analysis, review of existing USP facilities, adjacent land use, existing services;
- Prepare of the Master Plan for the entire site including facilities, building layouts, access roads, refer Annex A;
- Liaison with specialized consultants such as civil / structural engineers; building services engineers (electrical / mechanical / hydraulics) and quantity surveyors and geotechnical engineers; and
- Provide recommendations and preliminary cost estimates for budgeting purposes on the repair alternatives (accuracy levels: -10% to +30%);
- Confirm the engineering design criteria from relevant regulatory authorities and international standards and codes that will be adopted in the design;
- Propose structural engineering systems and options for civil works for consideration; and
- Propose geotechnical brief requirements for the project.

In addition to the main report text a range of supporting information is provided in the Annexures. Annex A contains the USP TONGA - Proposed Master Plan & Concept Drawings, June 2016 issue.



TONGA USP - PROPOSED MASTER PLAN

2.2 PROJECT LOCATION & BUILDINGS SET-OUT

The project locates at Taufa’ahau Road, ‘Atele. The site is adjacent to the existing USP facility to the west and facing due north to the Taufa’ahau Road, refer to Master Plan in Annex A.

Tonga’s traditional trade wind is from the South-Easterly, and as such, generally buildings should face due south-east where possible to maximise natural ventilation. Similarly, buildings should be protected from the harsh western afternoon sun by means of veranda and/or the like.

The master plan included the “Pangai” area immediately adjacent to the main road for easy access which features traditional large Tongan functions and community gatherings. The location segregates the Pangai which normally be populated and noisy from the university study areas.

The site is on relatively flat land which is perfect and easy for construction; in comparison to sloping sites. The site is recommended to be raised and elevated (say) 300mm to 350mm to alleviate flooding especially in future when surrounding areas are developed.

2.3 ARCHITECTURAL CONCEPT DRAWINGS

Based on the TOR, QDL and Project Team has undertaken detailed study of the proposed USP Campus Development. Subsequently, QDL has prepared the new USP Campus Tonga - Master Plan and Architectural Concept Drawings for the proposed buildings, roads and recreational areas, refer Annex A and B.

The Pouono building will be the most frequented place and is located closest to the main entrance. It also functions as the Reception for all other activities and is the point of entry to the 'hub' and start of the 'axis' of travel into the Campus. All other buildings have been provided with office space specific to their specific requirements and can be identified as separate entities off Reception within each building whilst maintaining a close liaison between the departments.

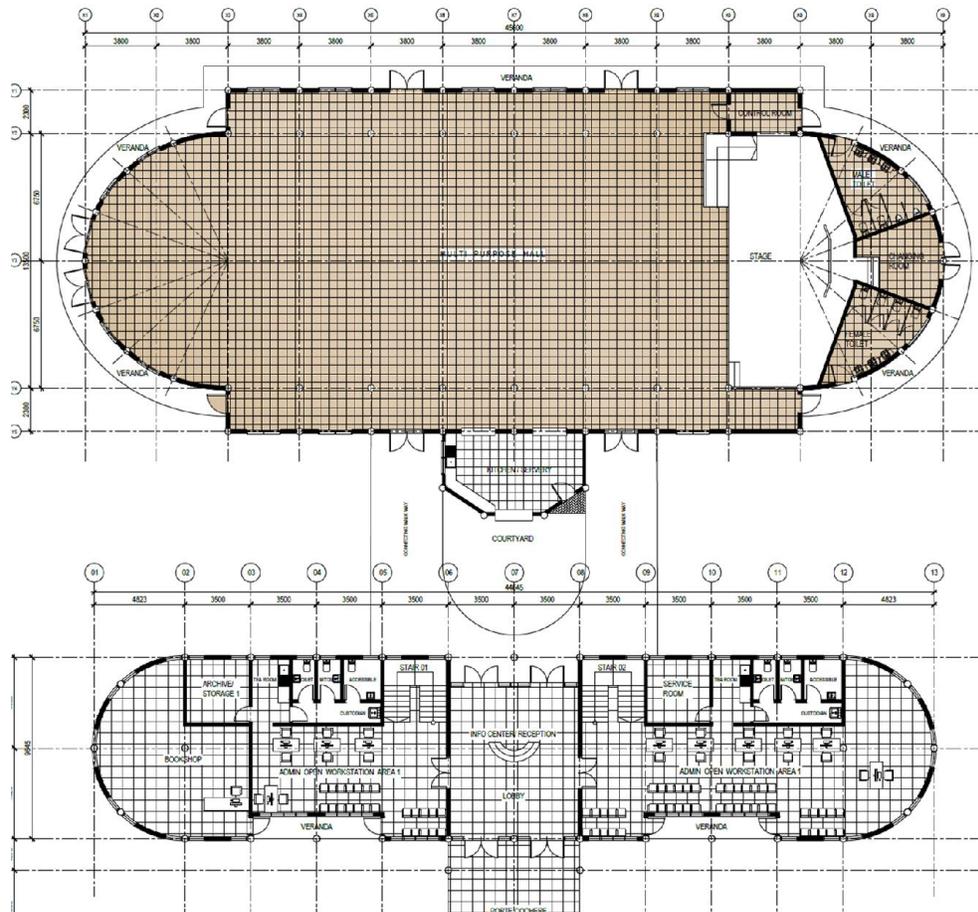
Air-conditioning is not to be considered for ventilation and temperature control.

These areas are to be equipped with telephone outlets, power points, light fittings and ventilation systems appropriate to the support of everyday office activities and as further described in this report in the Services Section.

IT is to be designed by the Client's IT specialist section for incorporation to the overall project.

The New USP Campus Development - Concept Drawings comprised of the following buildings and facilities:

- a. **The Master Site Plan:** Outlined where all buildings and facilities are located.
- b. **The Pouono House:** houses reception in the vicinity of the main entrance and to be occupied by Administration / Academic staff, Director's Office and the Multi-purpose Hall next-door. This area will be the first point of contact with the public and visitors and to be



directed as necessary, refer floor layout below. Pouono House is the most significant structure for the university and will showcase Tongan meeting-place, architecture, culture and our heritage.]



THE POUONO House - 3D VIEW

The Kolokakala Block: Existing library building is to be upgraded for the Student Association and work areas, bookshop and student support areas.

- c. **Matalanga O Maui PH-1:** two-storey building housing the Science Laboratories on the ground floor, amenities and tutorial classrooms on the upper level.

- d. **Matalanga O Maui PH-2** (Classroom): Houses several classrooms.

- e. **Tavake Oma** (Computer Laboratory): Houses the computer laboratories, Servers and IT, and video conferencing and amenities.



MATALANGA O MAUI - 3D PRESENTATION

- f. **Piu O Tafahi:** The existing café building to be upgraded as the dining hall and café;
- g. **Malau O Vailahi:** The existing administration block to be upgraded and as overall administration and IT offices, conference room, library, kitchen, post-graduates study and amenities.

- h. **Health Care Building:** An existing staff-quarter to be upgraded to be as the health centre.
- i. **Fanga Faliki Pako Building:** New 2-storey student dormitory building.
- j. **Recreational Area & Caretaker's Facility:** will have two tennis courts only, and Open shed type for the caretaker's storage and facility with no slab on ground, just compacted gravel fill.

The plan layout of each building in the New USP Campus Development is included in the Annex B Concept Drawings.

3 Design Criteria

3.1 SITE SPECIFICS

- ▶ Location: Taufa'ahau Road, 'Atele, Nuku'alofa, Tonga
- ▶ Latitude: 175° 13' 16.5" E
- ▶ Longitude: 21° 10' 50.7" S
- ▶ Time zone: GMT + 1300
- ▶ Building Types: Institutional & School Buildings
- ▶ Rainfall: Average Annual precipitation 1600mm

3.2 BUILDING CODES

The design criteria for the proposed USP Campus Development will adopt the following:

- ▶ Draft Tonga National Building Code - 2007;
- ▶ Building Code of Australia (BCA); and
- ▶ Current Australian and New Zealand Standards and Codes.

3.3 LOADINGS

3.3.1 Live Loading

Live Loads shown are in kPa:

Areas	kPa	Areas	kPa
Balconies	4.0	Stair/Landings	4.0
Classrooms	3.0	Car Parking	2.5

Office – General	3.0	Toilet / Tea room	2.0
Corridors / Lobbies / Foyers	4.0		

3.3.2 NATIONAL BUILDING CODE - 2007

The following design data will be adopted for the USP Development Complex Building, Nuku'alofa:

- Site Locality: Atele, Nuku'alofa, Tongatapu
- Region: Cyclonic region C
- Regional Limit State Wind Speed: 70 m/s
- Terrain Category: 2.5

The design of the new USP Campus Development will adopt guidelines of the Draft National Building Code 2007 (NBC 2007), the current design manual for Tonga.

The design requirements for wind designs / cyclone, the NBC 2007 makes reference to the Australian Standard AS 1170.2 – 2002 and adopted the wind and earthquake design criteria for all islands in Tonga as follows:

(i) Wind: Basic gust wind speed (permissible stress) $V_p = 57$ m/s

A limit state regional wind speed of 70 m/s to all islands of the Kingdom. The equivalent regional wind speed for permissible stress methods of design is 57 m/s.

(ii) Earthquake: Seismic coefficient of acceleration; $a = 0.4$

As an alternative, AS 1170.4 - 1993 (equivalent to California Building Code $Z = 0.4$)

3.4 MATERIAL PROPERTIES

The following concrete and blockwork properties have been adopted in the design based on the understanding of the Vanuatu Construction industry:

- Slabs on grade = 32 MPa
- Suspended Slabs & Beams = 32 MPa
- Columns & shear-walls = 32 MPa
- Blockwork = 12 MPa
- Grout = 15 MPa

3.4.1 Site Drainages

Our reviews of the site and the topographic survey drawings revealed there is limited and/or inadequate piped drainage system. All existing buildings on the site and around drain its roof runoffs to streets level and to some pits.

For this reason, it is recommended that the buildings are raised on coral fill platforms to have floor levels approximately 400mm to 500mm above the natural ground. This would alleviate future flooding even surrounding properties are developed.

The new development will have a large collective roof area and the runoff would require proper piped drainages. It is recommended that rain water harvesting be considered and then overflow to a series of soak pits.

3.5 GEOTECHNICAL INFORMATION

At the completion of the Concept Design, and once buildings locations are fixed, QDL recommend carrying out of appropriate levels of geotechnical investigation in order to confirm subsoil conditions and for footing design parameters for the buildings.

The geotechnical investigation would be tailored to suit the proposed buildings types and facilities confirmed for the development.

4 Cost Estimates

4.1 GENERAL

After the submission of the draft Master Plan and Architectural Concept Designs, the main the main hurdle was obvious which is how to reduce the project budget to be in-line with the Client's approved budget of TOP 14.5 Mil.

Consequently, Quality Design had undertaken significant design revisions of the Masterplan and all buildings to reduce costs. Discussions with the Client, confirmed few existing building facilities which now to be included in the project scope and to be refurbished and upgraded in lieu of new buildings.

4.2 BUDGET COST ESTIMATES

Refer attached Costing Report.

4.3 STAGING OF THE WORKS

The staging of the works can be addressed during the next "Develop Design" phase as detailed discussion and Client's inputs regarding costing will be vital for the staging planning. Meanwhile, in the Master Site Plan and Costing Report, please refer to it, as it clearly indicates the planning and phasing of works.

Moreover, the initial idea has been adopted towards combination of new building construction, renovation and refurbishment towards existing facilities to assist in keeping up with our budget constraints.

Annex A

Concept Plans, June 2016

Annex B

Costing Report, June 2016

Annex C

3D MODEL VIEWS, June 2016