



THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

FACILITIES MANAGEMENT DIVISION

Standard Brief
For Design and Construction
of Campus Facilities

JANUARY 2014



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Standard Brief For Design and Construction of Campus Facilities

The quality of any building project depends on the Design Team's fullest understanding and correct interpretation of the University's requirements. It is, therefore, important to recognise the key role of the University at the crucial briefing stage when the requirements for the building are established.

This document sets out the University's minimum requirements for the design and construction of its facilities. The intention of the document is to describe specific requirements of detailing, and to draw Consultants' attention to problems to be avoided.

Queries concerning this standard brief should be directed to the Facilities Management Division (FMD) staff of the University of Waikato, directly concerned as follows:

Mr J Cameron - Head, Facilities Management Division

Mr A Dicks - Group Manager, Facilities

Mr J Badham - Capital Works Manager

"University's approval", or similar expressions in this document means approval on the University's behalf, as given by the Project or Job Manager nominated by Facilities Management Division.

Throughout the document the term "Consultant" and "Design Team" shall be used interchangeably to refer to the consultant specialists who have been engaged to assist the University in its building programme. The following documents are to be read in conjunction with this brief:

- 1. University Sexual Harassment - Policy and Procedures**
- 2. University Occupational Health and Safety Policy, Questionnaire and Agreement**
- 3. Information Technology Division Standard Requirements for Cabling on the Campus**
- 4. ITS Teaching Technology Group Recommended Base Specifications for Teaching Room Developments**
- 5. The University's Emergency Procedures Brochure**
- 6. The University Style Guide and the Building Sign Manual**

These documents are available upon request.

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J Cameron Head: Facilities Management Division

Changes made:

13 Jan 2014 - clause B.23.8 changed as the campus is now Smoke Free.

14 Jan 2014 – page 68, Appendix 4 – item 6 Suspended Ceilings – 1st para sentence added at the end

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Section A – Sustainability & Environmentally Sustainable Design

A.1 Preamble

While there are many criteria to be considered in the design process, this Standard Brief is intended to assist the University and the Design Team to gain a better understanding of Energy, Environmental and Sustainability Issues as well as the technical requirements, thereby encouraging the adoption of best practises in the development of their project.

Climate change is expected to manifest itself in various ways which will affect the University and the Design Team is urged to ensure that all its members are fully conversant with these expected changes.

Buildings directly account for approximately 22% of our nation's fuel consumption and approximately 15% of CO₂ emission. Professionals involved in the design, construction, operation and maintenance or refurbishment of buildings, therefore, have a vital role to play in improving the efficiency of energy usage and reducing the level of carbon dioxide emissions.

This design guide refers to a series of documents relating to energy and the environment, which should be addressed in the design of any project - see **Appendix 1a, 1b, 1c, 1d**. These apply to new construction projects as well as the refurbishment of existing buildings.

The document also address other considerations, such as function, method of construction, cost and statutory controls, which may be regarded as equally significant determinants of design.

A.2 Solar Control

Particular attention is to be paid to solar control. Sun shading and screening shall be in-built into the building design and provided by features such as slab projections, overhangs, fins and blades, preferably in concrete. It is very important, however, that the solar control features should not reduce the penetration of natural daylight into the building space.

The exterior form of a building is not to result in rooms being uninhabitable because of high summer heat gain. The University does not favour "easy" solutions such as air conditioning, which have huge running costs, and specifically requires that solutions do not result in loss of available solar gain during winter months. Drawings to show expected sun angles, winter and summer, and calculations indicating expected natural temperatures in rooms are to be provided to the University during the design phase. Refer to **Appendix 1a, 1b, 1c, 1d and Appendix 3**.

A.3 Relevant Reference Documents

- a. Appendix 1a - The EnergyWise Charter of Key Principles.
- a. Appendix 1b - The Total Energy Management Cycle shown in illustrates an indicative process which can be used.
- b. Appendix 1c - Key Design Issues Relating to Energy and the Environment.
- c. Appendix 1d - Checklist of Sustainability Issues to be Considered.

Section B – Preliminary & General Matters

B.1 Building Code, Resource Consents and Development Levies

The project Consultant is to ensure that the NZ Building Code is complied with in all respects. On behalf of the University the Consultant will normally have responsibility for preparation of, and presentation to the Territorial Authority, all documents required to obtain Building Consent under the Buildings Act 2004 and amendments. The Contractor is to be responsible for keeping the Building Consent documents on site during the contract, returning all documents to the University at the end of the project. Like the Building Consent, the Code Compliance Certificate (CCC) is legally the building owner's responsibility. However, prior to the issue of the Certificate of Practical Completion the Contractor and Consultants shall provide all necessary Producer Statements and Certificates of Compliance to enable the University to apply for the CCC.

The Consultant is to be responsible for the preparation of all documents necessary to obtain Resource Consent approval, should this be required. Prior to submission to the Territorial Authority, approval of the outline plan and elevations has to be obtained from the University's Capital Asset Committee. The University will have the responsibility of forwarding the documents, prepared by the Consultant, for Resource Consent approval.

The Hamilton City Council's Development & Financial Contributions Policy provides for differential contributions to help fund the growth of infrastructure and facilities in the city. To this end charges are levied on all new buildings and structures, the rates being determined by the type of development. The Consultant will be responsible for the preparation of all documents necessary to make a submission on the Development Levy and will liaise with the University regarding the responsibility of the submission.

B.2 Health & Safety

The Consultant is to include in contract documents specific clauses covering Health and Safety in Employment Act matters, control of all workers engaged in the project while on the campus. No worker engaged in this contract should commit any act contrary to Law. All contractors who are required to enter ceiling spaces are to treat all cables as live.

B.3 Permits (Hot Work, Confined Spaces, Plumbing & Drainage, Fire Protection, Firewall Penetrations)

Prior to the commencement of any contract work which involves welding, cutting, or the use of a naked flame, a Hot Work Permit is to be obtained from the University's project manager or Facilities Management reception, and the provisions and requirements of that permit are to be followed as if they formed part of any contract or agreement between the University and the Contractor. Similar arrangements are to apply for work within confined spaces, any works involving alterations to existing hot or cold water supplies or drainage, and any works requiring penetration of any fire wall.

See also Section G.1 regarding fire alarm isolations, which should take place for all types of work, hot or cold dusty or clean.

See also Sections J.7 and I.7 regarding Locking-out procedures when work is done on electrical and mechanical equipment.

B.4 Design for Accessibility

All buildings shall be designed for access and use by the disabled in accordance with NZBC and applicable standards and guidelines including NZS 4121/2001. The University must be consulted on its requirements. Particular attention shall be paid to toilet facilities, lifts, door sizes and swings, floor finishes, hardware, hand rails, services, access and parking. Each floor shall incorporate a toilet for the disabled for each sex unless the University agrees otherwise. (Separate access unisex toilets may be considered.) Building entrances shall normally be at ground level without steps or shall be accessible by way of ramps at the required gradient. (The maximum gradient is 1:12 but where circumstances permit a gradient of 1:15 is to be sought.)

B.5 Confidentiality & Copyright

To protect copyright or potential security relating to the University's buildings, all plans and specifications lodged with the Territorial Authority are to be marked "Confidential". In this way, the TA can be expected to refer any enquiry from a member of the public for access to our plans to the University.

Unless otherwise agreed to, the intellectual property/copyright in all drawings, specifications, reports, software and other material prepared by the Consultant for the purposes of carrying out any project for the University shall, upon creation, be owned by the University. The Consultant must also confirm that all intellectual property rights prepared or created by the Consultant in carrying out the services for the University will not infringe the intellectual property or other rights of any third party. The ownership of data and factual information collected by the Consultant shall, after payment by the University, lie with the University.

B.6 "For Construction" Drawings, Marked-up Elevations and as-built services plans

The Consultant is to supply a copy of elevations at the conclusion of the contract, marked up to indicate the colours used for all painted and special finishes. These colours must reference to British Standard colours and must include internal and external finishes.

The Consultant is responsible for designing and specifying all work associated with the project and all costs, inclusive of all service connections, all roading, paving, street lighting, landscaping, signs etc required to service the project whether included formally in the contract or whether arranged by others. Such "for construction" drawings are to be marked up, either by the Consultant or Contractor as agreed, to reflect all changes made during the construction phase and delivered to the University at handover as "as built" records. In particular, these details must indicate all underground service locations to the standard required by the University.

See also Section K.1.

B.7 Original Documents

The Consultant is to ensure that the original documents of all Building Consents, Resource Consents, Building Certificates, Code Compliance Certificates, Compliance Schedules, Statements of Fitness, As-built Drawings, Maintenance Manuals, Guarantee Certificates, Warranties, Technical Schedules, etc. are lodged with the FMD Project or Job Manager in order that they can form part of the University's record of the project. These will generally be bound into the Operations & Maintenance Manuals and other As-built documentation.

B.8 Design Drawing Formats

All original hard copies of drawings are to be in A1 or A2 format, with A3 only used for small details or reduced-size prints.

All 'for construction' and 'as-built' drawings are to be made available to the University in hard copy as well as electronic format, the latter being in Autocad 2013 or later format.

When 'for construction' drawings are issued an electronic version must be handed over to the University Job Manager at the same time. The Job Manager will exercise a preference for full-size or reduced size copies of the drawings.

'As-built' drawings are to be similarly handed over in electronic format at Practical Completion along with one full-scale hard copy of all drawings (for Drawing Office records) and two A3 reduced size copies which must be included within the O&M Manuals.

B.9 Architectural & Urban Design Control

The Capital Asset Committee, a committee of the University Council, has overall responsibility for control of the appearance of the grounds and buildings. The University has a preferred Urban Design Advisor to develop an overall plan for the campus. This plan gives the guidelines which any development should comply with and all major building or infrastructural projects must be planned in conjunction with this urban design plan and in consultation with the University's specialist advisor. The Urban Design Advisor will assist with

setting broad architectural guidelines for each building, details of which will be conveyed to project Consultants within the brief.

The urban design concerns may include the site of a building, its main approaches, points of entry and access to roads, paving and parking, its bulk and its relation to adjacent buildings, its visual impact from all aspects, including surface treatments and colour schemes.

The Consultants will be given the opportunity of meeting the Urban Design Advisor to discuss project sketch designs as required. The Project Manager will ensure that such meetings are held as required.

Sketch plans including elevations will only be approved by the Capital Asset Committee after they have been seen and approved by the Urban Design Advisor as conforming to the accepted standards and aims of the approved campus site plan.

Full details of the approach adopted by the Consultant to energy conservation and efficiency must be included in the design reports prepared for the project. See **Appendix 1a-1d** for details.

B.10 Access Roads

All major contracts are to require the Contractor to clean up roads at regular intervals to ensure there is no mud or dust nuisance emanating from the site. This should happen on at least three occasions - after the main excavation work, at say mid contract (assuming long term contract), and at the end of contract. Regular dousing with water of all roads that carrying site traffic to reduce the transfer of dust particles must also be specified. Precautions must be taken to ensure such cleaning or dousing does not lead to unwanted material entering the campus drainage system. Where there is a possibility of discharge into any drains, the Contractor must provide filtration of mud and silt to prevent it entering the drainage system. In any case, the responsibility of the Contractor to maintain clear and clean access for University's purposes is to be emphasised. Contract conditions must be inserted which require the resurfacing or rebuilding of any roads which become distressed or badly damaged during the construction period.

B.11 Flood protection

The Contractor is to provide protection of the building work on the contract site against incursion of water from within the site and from adjoining sites, and is to prevent the flow of water off the contract site onto others. Collected water is to be discharged to stormwater drains or other approved points, clearly marked by the Consultant and approved by the University. Where discharging into drains, the Contractor must provide filtration of mud and silt before discharging. Specific approval must be obtained for any area used for the flushing out of concrete delivery trucks. The contractor must remove and make good all temporary works upon completion.

B.12 Noise and other disruptions

A description of the University's activities as a teaching institution is to be stated clearly in the contract document, with the requirement that disruption of the University's activities by excessive noise, or other activities of the Contractor is not allowed. Particular care is to be taken during examination times. Appropriate advance consultation with the Project Manager over activities likely to disrupt the University is required. In general, it must be assumed that the use of radios is not permitted.

Suggested clauses for inclusion in the contract documents are attached as **Appendix 2a**.

B.13 Sexual harassment

The following clause is required in all specifications and contracts:

The Contractor shall exercise proper control of all workers, and persons on the contract site and general University grounds including those of the subcontractors and suppliers to the contract.

The Contractor shall ensure that all workers, subcontractors and suppliers working on the University's site are aware of and shall abide by the University's policy and attitude concerning sexual harassment. In particular, the Contractor shall ensure that "cat-calls", "wolf-whistles", display of offensive pictures, posters, graffiti or

written messages and insulting, objectionable or derogatory comments or gestures are not directed at students, University staff or other campus users.

The Contractor shall co-operate fully and promptly by investigating a formal complaint of sexual harassment from the University and shall provide a report within 3 working days on the appropriate actions taken. The University may treat the Contractor's failure or neglect to do the above as a wilful breach of contract.

The University's Job Manager may instruct the Contractor to refuse access to the site by any offenders. The instruction or any other act taken under the terms of contract by the Job Manager shall not relieve the Contractor from any obligations and liabilities under the contract.

The Contractor shall have no claim for any loss or expense or extension of time as a result of possible action arising from complaint of sexual harassment during the course of the Contract and the Maintenance Period.

Contractors are advised that both the Hamilton office of the Auckland Provincial Employers Association, and the Co-ordinator from the Waikato Trades Union Health and Safety Centre (34 Harwood Street, or P O Box 9058 Hamilton), have resource personnel available to assist in these matters.

Tenderers are asked to confirm in their tender that they will use these resources, should a complaint of sexual harassment be made involving persons on the contract site.

B.14 Builder and Consultant Sign

A combination sign for the contract duration at the University's entrance is not to exceed 2400 x 1200 and is to be sited to the specific approval of the University. Signage is to be maintained, moved as required and removed upon completion. The area where the sign was erected should be made safe thereafter.

B.15 Contractor's Site Supervision

The project specification must state that the Contractor appoint a full-time site supervisor and appropriate foreman/manager.

B.16 Site Fences

An adequate fence delineating the contract site is required. The particular form of it depends upon proximity to other buildings, student traffic routes etc. The Contractor is to maintain, move as required and remove upon completion. The Contractor must make good all damage to landscaped and grassed areas.

Depending on the location of the site it may be appropriate to specify that the site fences comprise rigid materials such as plywood. In certain instances it may also be relevant to allow these solid panels to be used for student notices, placards, etc. The possibility of this must be resolved with the Project/Job Manager prior to tender.

B.17 Parking

All Contractors are to use the parking areas as designated – use of named parks or those marked for “Visitor” or “Res” may result in wheel clamping. No parking on grassed areas will be permitted, unless specifically approved, and in which case detailed requirements for reinstatement/rehabilitation must be met.

Vehicles must not be parked in any position which limits access by emergency services vehicles to any of the University buildings. See also G.7.

B.18 Bi-cultural nature of the University

New Zealand is officially a bi-cultural country and the University of Waikato has for many years embraced elements of bi-culturalism. In any significant construction works on the Hillcrest Campus, consideration must be given to how this bi-culturalism can be manifested. In particular, building forms, outward identities and landscaping areas should attempt to reflect this bi-culturalism. In all cases of significance, this aspect will need to be more explicitly discussed with the Consultant during the briefing and design processes. During the

design process it may be necessary to engage with a specific user group tasked with addressing Maori and bi-cultural issues.

B.19 Contingencies, Increased Costs and Savings

B.19.1 Contingency allowance

In the documents prepared by the Consultant for final approval of the project by the University, a sum totalling at least 5% of the contract sum shall be included in the estimates for the project to cover the costs of contingencies. In the case of alteration works, this amount may be increased to 10%. This amount will appear in the project budget but is not to appear in the tender/contract documents. Expenditure against the contingency allowance will only be authorised by the Project Manager.

B.19.2 Notices to Contractor, Architects Directions and Variation Orders

The Consultant shall maintain a system of "Notices to Contractor", "Architect's Directions" or "Variation Orders" during the course of the contract, with the intention of giving instructions to the Contractor concerning the running of the project and covering any changes which might be required for its proper execution. Where these changes affect costs, the Consultant shall take proper steps immediately to consult the Project Manager for approval. A copy of every Notice to Contractor, Architects Direction or Variation Order shall be forwarded to the University as soon as possible after being issued, preferably in electronic format.

With the specific approval of the Project Manager, the Consultant may be authorised to instruct the Contractor in accordance with ordinary contract management procedures for variations required to maintain the integrity of the project (ie. the building/project will not function as intended without the change.) However, the Consultant shall include an approximate cost of the variation on the University's copy of the Notice/Direction/IOOrder.

B.19.3 University approval

University requests or Consultant's recommendations or variations other than those required to maintain the integrity of the building, shall be subject to approval by the Project Manager, who ordinarily will require an estimate of costs of the proposed commitment, before authorising the work.

Note that when a "University department", during the course of construction, seeks a variation to the project not part of the original brief or authorisation, the Project Manager has the option of approving of it from within the 5% contingency provision or referring it for approval to higher authority (the Head of Facilities Management or the Vice-Chancellor). Where, in the opinion of the Project Manager, the cost or scope of a proposed variation is exceptional, this too shall be reported for approval to higher authority.

B.19.4 Variation Price Requests (VPR) to Contractor

Clauses must be inserted into the Special Conditions setting out the conditions under which VPR's will be issued. It is essential that all parties clearly understand the need for VPR's to be in writing and that no costs will to be borne by the University unless the VPR is followed up by a written Variation Order.

B.19.5 Value Change Proposals (VCP) by Contractor

As a method of encouraging initiative, collaboration and reduced costs, the concept of a VCP may be advantageous to the project.

Details of a possible clause which can be inserted into the Special Conditions of Contract are given in **Appendix 2b**.

B.19.6 Increased costs

Generally all contracts are to be fixed price ie. no rise and fall clause. In certain special cases, provision for increased costs (also termed "fluctuations" or "inflation costs") may be allowed for in the contract documents of larger contracts. The need for this provision may arise because of the increased costs of labour arising from award rate increases, from merchants price list increases or from similar special circumstances. The need for

such a clause must be discussed and agreed to by the University prior to inclusion, its conditions must be agreed upon and the costs shall be allowed for over and above the contingency fund, as a separate item.

B.20 Permanent Signage

B.20.1 Standard Sign System

The University has established a standard style and pattern of informational and directional signs on the Campus generally. The fundamental principles of this system are to be incorporated in the sign scheme for new buildings. The Consultant is to refer to FMD for all signage details.

B.20.2 Building Identification Required

The external design must allow for the building to be appropriately named on the exterior.

B.20.3 Internal Identification.

The interior design must allow for a changeable lettering directory in the main foyer(s).

B.20.4 Internal Door Signs

Informative signage is to be provided to selected doors and all rooms are to be numbered. Generally such signs are provided on the upper left quadrant of the door when facing into the room. Signs may be formed of directly-applied vinyl or vinyl on acrylic mounting strips. All signs of the latter nature are to be screw-fixed, not glued.

B.20.5 Fire Exits

Signs in accordance with the code are required.

B.20.6 Accessible Signage.

Signs in accordance with the code are required.

B.21 Building Completion & Defects Maintenance

B.21.1 Building Defects Maintenance

The maintenance period for building trades is to be six months on larger contracts. The maintenance period on electrical and mechanical services will be 12 months. Representatives of the Building Maintenance and Technical Services sections of the University's Facilities Management Division are to be invited to assist the Architect and engineers with the survey and compilation of the defects list. This service will be provided free.

B.21.2 Pre-completion Inspections by Maintenance Staff

Apart from the obligation of Contractors and Services Consultants to instruct the maintenance staff in the use/operation of the new plant and equipment (as described elsewhere in this document), it is most helpful to the maintenance staff if they can view the installation(s) prior to "closing in".

The Consultant and Contractor should therefore liaise closely with the Project Manager for a pre-completion inspection of the works prior to the installation of ceilings, wall panels, etc which will hide the various items of mechanical/electrical plant/services from view.

B.21.3 Re-inspection Costs

Where the Contractor advises at any time that work is completed and/or ready for inspection, and there is found to be outstanding matters requiring re-inspection, the Contractor will be liable for all costs associated with any subsequent re-inspection. This reference to inspections is to include any shop drawing or other inspections required in the documents.

If re-inspection or costs arise (under NZS 3910 or NZIA, whichever is being used to govern the contract), then the contractor will be advised of the cost (or estimated cost) that will result. The costs will be met by the University, and a like sum deducted from the contract. Any dispute of this cost or its amount must be raised within one month of such advice of cost (or estimated cost).

B.21.4 Building Act Compliance – Proper Maintenance Records

Contractors are to ensure that the requirements of the new Zealand Building Code with respect to IQP maintenance and inspections are undertaken and met during the contract maintenance period in order that a Certificate/Warrant of Fitness can be issued at the end of the period. The University has been severely criticised by the Territorial Authority in the past for its failure to ensure adequate compliance with the Building Code during, and immediately subsequent to, the maintenance period. The Consultant is therefore to ensure that the matter is fully addressed in the contract documents and that the University's IQP Inspectors are involved in setting up systems which will ensure compliance.

The Contractor is therefore required to nominate a place on campus, where all records pertaining to the building features are to be kept for inspection.

Any Consultants or Contractors who are unfamiliar with the Certificate/Warrant of Fitness requirements are to obtain timely clarification from the Project Manager or Technical Services Manager.

B.22 Operating & Maintenance Manuals

In addition to the items detailed above, the following are to be provided to the University on completion of the construction contract.

Two (2) copies of operating and maintenance manuals shall be provided for all finishes and services, unless more copies are specifically requested. These properly bound manuals shall include but are not limited to:

- guarantee and warranty certificates
- colour schemes
- operating instructions and technical schedules
- maintenance instructions and programmes
- supplier information
- hard copies and electronic copies (AutoCAD 2013 or later format) of all as-built drawings (see clause B.8 for specific requirements)
- control and electrical plans shall be complete with terminal numbers corresponding to wiring ferrules and shall be cross-referenced as required.
- commissioning data, set points, flow rates, timer settings etc.
- contact names, addresses and telephone numbers of consultant and contractor involved.

Draft versions of the manuals are to be provided on or before the date of issue of the Certificate of Practical Completion. These will be for review by the University and the Consultant.

Final versions of the manuals must be provided within one month of the return of the draft manual by the Contractor to the Consultant. No final retention monies will be released until these documents have been approved by the Consultant and received by the University.

B.23 Miscellaneous Items

B.23.1 Raised floors and platforms

Generally these would occur in teaching rooms or in IT/machinery rooms and are to be avoided wherever possible. If a requirement for such is suggested, detailed consultation is required to confirm the exact form of provision.

B.23.2 Furniture in offices

The University has a preference that standard joinery in the form of adjustable book shelves with under cupboards be provided in rooms. There are some difficulties over detailing quantities room by room and it will

be important to study the module to be used. As the varnished native timber used previously is likely to be unavailable, the Consultant is asked to investigate and advise on alternatives. Options may be, for example, customwood with special paint finishes, or custom-built units ordered from a specialist manufacturer.

B.23.3 Maori Ceremonies

A ground-breaking ceremony will be required prior to commencement of construction for a new building and a blessing ceremony will be required prior to the building being taken into service. Carvings or sculptures may be required to form part of the building or could be placed near the main entrance. Full details should be discussed with the Project Manager.

B.23.4 Asbestos

Contractors should treat all cement and vinyl sheeting used in pre-1980's buildings as containing asbestos. Asbestos fire rated materials were commonly used up until the 1970's for packing or fire insulation around piping in ceiling space wall penetrations. Contractors working in ceiling and roof spaces should assume that unless indicated otherwise, any existing packing or insulation materials around piping is contaminated with asbestos, and these materials should not be disturbed without the written permission of the Consultant. The removal of asbestos must be dealt with as required by current regulations. An Asbestos Register is available upon request.

B.23.5 Waste Minimisation Procedures

The Contractor must adopt a waste minimisation programme with the specific objective of reducing the volume of construction waste disposed to landfill or cleanfill. A site-specific waste management plan must be developed and submitted to the Architect for approval at the commencement of the contract. The plan should be in keeping with the Hamilton City Council's REBRI scheme guidelines.

The Contractor must at all times comply with all statutory and regulatory requirements that relate to the disposal of toxic and non-toxic materials and must ensure that all sub-contractors comply likewise.

B.23.6 Establishment of a Waste Management Area

The Contractor must establish a single area on site for the separation and storage of waste prior to recycling or disposal to landfill. To encourage the re-use of offcuts and minimise material wastage the Contractor must establish central cutting areas for timber etc. Specific requirements for the waste management area include:

- a) Establish a single waste storage area with sufficient space for 5 steel skips to contain the various waste streams – cardboard, timber, steel, gib board, residual to landfill.
- b) Provide rubbish sacks or bins to handle plastic (recyclable and non-recyclable separately) and paper.
- c) The area is to be secure and be easily accessible to all trades and sub-contractors as well as the waste removal vehicles.
- d) All bins are to be clearly labelled and the general area is to be cleaned up at least weekly as part of general housekeeping.
- e) The Contractor is to train all sub-contractors in the principles and practises of waste minimisation.
- f) The implementation of the waste management plan is the responsibility of the Contractor's site manager.

B.23.7 Digital Pulse Output Metering

In order to have the ability to centrally monitor and manage the use of piped services, the University is desirous of installing digital pulse output meters wherever appropriate on all major services.

All electricity, gas, water being supplied to any new major facility should be metered using equipment that is capable of communicating with the building management system (BMS) by way of a digital pulse output connection.

B.23.8 Smoke Free Campus

From 1st January 2014, the University of Waikato campus became smoke free. This ruling will also apply to all contractors and their staff who are deployed on the university campus. The Knighton, Hillcrest and Silverdale road reserves are not subject to this ruling.

Section C – Carpentry, Joinery, Roofing & Related Trades

C.1 External – Walls, Windows & Roof

C.1.1 Total life cost of the structure

The exterior envelope of the structure must take into consideration the total cost over the life of the structure. To this end long life and low maintenance products must be considered in preference to products which may have a low initial cost but which will require extensive maintenance in the long term.

C.1.2 Building insulation

The insulation of the floors, walls and roofs of any structure must be designed to current best practice. This includes general insulations levels, avoiding cold bridges, eliminating comparatively cold areas, pipework insulation, optimised window:wall ratios.

C.1.3 Weather protection

All external doorways, entrances and porches shall have protection from the weather. Facade staining must be avoided by careful design and detailing to shed water clear of the building, clear of lower level projections and clear of pathways.

The exterior building envelope must be designed to incorporate long life products which will minimise the maintenance requirements for the building over its lifetime.

Any sheet cladding materials are to be designed, specified and detailed in strict accordance with the manufacturer's recommendations.

C.1.4 Discouraging vermin & pests

The external fabric and features of all buildings are to be designed to discourage:

- The ingress of vermin such as rats, mice, possums - to this end no holes or openings greater than 10mm diameter anywhere near ground level are permitted.
- The perching or roosting of pests such as pigeons and other birds - this means that ledges and recesses are to be avoided wherever possible.

C.1.5 External Steelwork – Structural and Decorative

Because metals in the external environment can give rise to a high maintenance load, durable products are essential. Where possible or practical, stainless steel (grade 316) is to be used for structural and decorative elements as well as all fixings. The next best solution is using hot-dipped galvanised steel or some other durable metal such as copper. Where none of these solutions are possible then steelwork protected by specially-designed coatings will be considered. In all cases the protective coatings are to be applied by experienced and expert tradesmen and any steelwork which is damaged on site must be immediately treated to restore the protective coating.

It is essential that galvanic corrosion is to be prevented between dissimilar metals.

C.1.6 External Timber Features

Whilst the use of timber on the exterior of University buildings is not encouraged, there are a number of locations where natural timber is used as a feature, usually in the form of carved or sculptured panels. These features are to be treated with specialist products which must be approved by the University prior to incorporation in any specification. Plantation-grown timber only is to be used, unless by special arrangement with the University.

C.1.7 Windows

A small amount of natural ventilation into a room in conditions of high wind (without papers and curtains, etc being violently disturbed) is desirable. Solutions which may be adopted include providing a specially notched window stay, hoppers, trickle ventilators, etc. Windows are to be flashed on all four sides.

Those windows that are accessible from either the ground or a platform should have adequate security measures installed. Consultation on this should be made with either the Building Maintenance Manager or Security Manager.

Avoid the following window design features:

- timber construction of any kind,
- light weight aluminium construction akin to domestic joinery,
- high level opening windows, for which the opening controls are ordinarily inaccessible from floor level.

The University generally favours a window comprising a lower level "hopper" type window, opening inwards, and/or an upper level "fanlight" type window opening outwards. The main windows should be an "awning" type opening outwards, except where a hazard exists to adjacent walkways.

Where possible, sun control devices should be detailed to allow for window cleaning and other maintenance.

Toilets and similar spaces should be naturally ventilated wherever possible.

Where facades are extensively glazed cognisance shall be given to cold radiation and down draughts. Consideration should be given to the fitting of double glazing special glass to reduce heat and light transfer.

Confirm with the University Security Manager whether any of the glazing beads need to be installed from the reverse side for security reasons.

C.1.8 Roofing

Roofing shall be 0.55mm galvanised steel for flashings and 0.75mm for roof sheet material (long run, etc). Trough section roofing shall be minimum 0.75mm thickness unless agreed otherwise. Thermal insulation strips are to be used where there are steel purlins. Concealed fixings are to be used wherever practicable: drilled, screwed, rivetted fixings ie. any fixing method which punctures the waterproofing layer is to be avoided. All flashings should be primed on the underside with an approved oil based galvanised primer prior to installation. All fixings and steelwork installed externally or near water shall be hot dipped galvanised or stainless steel. Painting shall be included in the contract and where possible use should be made of pre-painted material, touched-up on site after installation. Refer to FMD for appropriate colour schemes. The use of dark colours which encourage heat gain is to be avoided.

Essential roof and wall penetrations for services and safety anchors are all to be sleeved with an appropriately shaped sleeve, fixed or bonded to the main roofing. The penetrating cables, pipes etc are on no account to be directly bonded to this sleeve but, due to thermal expansion or other cause, must be allowed to move differentially. This is particularly important with PVC pipes. An overflashing with generous overlap is to be detailed to maintain weathertightness. In such situations, the use of silicone as the primary means of waterproofing is unacceptable. Through walls, penetrating services must be inclined downwards on the outside to ensure water run-off.

C.1.9 Roof Drainage

This should include emergency outlets to avoid the risk of flooding if the outlets, gutters, downpipes or drains become blocked. Valley and hidden gutters are to be avoided if possible or designed to preclude any water entering the building. Such emergency discharge points are to be easily visible. Overflows should be at the high points of any internal gutters and they should be at a level least 50mm below that where water can enter the building. All gutters are to be sized and sited to facilitate easy access for regular cleaning and maintenance by hand.

C.1.10 Roof Access & Maintenance anchor points

The Consultant is to make provision for access onto the roof as well as anchor points to facilitate any maintenance work on the roof, gutters, windows, facade panels, etc. The system which is installed for the safety of maintenance staff must conform to the requirements of the Building Code. See **Appendix 4**.

Any area of roofing more than 3.5m above ground level must be provided with access for maintenance and repair via an access hatch/door/window or permanent galvanized steel ladder. A galvanized steel or aluminium platform, preferably not fixed through the roof and minimum 1 sq.m in area, must be provided at all step-out points on to roofing. Consideration must also be given to providing a walkway to, and around, all major roof-mounted plant/machinery.

C.1.11 Roof Washing

On higher level roofs where a supply is not conveniently located elsewhere, hose bib taps should be provided to enable regular washing of colorsteel or similar roof sheets. These are to be suitably located (generally therefore at roof level) to permit effective wash-down of the roof with a 30m hose.

C.2 Internal – Walls, Finishes, Curtains, Blinds

C.2.1 Internal Walls

Consideration is to be given to use of heavyweight internal finishes as this will assist in thermal control of internal environment, particularly where natural ventilation is employed. Where gib-board is used on walls, this should normally be 13mm.

C.2.2 Finishes

Corridors and public spaces generally get hard use. Only quality brands of paint, such as Dulux, British Paints, Taubmans, Resene, Wattyl and the like, shall be used. A single brand of paint shall not be specified without the agreement of the Job Manager in each case. The most commonly-used paints on campus are made by Resene.

NZ Standard colours are to be used throughout, and no boxing, tinting or special mixes of colour should be permitted. FMD can advise on an appropriate Paint Colour Scheme, and the Consultant is to provide a colour board for FMD's prior approval. Painting contractors shall provide an "as built" schedule of finishes upon completion of their work and before final payment.

The University requires a wearable surface with a good degree of acoustic treatment for sound attenuation and lack of reverberation. If a good wearing semi-gloss paint is used, plaster or gibraltar board would be satisfactory. Special attention should be paid to the corridor corners and edges, by fitting suitable corner protectors on all corners and edges in well-used areas, from floor level to a height of at least 1 metre.

The use of lighter colours for maximum light reflection is encouraged.

The general colour scheme for internal timber doors is: doors are either to be finished in rimu veneer with clear varnish or painted with a durable enamel paint. However, for identification purposes, doors to toilets are to be painted Resene Astronaut or equivalent. Doors to service areas (e.g service ducts, cleaners cupboards, comms rooms) are preferably to be painted to match surrounding wall finishes and thereby be least visually obtrusive. Deviations from this colour scheme should be discussed with the University's Buildings Maintenance Manager prior to a final decision,

Fire-rated finishes are to be used on egress routes as required by the Building Code, including curtains, drapes, carpets, etc.

C.2.3 Native timbers

Native timbers are only to be used in locations which have been specifically approved by the University's job manager for the project. If used they are to be coated in a clear varnish -- Satin or Semi-gloss finish is preferred. Refer to the University's paint colour scheme.

C.2.4 Sound Attenuation

Careful attention should be paid to transmission of sound between rooms, and from corridors into adjacent rooms.

There are a number of buildings on the campus where unsatisfactory sound transmission situations occur and similar situations are to be avoided on all future projects. The Consultant must be prepared to discuss and defend his proposed construction procedures for adequate sound attenuation characteristics between rooms.

Sound Transmission Class ratings are as per the table below:

Acoustic Separation Category	Acoustic Rating of Partition (STC)	Likely Installed Performance (STC)	Subjective Performance
STANDARD	40 (ave of 35 if significant single glazing used)	30 - 32	Some speech privacy for conversational voice. Raised voice intelligible. Suitable for partitions with non-specific acoustic requirements
MODERATE	48	37 with no ceiling baffles 40+ with a ceiling space barrier	Medium – good privacy for conversational voice. Some words of raised voice may be intelligible. Suitable for enclosed rooms where a level of speech privacy is required
HIGH	52	45	Good speech privacy even with raised voices and quiet background. Good isolation of medium noise level activity. Medium security. Suitable for rooms where confidential discussions often take place.
ISOLATED	58	45+	High level of speech privacy with raised voices. Good isolation of structure-borne noise associated with pipework or wall-mounted equipment. Suitable for use around service areas and between kitchens/toilets/etc and occupied spaces.

All internal walls should have a rating of at least STC 40 unless expressly agreed otherwise.

The rating of walls between adjoining teaching spaces should be maximised.

All internal glazed walls are to use Pilkington 9mm 'Hushglass' with STC rating 38

Teaching/meeting rooms to preferably be STC 45. Some use may be made of Autex Vertiface Composition panels to improve rating.

Noise from toilets, toilet waste pipes, water supplies is to be avoided or minimised by isolating pipework from structures, lagging, providing additional walls and doors, limiting liquid velocities to 1m/s, etc.

Lift shafts are to be appropriately constructed to limit transmission of noise to adjacent rooms.

All mechanical plant installations are to be fitted with appropriate ductwork attenuators, anti-vibration mountings, etc to eliminate any transmission of noise into adjoining occupied spaces.

Reference may also be made to BRANZ leaflet 180.

C.2.5 Pinboards

Areas for displays, posters etc are normally essential. In the past fabric-covered "pinex" boards were used for large pinboards on walls, but in all appropriate locations this is being replaced by the use of Autex Vertiface Composition. FMD can advise on preferred colours. This product is stuck to the un-painted wall and finished off with aluminium angle trim as appropriate. The use of pinboards may still be considered where consistency with adjacent areas needs to be maintained or if it is advantageous to recycle existing FMD stockholding.

Door pinboards 300 high across the full door width may be provided to selected doors, primarily office doors. These pinboards are to match the door signs. Refer to FMD's Sign Manual for guidance.

C.2.6 Curtains and Blinds

Black-out blinds may be required in teaching rooms – each case is to be considered independently. Where blinds are required in offices, metal heavy duty slimline venetian blinds are to be used. The use of curtains is generally to be avoided unless approved by FMD.

C.2.7 Internal Joinery

All internal joinery which may be subject to periodic wetting (such as Science laboratories) must have the ends of all shelves and work tops properly sealed against moisture ingress. Alternatively marine ply cores must be used instead of particle board or customwood to obviate swelling of the material when repeatedly wet. All Science or Wet area fixed units are to be levelled on adjustable feet and the plywood toe space is to be scribed to the floor ready to take coved vinyl. Where piped services are run within the units, a drainage tray is to be detailed under the pipe work to channel any leaks to the outside of the unit.

As cleaners usually wet-mop all the vinyl floors on a weekly basis, the design of all joinery and flooring in these locations must receive special attention, either by the use of ply cores or by coving and welding all flooring.

Hinges and hardware on internal joinery must all be designed to withstand periodic wetting as well as heavy usage.

In areas where trolleys and such equipment is utilised, edge protection must be provided to all fixed joinery, doors and their frames, etc.

C.3 Ceilings & Ceiling Finishes

Ceilings are to be suspended acoustic tile (refer to **Appendix 4**), or similar approved. Solid or gib board ceilings are not favoured. The suspension system of any suspended ceiling must provide adequate support to the ceiling panels on all sides of the panels. (To illustrate what is not required, the University Job Manager can point out several poor and good examples on the campus if necessary). Sufficient ceiling space is to be allowed for the proper installation of piping (water feeds, gas, drainage, foul sewers, sprinklers), ducting (ventilation) and cabling (electrical, mechanical, communications, computers.) Services drawings are to be sufficiently detailed so that “pinch points” can be identified. Allowance must be made for sufficient access points to services within the ceiling space and the location of these services must be indicated on the T-sections.

C.4 Use of Timber Preservatives

The following methods of timber preservative are listed in order of preference. Contractors must be obliged to use the most preferable method of preservative in any given situation.

1	Plantation timber which requires no treatment
2	Boron salts for H1 hazard ratings in all locations which are protected from the weather
3	CAF – Copper-based Chrome and Arsenic-free treatments, such as ACQ, where H3.2 and H5 hazard ratings are identified
4	LOSP – Light Organic Solvent Preservatives where H3.1 treatment is required - is only acceptable with prior approval from the Architect.
5	CCA – Copper-Chrome Arsenic treatments where H3.2 and H5 hazard ratings are required – may not be used without approval of the Architect.

Kiln-dried radiata pine treated with “TimberSaver” Boron (T1.1 or T1.2) is not an acceptable alternative and is not to be used under any circumstances.

Brush-on or spray-on treatment is not acceptable.

All nail and screw fixings into CCA, ACQ and CuAz treated timber must be grade 316 stainless steel and not galvanised, regardless of location.

All bolts or fixings into H3.1 or H3.2 or H5 treated timber must be grade 316 stainless steel and must be thoroughly greased to prevent corrosion.

C.5 Service Room Specifications

C.5.1 Plant Rooms

If required, please consult in detail over location, layout, size, etc. Other factors to be considered in the design of these facilities are ventilation, lighting, location of electrical switchgear and access.

C.5.2 Communications closet

It is essential that the input of the University's ITS Division is obtained prior to the sizing and siting of any communications closets. In general, the minimum size room is 2.0 x 2.0 m, with double doors opening outwards, and a thermostatically controlled extract must be provided. A suitable floor or door grille will be required for make-up air.

Where there is more than one comms closet and/or server room in a building, power should be supplied directly from the main switchroom through an external UPS bypass unit. Details of the design and layout must be resolved with the University's Technical Services Manager.

Section D – Doors, Hardware & Locks

D.1 Doors – General Note

Of all single building elements, doors give the University its greatest number of maintenance problems. It is therefore of prime concern that these features receive the appropriate amount of attention. Heavily used doors must be built and finished to withstand that use. Simple paint or varnish systems are considered inadequate. Some doors are severely affected by the wind, slamming shut, slamming open, or being generally difficult to handle, and the design of a doorway should take this into account. Some wooden doors have been unsatisfactory because of damage in high wind conditions and their inability to withstand "heavy traffic". Design shall take particular care to prevent these problems (eg. Joints shall be haunched through mortice and tenon.) The painting/finishing of internal doors is detailed above.

D.2 External Doors

External doors, recessed into the building (eg Block A basement) are successful. Mat wells are not to be provided and all-weather floor coverings are to be provided at all building entries (See also Floor Coverings). Door sills shall be negotiable by persons with disabilities. Note NZS 4121 reference to 36N force to open doors. Glazing should comply with NZS 4233, Parts 1, 2 & 3. Major entrance doors should be automated. They must also be provided with suitable flashing above. Solid core wooden doors are not to be used in external locations – aluminium is the accepted material. Examples of external doors which meet the expected standard are to be found in I, J, K Blocks. See also Section H – Security & Electronic Access

D.3 Closers

Door closers that can be negotiated by the weak yet resist the forces of wind are required. A high standard of quality is demanded. The closer should be protected from the wind and weather by overhangs or by recessing doors into the building. Heavy doors must be equipped with closers appropriate to their size, weight and location. Details of the proprietary door closer which the University uses on external doors is given in **Appendix 4**. To assist the University with the ongoing maintenance of door closers, serious consideration should be given to requesting the University's carpentry staff to assist the Contractor in establishing the correct fitting of the door closers. A template can be provided by the carpentry staff and the fitting of the initial closer should become the benchmark for all others. This service will be provided free of charge to the Contractor.

D.4 Aluminium Doors

Any aluminium doors should be constructed in commercial, heavy cross-sectional aluminium to obviate problems which have been experienced in the past. Stiles, middle and top rails are to be of 100x40mm section and bottom rails are to be of 150x40mm section. Aluminium doors with narrow stiles are only to be used where expressly approved in each instance. Stiles are to be bolted through the bottom and top rails with a full-length threaded rod, and if a narrow stile is used, it must accommodate a 30mm backset latch. Packing is required between jamb liners and framing with substantial packing at lock height to prevent unlawful entry.

D.5 Internal Doors

The construction of certain smoke & fire rated doors has caused continued maintenance problems, and needs close attention. Our experience is that guarantees are useless - good initial design is essential. All vision panels on smoke & fire rated doors should not exceed 0.065m² per door leaf. The preferred panel size and location is to be confirmed with the University's Buildings Maintenance Manager. All smoke & fire rated doors should achieve a rating of -/30/30 (Sm) or -/60/60 (Sm) respectively. The insulation factor must not be compromised by the introduction of larger or more than one vision panel per door leaf. If the design is to have more than one vision panel per door leaf, special fire rated insulated glass must be fitted to achieve the -/30/30 (Sm) or -/60/60 (Sm) smoke & fire rating. Unless specifically stated otherwise all internal doors shall be solid core. See also Section H Security & Electronic Access.

Door sizes and thicknesses – Every effort should be made to provide 860mm wide doors to facilitate movement of people, equipment and furniture. For doors up to 900mm, 38mm thickness is adequate but larger doors should be 48mm.

Internal double doors to be on door closers – details of the closers to be used are given in **Appendix 4**. Where double doors are installed, their closing edges should not be rebated. If they open one way only, engraved push & pull signs are to be fitted. Push plates and pull handles should be judiciously selected and utilised to provide intuitive action by users. Provide glazing on all corridor double doors and small glazed panels on all lecture room doors. (In this regard take note of the University's preferred sizing and location of vision panels in Fire doors).

Double doors to seminar rooms should be detailed similarly to those in Science, Block F 1st floor. These door jambs are not rebated and they feature seal thresholds. Single doors to offices etc should be similar to those in blocks I, J and K. They feature a small pinboard, a vinyl kickplate, and generally adequate construction all round.

Some smoke/firestop doors may need to be held open on release sensors (to close automatically in event of fire or when released by University Security)

D.6 Hinges

Hinges to doors must match the door weight.

Aluminium doors to have 5 hinges in total -- double hinges at the top (150 mm down from the top and 50 mm apart), a bottom hinge 150 up from the bottom edge and the other 2 hinges spaced equally in the gap between the upper and lower hinges. Solid core doors to heavy use areas to have 4 hinges in total -- double hinges at the top, a bottom hinge 150 up from the bottom edge and one in the middle between these. Stainless steel hinges of the ball-bearing type are to be used on all entrance and main internal doors (eg laboratory, lecture theatre, toilet, smoke-stop and fire doors) Further details are given in **Appendix 4**.

D.7 Hardware

Before detailing, please note specific requirements for hardware in **Appendix 4**, i.e. closers, finger plates, kick plates, push/pull signs, coat hooks, doorstops, tower bolts, cabin hooks or other hold open devices and edge protection (in areas where trolleys are used.)

Door handles and pushplates on doors in main thoroughfares should be intuitive so the direction of opening is obvious.

D.8 Locks and Masterkeying

The electronic access control to buildings is described under section H.2.

This section covers the locking and keying systems which are required for individual spaces and rooms within buildings.

D.8.1 Manual Locks and Keys

See **Appendix 4** and D.8.2. below, but generally provide Legge Pacific 990 series. Allow for master keying of locks by Chubb Ltd Hamilton to MLA profile. Full details will be provided when necessary. A keying schedule will be drawn up by the University. Builders construction keys are to either be master keyed, or keyed alike. LOCKWOOD 950 930 KEY IN LEVER LOCKSET is not approved or suitable for use in any circumstance.

D.8.2 Electronic and Card/Fob-controlled Locks

The electronic locking system which has been installed recently in College Halls has proved to be very cost-effective, robust and flexible.

This form of locking and keying is the preferred solution for major new facilities with extensive keying requirements.

Specifications of the electronic locking system must be developed with the Buildings Maintenance Manager and the Security Manager. Aspects of special concern will include cost, robustness of hardware, appearance of the hardware, ease of programming, ongoing costs, possible interface with Gallagher security system.

Section E – Floor Coverings

E.1 Timber Flooring & Decking

All timber and composite timber products used in timber flooring and decking are required to be sourced from either, or a combination of, post-consumer re-used timber or Forest Stewardship Council (FSC) certified timber.

All composite wood products such as plywood shall be low formaldehyde.

E.2 Carpet Tiles

All flooring shall be low VOC as defined by the US Carpet and Rug Institute Green Label certification scheme. The Contractor shall provide documentary evidence that, at the time of purchase, the product had valid Certification by the Environmental Choice labelling scheme or the US Carpet and Rug Institute Green Label certification scheme.

It is the general policy to use only Carpet tiles in carpeted areas. Dispensation should be sought before selecting a range of product different to that which the University possesses as stock and/or uses as standard. The preferred carpet tile and method of fixing is detailed in **Appendix 4**.

Notwithstanding the above, due regard must inevitably be paid to compatibility or precedents set by flooring in adjacent areas, aggressive conditions of usage and cost considerations. Where small areas of new flooring are required, it may be that FMD have sufficient product in stock. FMD, through the Buildings Maintenance Manager, are happy to collaborate in the flooring selection process.

It is imperative that all materials used in the sourcing and manufacturing of flooring have been sourced from a sustainable or recycled source. The full environmental protocol for the product is to be provided including the policy on re-use of existing product.

A plan for the laying of the carpet tiles on each floor shall be approved by the Job Manager prior to any laying work on site being commenced.

E.3 Vinyl & Marmoleum Flooring

2mm commercial grade Vinyl sheet should be used in toilets, cleaner rooms and other rooms where required. Vinyl is to be covered up walls 75 mm. All joints are to be welded. The University's preferred product is given in **Appendix 4**. Use approved adhesives only of non-toxic and non-odorous type

Marmoleum shall be opened out and loosely fitted and allowed to relax as long as possible before being permanently secured in position. Ensure sheets are cleanly and accurately cut to margins, junctions, fittings, doorways, etc. Marmoleum shall be permanently cemented down directly to the concrete or timber surfaces so as to be in complete contact and free from bubbles, bumps, wrinkles or other irregularities.

Joints shall be as few as is practicable and shall be tight butted, even and neat and thermo rod welded.

All laying shall be in accordance with the manufacturer's recommendations and to the complete satisfaction of the Job Manager.

See also Section C above regarding joinery design in wet areas.

The maintenance of vinyl or marmoleum flooring may be greatly reduced by the initial application of a sealing layer. The University's Support Services Manager has found that the pre-seal which is used on most products is inadequate: where such an initial seal layer is deemed necessary, the Contractor must allow sufficient time for the floors to be sealed after being laid. This additional seal will be provided by the Support Services Manager or by the Contractor to his specification.

E.4 Entrances

An approved hard-wearing synthetic carpet (refer to **Appendix 4**) is to be used inside entrances. This covering should normally extend a minimum of 2m inside the doorway.

E.5 Stairs

Consideration is to be given to maintenance issues in the selection of flooring to stairs. Of particular concern is the nature of the tread nosing which is to be used. Stair nosings are to be double-width type, securely screw-fixed, not plugged and nailed, and they are to be a colour which contrasts with the adjacent floor finishes.

E.6 Plant rooms

Floors are to be cement rendered and painted with non-slip 2-pack paint.

E.7 Sealants and Adhesives

All sealants and adhesives are to be low VOC (Volatile Organic Compounds) varieties.

E.8 Floor Finishes

All coatings and other finishes shall be Low VOC in nature.

E.9 Cleaning & Polishing of Floor Coverings

At the completion of the contract, after the completion of all work by other trades and immediately prior to occupation all flooring shall be cleaned and/or sealed/polished as is necessary.

All floor coverings shall be left in a perfectly clean state immediately prior to occupation.

E.10 Warranty

The flooring and carpet contractor shall furnish a written warranty that the flooring and its installation with the associated builders work will remain free from any defects failing or detracting from the general appearance of the job for a period of two (2) years after completion of the building.

Such a warranty shall cover the making good of any defects that may occur and rectifying any damage to any part of the building consequent upon defective workmanship or materials.

Section F – Plumbing & Drainage

F.1 Plumbing and Waste – Permit to Work Requirements

Before any work is undertaken on any plumbing or drainage service within the “Science Blocks” (ie. Blocks C, D, E, F, G, LSL, R, TRU), the plumbing contractor must obtain a Permit to Work from the FMD Service Desk. This also applies to runs adjacent to these buildings which reticulate to or from them.

Considerable effort has been (and is being) made to accurately survey and record the water and drainage systems of strategic buildings on campus, particularly the Science buildings. This follows a lengthy period in which developments took place with inadequate feedback to FMD records, poor service identification, all done by a variety of plumbing contractors. The above requirement for a Permit to Work will help to protect the integrity of the hot, cold and potable water systems as well as the waste water drainage system.

In being granted a Permit to Work, the Contractor will inherit an obligation to:

- record exactly the work carried out and pass this identification back to the FMD Job Manager for record maintenance,
- include consent or related compliance certification where appropriate,
- label all new piping for ease of identification and flow direction,
- report any failings in the infrastructure or reticulation that may become apparent,
- have the Permit signed off on completion of the work.

F.2 Proprietary Products are to be used

Unless the Consultant can indicate why there should be a deviation, the products given in **Appendix 4** should be specified for use.

F.3 Water Usage Minimisation

Wherever possible fittings are to be selected for their efficiency of operation and for minimised water usage. This is not to be at the expense of proper and effective operation of high-use installations.

F.4 Toilet Pans and Washhand Basins

These are to be white ceramic. In order to facilitate cleaning, WC pans are to be back-to-the-wall floor mounted of a style which eliminates any gaps/spaces behind the pan at floor level. If the WC's are floor mounted, they are to be over the top of floor finishes. Seats are to be white plastic, but “Soft closing” toilet seats are not to be used. WHB's to have soap recesses.

F.5 Toilet Flushing

Flushing valves are to be as per **Appendix 4** with a push button for public toilets . Other toilets are to have a ceramic cistern with screw fixed lid, where approved by the Job Manager.

F.6 Urinals

Wall mounted ceramic single units are to be used. Push button flushing valves are to be fitted. See Appendix 4.

F.7 Taps

See **Appendix 4**.

F.8 Electric Hand Driers

To be used in preference to paper towel dispensers. See **Appendix 4**.

F.9 Soap Dispensers

None – to be supplied by the University of Waikato supply where needed.

F.10 Toilet Roll Holders

In all facilities which are serviced by Facilities Management, vertical-style three-roll holders with stainless steel locking lids are to be used. (The make and model are given in **Appendix 4.**) When work is done in a Hall of Residence, the Consultant and Project Manager are to liaise with the appropriate staff in that division to determine their requirements.

Where possible, toilet roll holders are to be bolted back-to-back with threaded rod through partition and domehead nuts (not screw-fixed). Special attention must be paid when affixing toilet roll holders, soap dispensers, shelves, etc to gib walls – extra nogging to be provided.

F.11 Drinking Fountains & Multi-function Water Dispensers

The provision of such fountains is to be agreed by FMD, as demand is increasingly for chilled and filtered water dispensers for which FMD have a leasing agreement. Fountains are to make provision for the filling of fresh water drinking bottles.

Multi-function water dispensers (i.e. dispensing hot and cold water) are to be provided only where their use will be justified. Products are to be selected in consultation with the Buildings Maintenance Manager as some products have higher ongoing maintenance and servicing costs than others.

Details as per **Appendix 4.**

F.12 Toilet Partitions and Walls

Provide a 75-100mm gap at bottom; indicator bolts to be easily read; with coat hook/door stop. Toilet walls and partitions must be fully washable. Doors are to be on falling butt hinges, falling to open. (See also below.)

F.13 Mirrors above basins & shelves in toilets

Mirrors are to be kept up clear of splashes, but they must still be at a height to be usable by persons in wheelchairs. (Refer to NZS 4121/2001) The possibility of one full length mirror must also be considered.

Shelves should be provided in toilet stalls and near wash basins wherever possible. The Buildings Maintenance Manager has developed designs for shelves in various locations and spaces – these should be referred to and copied where possible.

F.14 Lighting

Provide a good general level of lighting to allow for isolated lamp outages.

F.15 Sanitary Towel disposal Units

None --The University will supply these units, but the layout of the stalls should allow for their inclusion ie. Larger stalls or off-centred pans.

F.16 Facilities for Persons with Disabilities

These shall fully comply with NZBC and applicable NZS 4121/2001. This includes accessible showers, where required. Doors are to be opening outwards on rising butt hinges, falling to closed.

F.17 Drainage in toilet and shower areas

Care must be taken to ensure that water is adequately contained within individual shower stalls. In accessible toilets which also house showers, the drainage design should minimise the the amount of water which reaches the toilet area from the shower area. Toilet areas should be fitted with floor drains wherever practical.

F.18 Hot Water Boiling Units

To be permanently plumbed-in and mounted above draining boards or sinks. Products to be as per **Appendix 4**.

F.19 Placement of Dishwashers

Where commercial dishwashers are required in tea rooms, these are to be installed on a plinth which raises the unit approx 300mm above floor level. They are to be fitted with appropriate backflow prevention devices.

F.20 Ventilation of toilet areas

Adequate ventilation of these areas is essential: the University's experience is that is a commonly deficient item. Extracts should ideally be placed at low height, in or near the toilet pan, to restrict odour spread.

F.21 Water & Waste Pipes

Unless agreed otherwise, water pipework materials are to be as follows. All pipework from 25mm dia and above is to be PE. For diameters smaller than 25mm, higher pressure piping and all piping within the "core" buildings (C – G, R, TRU) is to be copper. However, In the "non-core" buildings, small dia pipework may be REHAU.

Materials used for waste piping will be very dependant on the nature of the products being handled (e.g. glass or alkathene may be required for highly corrosive wastes), so it is essential to ascertain the nature of the probable/possible wastes prior to finalising the product specifications. Wherever possible the use of PVC materials is to be discouraged and more environmentally-friendly products such as HDPE, PP, Polybutylene, copper or stainless steel are preferred.

In drainage works, sufficient cleaning eyes, inspection fittings, manholes and catchpits need to be provided to facilitate easy inspection and cleaning of drainage lines. Also, the sizing of pipes should not only be based solely on the expected discharge volumes, but also on the practical needs for inspection and cleaning as well as future requirements.

It is essential that galvanic corrosion is to be prevented between dissimilar metals, to roofing, pipework, flashings and the like.

Section G – Fire Safety

G.1 Fire Design

For additions and alterations work, Consultants shall refer to the existing fire philosophy report for the building concerned, and allow for this to be updated where required. In some cases such a report may not exist, in which case consideration must be given to including a full fire report for the building.

G.2 Fire Alarms

The University has a number of automatic fire alarm systems connected direct to the N Z Fire Service, who charge for attendance to false alarms caused by malicious, accidental or fault activations. Additionally, alarms of this nature are unnecessarily disruptive to University staff and students and every attempt is made therefore to minimise them.

Contractors are to ensure that fire alarm systems, including wiring, detectors, manually activated call points and panels, have been suitably isolated prior to the commencement of any work they undertake. This applies to the systems within the work area as well as those in adjacent areas and is relevant whatever the nature of the work – heat, fumes, dust and physical damage can all result in alarm activation. Information regarding these fire alarms and any isolation required may be obtained through the FMD Service Desk (ext 4001), the Technical Services Manager or the FMD Service Desk. Unless otherwise arranged and agreed to in writing, Contractors will not deal directly with fire alarm contractors, but will liaise through the Technical Services Manager or Security Manager for any necessary work. In general, one working days notice will be required for any isolation or disconnection of a fire alarm system. **Appendix 4** gives the details and procedures required for disconnections.

The Consultant is to ensure that the New Zealand Fire Service approve plans for the building, including exterior access for fire tenders, and the provision of fire hydrants in the building environs.

G.3 Fire Evacuation Procedures

The University has in place schemes for the safe evacuation of building occupants in the event of fire or other emergencies, including a commitment to regular trial evacuations which are held throughout the year in different locations. The University's Security Manager will meet with the Contractor at the commencement of construction to discuss and implement an emergency evacuation scheme for the building. The Contractor is to instruct his staff and subcontractors on these procedures and is to comply in all respects, including in the trial evacuation procedures. Building and floor wardens are identified for evacuation purposes by a brightly coloured yellow or orange vest. Any instructions given by these persons must be followed.

G.4 Fires on the Construction Site

The Contractor must satisfy the University's Project Manager and Security Manager that he has adequate procedures in place and that his staff are properly trained to handle any fires which may arise on/in the area where construction is taking place. All hazards must be identified prior to work commencing and procedures drawn up to cater for the unexpected.

G.5 Exitways and Escape Routes

During the period of any contract, all practicable precautions must be taken to ensure that obstructions do not occur in any exitway or escape route leading to an exitway. If in doubt, Contractors are to consult with the Security Manager regarding this requirement.

G.6 Electricity, Gas and Water Shutdowns

As well as security and fire protection systems, there are a number of operations and devices around the University which are reliant on electrical and/or water supplies. Consequently, shutdowns could not only reduce their effectiveness, but could result in disruption, loss and/or costly false alarms.

Contractors are to notify the Security Manager, the Technical Services Manager (electricity and water) and the Buildings Maintenance Manager (water) of any interruptions to these supplies noting the time of commencement, the duration of the shutdown and the extent of the areas affected. Except for emergency shutdowns, 48 hours notice shall be allowed for contingency planning and for the implementation of any necessary procedures required to cope with the shutdown.

G.7 Fire Service call-outs

The Contractor shall be responsible for the costs of fire service callouts (false alarms) and fire contractor work which are a direct result of the contractor's failure to follow set procedures, or arise out of equipment defect during the guarantee period.

G.8 Emergency vehicle access

Access for emergency vehicles, fire appliances, etc. is to be available at all times, although short term obstruction for the purpose of loading and unloading etc., will be accepted. Any obstruction likely to exceed a duration of 4 hours, particularly where it will extend over a period of 24 hours or even days, must be advised to the University in sufficient time to allow for contingency planning.

The Consultant is to follow the requirements of the Building Code and in particular the requirements of C3/AS1, regarding the provision of acceptable access for fire emergency vehicles to buildings.

G.9 Interfacing HVAC with Fire Protection Systems, including BMS monitoring

Consideration should be given to interfacing all HVAC systems to fire protection systems and to the provision of Fire Service control of these systems in an emergency, together with a BMS interface for monitoring purposes. The details of the operation of these interfaces must be discussed with the Technical Services Manager who will ensure that other systems are not compromised.

G.10 Fire Systems

The design and installation of new or replacement fire systems shall include the following provisions:

Design will take into consideration not only the purpose of the system but in particular 'fit for use' of the system for particular areas, for example, smoke detectors in kitchens or laboratories may cause nuisance alarms. Consideration must be given to the use of composite detectors in particularly complex situations.

Analogue Addressable systems should be used for smoke and heat installations.

Smoke detectors will be Acclimate Dual Technology heads.

In the event of a fire, the fire panel must be set up to "fail open" any doors which are controlled by the Gallager (Cardax) access control system.

Sprinkler heads, where installed in areas that are likely to sustain damage from ladders, steps, etc., are required to have protective devices fitted to the heads.

All new fire alarm installations should have an automated dialler installed. This dialler should have an appropriate recorded voice message that phones security (4184) in the event of an activation.

For new buildings or major extensions to existing facilities the fire alarm contractor is to be approved by the University and is to be a sub-contractor to the main contractor.

In any new buildings which house computers in large groups (ie. in computer labs), the possibility of interfacing the alarm system with the computers is to be considered. This interface will enable a pop-up warning message to be displayed on all screens in the event of a fire alarm.

In the event of a "Trial Evacuation Key" being activated, the fire alarm systems are to evacuate the building without sending a fire call to the fire alarm monitoring company. A key-operated test switch for this is to be located on or near the alarm panel. Details of the layout are to be discussed with the University's Security Manager.

The University is working towards having the ability to remotely isolate buildings and rooms. The chosen interface for this procedure is the “Petronics” system and this should be considered in any new installation – details can be discussed with the University’s Technical Services Manager.

All fire detection installations are to have “Firemap Graphics” provided as part of the installation.

G.11 Seal openings in concrete, plasterboard, etc

Openings (whether used or unused) through concrete, masonry or “Gib” walls, beams and floors must be sealed to meet the fire rating of the wall or perforated structure.

There is heightened concern by the Territorial Authority and the University over improperly stopped penetrations in fire- and smoke-rated construction elements. It is essential that this aspect receive special attention.

Any gaps/penetrations must be fire-rated to a state that is at least equal to the adjoining/parent structure using materials such as fire collars, fire wraps and intumescent systems.

All materials must be installed strictly in accordance with the manufacturers’ specifications and every penetration must be labelled and recorded to indicate what material was used, when applied, by whom.

G.12 Marking of Fire Walls

Any and all fire walls must be clearly identified to ensure that Contractors and maintenance staff are aware of their location.

This identification is to be clearly noted on drawings and floor plans.

In the above-ceiling spaces notices must be placed/applied to the fire-walls at a spacing not to exceed 1.5m on both sides of the wall.

Section H – Security & Electronic Access

H.1 Security

H.1.1 General

The University requires contractors and their staff to maintain the security of the University's premises and property while they are working on any part of the site or in any building. In particular, specific attention is drawn to the consequences of leaving premises insecure, or being careless with any University keys entrusted to a contractor for the purposes of the work. The Contractor is to advise the Project Manager of any condition which may result in reduced security to University buildings or property. Any requirements to implement or improve security in the area covered by the contract, must be followed. Contractors shall refer to the University any query which they may have concerning aspects of security. The University may direct the contractor on any security matter.

H.1.2 Crime Prevention

All buildings must be designed taking into consideration Crime Prevention Through Environmental Design (CPTED) concepts to achieve a positive working and learning environment, whilst promoting adequate security and loss prevention strategies.

In general applications, the aim of CPTED as a crime prevention strategy is to design and use physical space to affect human decisions and behaviour. The object of CPTED in educational institutions is to encourage staff and student achievement through a positive learning environment, whilst at the same time improving personal safety, loss prevention and loss reduction.

CPTED strategies aim to reduce opportunities for crime through integrating crime prevention strategies and include maximisation of natural surveillance, controlling access to buildings and surrounding areas, and the installation of target hardening and detection hardware.

Staff and student toilet facilities should be situated near the entrances to buildings or off high circulation areas such as lift lobbies to increase natural surveillance through increased use and flows of people entering and exiting the building. Double door or swing door entry systems to toilets create feelings of vulnerability to users because of the separate and enclosed spatial areas. A maze type entry position, or doors which are in a locked open position will promote convenience and safety. The positioning of toilet facilities combined with improved entry mechanisms provides a deterrent to vandalism as well as attacks.

Computer laboratories or other facilities which are to be made available to staff and students outside of regular University hours should not be located in areas or floors which provide access to the remainder of the building, or are isolated from natural surveillance. They should be located as close as possible to the main after-hours access doors. Security access technology must be suitably placed for persons using wheelchairs.

Courtyards, patios and footpath areas should be designed so that they are adequately lit if they are intended for night use, and should also be located in areas which are under natural surveillance. Areas not intended for night use should have access restrictions applied.

H.1.3 Keys and Electronic Access cards

Contractors shall be responsible for maintenance of the security of any of the University's premises in which they may be working, and, when keys are issued to them for the purposes of the work, shall be responsible for the security of such keys. Any such keys issued for the purpose of the contract, shall be accounted for and returned by the due date unless an extension is arranged. Failure to return or account satisfactorily for keys may result in the Contractor being held liable for any costs incurred including, re-keying of affected areas if required.

Gallagher (Cardax) Swipe cards can be obtained for contractors engaged in projects on the campus. For short term projects these are obtainable from the FMD Service Desk and for long term projects (ie several months) the job manager can make suitable arrangements with the Security Services Centre. Contractors shall be responsible for the security of the Gallagher (Cardax) cards that are issued to them and should be

returned by the due date unless an extension is arranged. If a Gallagher (Cardax) card is lost, stolen or damaged then it is to be reported to the Security Services Centre urgently and a replacement card will be made available.

H.2 Electronic Access Control to Buildings

H.2.1 General

The University has an operational electronic access system installed throughout the campus, with the control, monitoring and management of the system being achieved from a central command centre. Any electronic or other locking mechanism required to be installed for the purposes of controlling access or to provide a higher degree of security, is to be compatible with this system.

The core electronic access control system is GALLAGHER, a proprietary name, formerly Cardax and CARDAX FT.

Access to individual spaces and rooms within buildings is described under section D.8.

H.2.2 Compatibility

Designers and contractors will ensure that the University is advised of any proposal to use electronic or security coded locking or access devices, and will generally be permitted to only specify or install equipment that is compatible with the existing system. It may be that the University in such cases will indicate acceptable contractors to undertake such installations, and in no case will any such devices be connected to the system without the approval of the University, and the knowledge of the Security Manager.

H.2.3 Manual Locks

All "Electronic Access" doors must have manual locks installed on them with a hold back mechanism on the tongue, in the event of system failure. These locks are to be on an SK145 key. Installation of these locks are to be co-ordinated by the Building Maintenance Manager, Facilities Management Division.

H.2.4 Magnetic Clamps

All double doors, including doors with half leaves, which have double door-head clamps, are to have the magnetic clamps wired together and are to be controlled as one door. This arrangement also applies to all auto sliding glass doors. (Doors which have electric strike plates are not covered by this requirement)

All doors in new installations which require magnetic clamps are to be 2100 mm high. The clamps are to be fitted to the door-head only.

H.2.5 Back-up Power Supplies.

All new connections onto the Gallagher (Cardax) network must ensure that the battery back-up power supply is capable of running a single access door for a period of eight hours.

All electrical connections to the University mains power must have the appropriate electrical certification.

H.2.6 Activation Devices

All readers, Break Glass units and Pushbutton door release units are to be installed on a wall closest to the door and at a height of 1100mm, being the distance measured from the bottom of the unit to the floor, to assure accessibility for disabled persons.

Break Glass units, Fire Alarm Activators, Fire Doors, Tamper Alarms, Timed Doors, Low, Medium, High, Critical Priority Alarms and Bond Sensing are to be wired through the Auxiliary Inputs to ensure monitoring is achieved.

The following monitoring shall be carried out on all installations:

Fire Alarm Activation	Power Supply Tamper
Break Glass Secure/Used	Door Locked/Unlocked
Door Closed/Open	Power Supply Low Battery
Door Open Too Long	Door Forced
Door Not Locked	

Gallagher-controlled doors are required to fail open/free in the event of a Fire Alarm activation,. The Gallagher/Cardax contractor must provide a separate 3 core, 0.75mm², cable from the fire panel to the location of the power supply and is to allow for connecting to the Gallagher system, and in conjunction with Fire Alarm contractor, ensure satisfactory commissioning. Ensure power is not taken from the fire panel for any Gallagher use. The Fire Alarm contractor will provide the relay and connect to the fire panel, wiring through the sounders and Trial Evacuation switch. Gallagher also requires a separate reset switch keyed-alike to the trial evacuation switch, to be wired in by the Fire Alarm Contractor, at the Fire panel.

Door release button operation is to remove power from the door holding device, as well as providing a "Request to Exit" signal.

Break Glass units are to be wired so that the test key can easily access the Break Glass unit.

Hold backs are to be wired through the door unit which controls that door.

Door closers, on new doors are to be adjusted by the building contractor, so that the doors do not slam shut onto the magnetic clamps. Door closers on existing doors are to be adjusted by Facilities Management Carpentry staff.

Magnetic clamps are to be installed on internal fire-proof doors.

The standard equipment currently in use is given in **Appendix 4**. - alternatives may be used where specifically required and authorised by the Security Manager.

H.2.7 Notes concerning the Gallagher System

Gallagher is a continually changing technology and prior to any contractor committing to install any hardware, consultation must firstly take place with the Security Manager to discuss the appropriate hardware.

Gallagher (formerly Cardax FT) units are to operate 2 Nidac speech diallers - one for the Gallagher-protected doors and the other for Fire Alarm activations and power failure.

All new connections to Gallagher on campus must be made using equipment that is compatible with the latest versions of hardware and software.

Keys to door units and/or other Gallagher installations are to be handed over to the Security Services Centre when the job is finished/completed.

The University currently recognises the following Gallagher agents, who are approved to carry out Gallagher related work at the University - Select Alarms, Chubb and Concord Technologies. Select Alarms are currently the University's preferred electronic security contractor.

No other agent or company may commence Gallagher work of any kind without firstly receiving consent from the Security Manager, Facilities Management Division.

Section I – Heating, Ventilation & Air-conditioning (Mechanical Services)

I.1 General

The mechanical design shall be sympathetic to the building form and take maximum advantage of energy conservation features. All heating shall be zoned to allow partial as well as full shut down of the building(s). Activities requiring use outside normal hours shall be identified at design stage and provided with independent plant or circuitry so as to obviate the need to run complete systems to satisfy partial needs. All equipment to be installed with seismic restraints.

All fixings and steelwork installed externally or near water shall be hot dipped galvanised or stainless steel.

All accesses to plant concealed behind building panels/elements must be clearly labelled.

The Consultant must ensure that the Contractor is obligated to remove and dispose of any and all plant, equipment, piping or wiring which may be rendered redundant during the upgrade or modification of a facility.

I.2 Air conditioning

Air conditioning will only be accepted in exceptional circumstances (Refer to Section 1 - Designing for Energy Efficiency and Minimised Environmental Impacts and **Appendix 2** – University Environmental Temperature Control Policy), and will in every case be reverse cycle design for independent areas. The Consultant is to develop design proposals that incorporate passive features such as structure, form and fabric to moderate the environment and provide comfortable internal conditions wherever possible, obviating the need for mechanical systems. Where it has been approved for large portions or the entire building to be air conditioned, it will be correctly zoned to take advantage of solar conditions. Air quality control with variable fresh air make up will be incorporated together with enthalpy control within the design.

Where air conditioning is installed into internal areas (rooms without opening windows), sufficient fresh air must be reticulated to ensure compliance with the Building Code.

Noise levels of air-conditioning and ventilation systems can be critical in lecture theatres, teaching rooms and performance facilities. It is therefore essential that the design levels be set appropriately and that the commissioning procedures ensure proper compliance.

Other factors to be borne in mind include the preferred use of VAV systems with locally adjustable thermostatic controls in larger installations and ceiling-mounted cassette units for small/individual locations.

I.3 Hot Water Heating Services

Low Pressure Hot Water (LPHW) heating systems shall include features as detailed below – any deviation from these is to be discussed with the Technical Services Manager.

- Grundfos pumps – preferably of intelligent type where variable duty is expected.
- Radiator Valves – Heimier adjustable units to maximise room occupant comfort.
- Speed Drives – Schneider Avatar.
- Radiators – Design, sizing and layout to be submitted for approval.
- Gauges and air bleeds – all to be fitted with shut-off valves.
- Access – care must be taken to ensure that all maintenance is clearly identified and can be easily accomplished without use of specialist equipment.
- Identification of equipment – allow to label equipment with engraved labels – asset numbers – from a list supplied by the Technical Services Manager – these numbers should be noted on as-built drawings. Also, all pipework must be clearly labelled to identify usage and flow direction.
- BMS-controlled portions of any installation are to have manual override.

I.4 Building Management System (BMS)

Wherever practicable all heating/ventilation plant shall be connected to the installed Honeywell "E.B.I." computerised building management system and shall allow the following operation:

- Remote scheduling of heating plant on/off cycles with local after hours control
- Remote resetting of any lock out facilities
- Remote logging of readings of energy use (pulse digital output tariff meters)
- Automatic monitoring of internal parameters of buildings as selected.
- Automatic monitoring & control of air handling and air conditioning plant
- Temperature changing

All proposed graphic displays are to be submitted for approval to the University's Technical Services Manager (through the Architect/Engineer and Job Manager) prior to installation and commissioning.

See also Section N – Commissioning & Handovers.

I.5 Lifts

Please consult the University before specifying. The University has a strong preference for certain standard manufacturers, namely Otis, Schindler and Kone. The lift is to accept calls in both directions. Calls in the opposite direction are to be carried out when the current run direction is completed. Lifts are to be supplied with emergency phones to activate an automatic call to 4444 on lifting receiver. Phones should allow high clarity voice communication. The phone should also be able to receive incoming calls to the lift car.

Lifts where possible should have one mirrored wall surface, starting at 1200mm from floor level and extending to the ceiling of the lift car.

Lift floor numbering shall follow the University system, not standard international system.

All lift dimensions, facilities and call buttons are to satisfy the NZBC requirements for use by disabled persons.

I.6 Supplier Contestability

The University is not generally in favour of accepting any equipment that is not capable of being serviced without modification by a number of service organisations; contestability for all work undertaken is a firm priority. Where this appears to be unavoidable, full discussion with the Technical Services section is required.

I.7 Locking-out of electrical controls and mechanical equipment

Whenever a Contractor is required to work on or interface with any existing electrical installation or plant/equipment, it is essential that such work be done in liaison with the University's Technical Services Manager. Formal and comprehensive lock-out procedures must be put in place to ensure safe working for all parties. Prior notice, preferably at least 24 hours, should be given to the Technical Services Manager in order that arrangements can be made for timeous and orderly shutdown of related plant, equipment, processes, experiments, etc. When electrical controls or mechanical equipment are locked out, the details must be entered on a suitable card (a "Hold Card") which must then be hung over the relevant switch, switchboard, valve or control point to prevent any accidental switching.

I.8 Log Books in Plant Rooms

In each of the plant rooms on campus there is a log book which the technical staff use to record the details of any work they carry out on the plant and equipment.

All contractors working in plant rooms must also make endorsements in the log book to indicate:

- a) What work was done.
- b) Who carried it out including contact details.
- c) When it was done.
- d) Any follow-up actions, servicing, etc which is required.

I.9 Defects Maintenance of Plant/Equipment and Instruction of Maintenance staff

In order to ensure that new systems are fully operational at the time of handover, it is essential that the systems be run free of defects prior to the handover. The maintenance period as detailed not commence until the systems have been successfully handed over to the University.

An adequate period must also be allowed for the instruction of maintenance staff in the operation and maintenance of the new systems. This Instruction shall take place immediately after commissioning, whether or not the final maintenance manuals and as-built drawings have been received by the University.

This separation of the staff instruction and final documentation does not relieve the Contractor or Consultant of their joint responsibility to provide the University with final approved manuals and as-built drawings in good time.

On complex projects there may be quite a time lag between instruction to the maintenance staff and receipt of the manuals and as-builts – in such cases it may be necessary for the Contractor to provide a second period of instruction, a cost which would not be necessary if the documentation was provided promptly.

The University has had considerable problems towards the end of large projects with the contractor being very slow to correct defects and attend to work within maintenance periods. Response times should be defined in the contract, as Emergency (immediate response), Urgent (within 24 hours), and Routine (within one week) along with appropriate corrective steps which the University may take if the Contractor does not respond accordingly.

The defects liability period for all services shall be 12 months defects period from the date of approval of final commissioning, as notified in writing by the Architect, Engineer or FMD Project Manager.

The rectification of defects shall be responded by the contractor as follows:

- | | | |
|----|-----------------------|--------------------|
| a) | Emergency type defect | Immediate response |
| b) | Urgent type defect | Within 24 hours |
| c) | Routine type defect | Within 1 week |

Failure by the contractor to respond to the defect instruction notice will result in the client remedying the defect, at the contractor's expense.

The regular maintenance of the system components during the maintenance and liability period such as filters cleaning and set point adjustment will be the responsibility of University FMD personnel. If supply of spare filter sets is part of this contract, these shall be handed over to the University FM Department.

See other details under Section B.21 Building Completion Defect Maintenance.

I.10 Commissioning of equipment

See Section N.

Section J – Lighting & Electrical Services

J.1 Conservation

The electrical and mechanical design features shall be designed so as to take maximum advantage of energy conservation features. (Refer to Section A -- Designing for Energy Efficiency and Minimised Environmental Impacts)

J.2 Electrical power supply

Electrical services will be designed and detailed in such a way that the University can evaluate the total design load and diversity factors used in sizing all cables and equipment including transformers. Electrical services shall be designed to allow for any building to be separately isolated from the HV reticulation without any disruption to other buildings.

Air circuit breakers will generally be used on mains cable protection for current in excess of 400 Amps.

Distribution boards will be of proprietary manufacture and in all cases shall be split into lighting and power. Dual boards in all but the smallest of buildings (domestic) will not be accepted. Consideration should be given to segregation back to the main switch board of all circuitry feeding switched mode power supplies & computer closets. It may be necessary in larger buildings to dedicate sub mains and switchboards specifically for this purpose.

Power factor must be corrected by an automatic device to achieve at least 0.95 lagging, ensuring that resonant conditions within all equipment are obviated.

Total harmonic distortion for installed fixed equipment caused by switched mode power supplies must not cause any detrimental affect to any services within the building. It will be the Contractor's responsibility to ensure that the equipment purchased has suitable characteristics so as to not produce unacceptable harmonics or has filters or chokes to obviate same. Reference to IEE standards is required.

Mains cables feeding buildings and sub mains must carry full core sizes on Neutrals -- no half size neutrals will be allowed anywhere in the installation.

Earthing is to include a bonding of all structural metal work within the building to the main building earth.

All single phase standard power outlets located in staff or student areas anywhere on the campus are to be RCD or RCCBO protected, with the protection (30 mA) located at the distribution board which supplies these circuits. The units and circuits must be appropriately sized to prevent nuisance tripping due to earth leakage.

J.3 Lighting

Lighting services will in all cases be of highest efficiency with the use of T5 technology and ambient lighting controls and occupancy sensors being considered. The minimum standard acceptable will be triphosphor fluorescent tubes. If the Consultant is aware of any other modern lighting developments he should discuss these with the University's Technical Services Manager.

LED lighting will only be considered on a case-by-case basis. Extensive warranties, minimum 5 years, will be required for all components in any LED system and these must cover labour costs which are incurred in any remedial work.

Feature lighting design must take due cognisance of cost and ease of repairs and lamp replacement, and energy efficiency of fittings. The use of other than ladders for lamp replacement will not be accepted without specific reference to the University's Technical Services Manager.

Emergency Lighting systems shall allow for ease of testing and take into account long-term maintenance costs. The University is reluctant to have dual-use fittings installed for this purpose and the use of central systems in most cases is preferred.

There are two emergency lighting systems which have currently been successfully installed on campus – FAMCO and LEGRAND – and these are to be regarded as preferred suppliers.

J.4 Offices and seminar rooms

All rooms will require artificial lighting, power outlets, telephone connections and CAT5 computer outlets. The actual requirements for each room are to be confirmed with the Project Manager. (See also below.)

J.5 Supplier Contestability

The University is not generally in favour of accepting any equipment that is not capable of being serviced without modification by a number of service organisations; contestability for all work undertaken is a firm priority. Where this appears to be unavoidable, full discussion with the Technical Services section is required.

J.6 Component Identification

All lighting and power circuits will be identified with engraved labels fixed adjacent to each light switch and power outlet. The label is to identify the switch board, phase and circuit number from which it is fed. The University's Technical Services Manager can assist with suggested nomenclature.

J.7 Locking-out of electrical controls and Electrical Shutdowns

Whenever a Contractor is required to work on or interface with any existing electrical installation or plant/equipment, it is essential that such work be done in liaison with the University's Technical Services Manager. Formal and comprehensive lock-out procedures must be put in place to ensure safe working for all parties. Prior notice, preferably at least 24 hours, should be given to the Technical Services Manager in order that arrangements can be made for timeous and orderly shutdown of related plant, equipment, processes, experiments, etc. When electrical controls or mechanical equipment are locked out, the details must be entered on a suitable card (a "Hold Card") which must then be hung over the relevant switch, switchboard, valve or control point to prevent any accidental switching.

J.8 Defects Maintenance of Plant/Equipment and Instruction of Maintenance staff

Refer to relevant clause in Section I.

J.9 Commissioning of equipment

See Section N.

Section K – External Works & Landscaping (including Roads & Walkways)

K.1 Site Services (i.e. Underground Services)

K.1.1 Location of services

Prior to the commencement of and during the Project, copies of drawings indicating existing services can be supplied by the University's FMD Draughting Office. Prior notice of one working day is required by the Draughting Office for the supply of drawings. Original copies of drawings will only be released in special circumstances as copies of all drawings are available digitally. Drawings of all known existing underground services will be provided to the Contractor on request via the Consultant and the Project Manager. These drawings are supplied on the basis that they are accurate to the best of the University's knowledge, but the University disclaims responsibility for any extra cost incurred because of possible inaccuracies.

K.1.2 Alterations & Additions to existing services

It is the responsibility of the Consultant or Contractor (if within the terms of a construction contract) to capture all relevant information as work proceeds. The Contractor is to notify/advise/inform the Consultant and the University Draughting Office when trenches for underground services have been opened up or prepared, so that the Consultant and the University can record as-built information prior to closing in. A similar requirement applies to all underground openings in building envelopes where services enter/leave the building. The University reserves the right to audit/survey the information supplied by the Consultant and instruct the Consultant to make corrections at no additional cost to the University.

Details of all new services are to be recorded on dimensioned sketches which provide a full record of the as-laid information, including dimensions that can readily be referenced. Where possible these sketches may be supplemented by photographs not substituted by them. These sketches and photos must be submitted via the Consultant to the University.

K.1.3 Excavations

Within one metre (or appropriate safe distance) of known site services, trenches shall be hand dug. Adequate notice of commencement of excavation shall be given to the University and clearance obtained.

In all trade sections, including the excavation of trenches for underground services, the Consultant is to specify that where such excavations are to be covered by foundations, floor slabs, buildings, roads or paths, the trenches shall be backfilled with approved imported backfill, adequately compacted. Backfilling with rocks, stones or unsifted soil or clay is unacceptable.

K.1.4 Drainage

Vents to manholes and such like chambers are to be cast-iron - including mushrooms (i.e. plastics are unacceptable) Gully traps are to conform to NZBC requirements above final expected ground levels. Any manholes and pumping stations which are installed shall comply with the standards and requirements of the Hamilton City Council. Chequer plate covers are not to be used as non-slip surfaces – more positive forms of non-slip protection are required. In addition, within 20m of any University building, all sewerage manholes or chambers are to have gas-tight covers.

K.1.5 Water supply

Water mains are to be laid to the depth required by Hamilton City Council by-laws. Water supply pipes carrying unmetered water under buildings are not allowed. Where it is necessary to serve a building, it is acceptable to provide a suitable sleeve to serve as a duct with adequate space at each end to allow pipe to be withdrawn and renewed.

48 hours notice is required before temporarily shutting down water supply. All temporary connections made by the building contractor during the course of the contract must be fitted with backflow prevention devices. All

new water mains are to be fitted with backflow prevention devices in accordance with the requirements of the Territorial Authority to prevent any cross-contamination.

Easily-accessible valves are always to be provided in order to allow isolation of the whole building, individual floors and “dead legs” without affecting occupants of other buildings. Unless agreed otherwise, a meter to record a building’s water usage is to be installed on new reticulation.

All meters require digital pulse output capability.

In laboratory buildings the use of high level tanks feeding the laboratories is to be considered. Such a system may also assist in accommodating the varying pressures which are encountered on the campus.

It is also essential to maintain the integrity of any potable supply which has been established to serve toilets, drinking water points and emergency showers/eye-washes. Great care must be therefore be taken in labelling and mapping these pipes to avoid inadvertant connection to them eg. to lab outlets. Note the requirement for permits in Section F.1.

K.1.6 Computer cable ducts

A cable duct for links to the computer centre and/or communications room from the exterior of the building must be provided where required. This duct must be separate from Telecom requirements, should be considerably oversized, easily accessed by wiremen, and sealed against vermin. Sizing of the duct, bending radius, etc. are to be confirmed by the University’s ITS Division.

K.1.7 Exterior Pole Lighting

Exterior lighting shall be designed as to integrate with the University’s installed system – close liaison with the University’s Technical Services Manager is necessary when designing any new system or layout. The current lighting serves a combination of purposes, namely security, safe illumination of pathways and decorative lighting of selected objects. It is essential that the lighting designer consults with the Project Manager to determine the extent and purpose of lighting allied to any particular project. As a general guide, the majority of exterior lighting will be designed for a two circuit system - before midnight all lamps will be illuminated and after midnight only sufficient lamps will be illuminated to meet external security requirements. The University will provide terminations points for control cables for this purpose. All poles will be concreted in and surrounded on grassed areas by a 300mm wide mowing strip. The University’s Technical Services Manager maintains accurate details of all exterior lighting – the Project Manager will advise what data is required for this record.

K.1.8 Earth Spikes

Sufficient information must be provided to the Contractor to prevent earth spikes clashing with other underground services.

K.1.9 Routing of Services

Careful co-ordination is essential to minimise complications and conflicts. Services must be protected against reasonable risk of mechanical damage or routed to avoid this. Routes must protect against damage due to building settlement, they must be laid with easy bends, they must not compromise future maintenance or alterations and they must have adequate draw pits and and draw wires to facilitate cable-pulling.

K.1.10 Adequate control valves and zoning

Adequate controls and valves (for heating, lighting, water, gas, etc) are to be provided to ensure that the services to the building can be opened or closed in a manner that will cause the minimal disruption to users. This applies to all wired and piped services.

K.2 External Works & Landscaping (including Roads and Walkways)

K.2.1 Costing of Site Works

The Consultant is required to include the full cost of all siteworks and landscaping in the estimates for the project. This must also include for all reinstatement of landscaped areas which are damaged during the construction works and protection against unnecessary damage to areas adjacent to construction sites. All established plants in or adjacent to the construction site must be protected by a barrier fence placed at the drip line of the plants and no materials or vehicles should be permitted within this area. The University's Grounds Manager must be advised of any major roots which are exposed during excavation. He will arrange for them to be properly cut by the University Arborist.

K.2.2 Overall planning

The Consultant is to collaborate with the University's Project Manager and Grounds Manager over the final form of hard and soft landscaping but is to take into account provision for:

- access to buildings - footpaths, and vehicles
- paved areas generally
- parking
- bike stands
- kerbing and channelling
- drainage ducts and channels (to be adequately sized for low maintenance and easy cleaning) which must be of a robust construction with appropriate cover grilles, including fastening mechanisms
- sumps (including covers which are paved to match surrounding paved areas)
- streetlighting and security lighting on the building, linked to the University's street lighting circuit.
- underground services and access to them (including manholes, ducts, cable markers, gully traps, sumps), also to ensure that the services are not damaged during installation of the landscaping.
- levelling and grassing
- planting, inclusive of herbicides, stakes, ties, bark mulch and irrigation systems
- "street furniture" including rubbish bins, outdoor seats, outdoor notice boards, signs and bollards
- outdoor hose points etc
- ensuring that such landscaping does not create a security or personal safety risk for users of the University, and that all planting is kept an appropriate distance from buildings, structures and equipment such as electrical transformers.

If it is deemed necessary by the University, the Consultant/Design Team may also be required to liaise and consult with the University's Urban Design Advisor over landscaping planning matters.

K.2.3 Finished surfaces for grass and plantings

Normally, all major work, earthmoving, grading and filling will be done by the Contractor under the Consultant's supervision. The Contractor will be required to leave the site with an adequate cover of clean topsoil, stone and rubble free, which has been rotary hoed and levelled, ready for an application of fertilizer, grassing and planting by the Grounds Manager and his staff. The topsoil in grassed areas shall be 100 – 150mm thick and in planted areas it shall be 300 – 400mm thick. The work will be inspected and approved by the University's Grounds Manager prior to handover. The Consultant must allow for sufficient funds in his estimate for the overall project to enable this work to be done. The University generally prefers not to have the Contractor sow grass etc.

K.2.4 Concrete Mowing strips around buildings and structures

Unless the external walls of a building abut paving, a concrete mowing strip is to be provided at least 300mm wide and appropriately reinforced, irrespective of whether the adjacent area is to be grassed or planted. This strip is to be cast at least 200mm below the internal floor level and is to be sloped to ensure run-off away from the wall. Where the adjacent area is planted, the finished soil/mulch level is to be kept at least 75mm below the top of the concrete strip, with the ground sloping away from the building if at all possible. Where this is not practical, care must be taken to ensure soil drainage is adequate to avoid ponding of surface water against the building.

Any placement of signage, transformers, ring main switches, light poles, rubbish bins, seating, etc. or any permanently fixed item on a grassed or garden area will have a concrete mowing strip at least 300mm wide and 150mm deep to facilitate maintenance work.

K.2.5 Roads and Roadworks

The Consultant is to ensure that all roads are designed and constructed to the appropriate standards as laid down by the Territorial Authority.

K.2.6 Road kerbs

To prevent vehicular and motorcycle access to grass and other pedestrian-only areas, kerbs are to be a minimum of 150 mm high. Design must allow for wheel-chair crossings at appropriate locations. The higher kerbs are preferred but may be substituted by the placement of bollards or wheel stops.

K.2.7 External ramps

Access to the exterior of buildings is to comply with NZBC Clause D1 Access Routes. (The maximum gradient is 1:12 but where circumstances permit a gradient of 1:15 is to be sought.) A non-slip surface is required to ramps. Drainage is required to the foot of extensive ramps and this shall be adequately sized for low maintenance and easy cleaning. The Consultant is to consider and advise the University on lighting to external ramps. See also the note on Handrails in the clause below.

K.2.8 External Stairways and Steps

Extensive stairways etc are to be avoided where possible, in favour of ramps. (A number of the precast stair treads used extensively around the University are proving to be a maintenance problem -- the treads come loose with little warning, there is a lack of consistency of surface treatment, there are varying tread overhangs and there are overhang recesses which are very difficult to clean. This gives rise to unsafe and unsightly situation in critical and prominent positions.) Side falls and drainage are required to extensive flights of steps. Handrails to all external steps are to be in accordance with the standards laid down by NZBC. Where possible or practical stainless steel is to be used for items such as handrails, with galvanised steel only used as an alternative where appropriate (e.g. to match existing). The stainless steel is to be grade 316. Stair nosings are to be the double-width type, securely screw-fixed, not plugged and nailed, and they must contrast in colour to the stair treads. In a manner similar to external ramps, the Consultant is to consider and advise the University on lighting to external stairways and steps.

K.2.9 Concrete retaining walls

For landscaping retaining walls, detailing must ensure adequate construction joints are provided, i.e. at least every 4-5m. There must be adequate falls to channels, and suitable arrangements for coping with potential overflows. Ensure acceptable backfill is used. Where possible the exposed faces of retaining walls are not to be vertical – they are to be laid back at a batter of approx 10:1.

K.2.10 Placing of Jumbo Bins near buildings

In order to comply with NZS 4541, Jumbo Bins are not to be located in close proximity to buildings – a minimum clear distance of 10m is required if the walls are non-fire-rated, 3m if protected by sprinklers.

K.2.11 Anti-skateboarding measures

All exterior ramps, stairs, seats, handrails, etc have the potential to attract skateboarders who often damage the facilities and threaten the safety of other people in the area. All such facilities must therefore incorporate design features to frustrate their use by skateboarders. Such facilities must be discussed with and approved by the University's Project Manager and Grounds Manager prior to installation.

Section L – Communications & Computers

L.1 Computer & Telephone Systems

L.1.1 Telephones

The University requires the cost of telephone installation to be included in the estimates for the cost of the building. The trend now is for most office telephones to run through the internet. There are, however, exceptions to this which need to be confirmed for each project. Plans for pre-wiring are to be prepared by the Consultant, and the work to be done at the Consultant's direction.

L.1.2 Computer cabling

Allow in the contract for the provision of a duct system to all specified rooms to take computer communication cables. Allow for face plates in rooms, and via underground services, a link to the University's central system.

Underground communication cables shall be run in generously-sized PVC ducts with approved access pits at all changes in direction.

L.1.3 Installation

The installation of computer and telephone wiring will be undertaken by a nominated contractor – details of approved contractors will be provided by the Project Manager.

L.1.4 Standard Specification

The University's Standard Specification for the Provision of Computer and Telephone Cabling in Campus Building Projects defines the standard and details to which all such installations will take place. The latest version will be supplied to the Consultant by the Project Manager.

L.2 Service Room Specifications

L.2.1 Plant Rooms

If required, please consult in detail over location, layout, size, etc. Other factors to be considered in the design of these facilities are ventilation, lighting, location of electrical switchgear and access.

L.2.2 Communications closets

It is essential that the input of the University's ITS Division is obtained prior to the sizing and siting of any communications closets. In general, the minimum size room is 2.0 x 2.0 m, with double doors opening outwards, and a thermostatically controlled extract must be provided. A suitable floor or door grille will be required for make-up air.

Where there is more than one comms closet and/or server room in a building, power should be supplied directly from the main switchroom through an external UPS bypass unit. Details of the design and layout must be resolved with the University's Technical Services Manager.

Section M – Teaching Rooms & Lecture Theatres

M.1 Expertise of the Teaching Technology Group

All new teaching facilities are to be designed, laid out, constructed and equipped in accordance with the specifications as laid down by the University's Teaching Technology Group (TTG) in the ITS Division. Prior to the commencement of and detailed design of new teaching facilities, input will be provided by the TTG, who shall also sign off the final design prior to construction.

M.2 Lighting in Teaching Facilities

Lecture Theatre lighting and control must be designed in conjunction with the FMD Technical Services Manager and TTG. Critical areas which need to be addressed are location and end-spill off whiteboard lights, position of and spill from lectern lights, switching systems and control of lighting, reflection of light off various surfaces such as desk tops, etc.

M.3 Seating

Styles, manufacturers, fabrics and colours of seating have proved problematic in some areas in the past and the University must give approval to any/all designs which are proposed. Should the Contractor wish to offer an alternative to that which has been specified by the University and Consultant, he will be required to submit samples for testing/evaluation.

M.4 Colours in Teaching Rooms

There is some contention that colours play a part in the effectiveness of the learning experience and the Consultant will be expected to bear this in mind when specifying the colour schemes for teaching facilities.

M.5 Synchronised Time Clocks

All teaching rooms on campus that can/may be used for examinations are to be equipped with PC-synchronised clocks. These are hard-wired into the central system (which is provided, managed and maintained by TTG) in a location agreed with TTG and are located on or adjacent to the main teaching wall.

Section N – Commissioning & Handovers

N.1 Commissioning by Contractor

All systems shall undergo a full and extensive commissioning procedure as well as a post-handover building tuning during the 12 months after handover.

Comprehensive documentation shall be provided to assure the University that the building performs in accordance with the design intent and the University's needs.

The various aims of the commissioning process are:

- To provide a safe and healthy facility for all the users
- To improve energy performance and optimise system performance
- To reduce operating costs in the short and long term
- To improve the orientation and training of the staff who operate the systems and equipment
- To provide improved documentation for future maintenance and reference purposes
- To ensure that all systems in the facility operate and interact as intended

The primary benefit of the commissioning process is that it serves as the overall quality assurance programme for the functional success of the project. It will ensure that the heating, lighting, ventilation, air conditioning, fire protection, emergency power supply and security systems all interact as intended in normal and emergency situations, as well as during the resumption of normal conditions after an emergency situation.

During the commissioning, all BMS points must be point-to-point tested and calibrated to operate correctly, including any relevant time scheduling. All BMS readings are to be checked over a continuous two week period with locally installed measuring equipment. All BMS points returned to central EBI system will be complete with University floor plan commissioned to the satisfaction of FMD Technical Service Manager and approved by same.

At the conclusion of the commissioning process a comprehensive report must be presented to the University for its records.

The Consultant and the Contractor are also to allow for and arrange periodic visits to the site to carry out the seasonal post-handover performance evaluations of the 12 month tuning period.

N.2 Independent Commissioning Agent

The University may wish to employ the services of an independent Commissioning agent to oversee and evaluate the commissioning procedures carried out by the contractor. This independent commissioning is separate to and in addition to any commissioning requirements included in the trade specifications. The contractor and the Consulting team must allow to liaise with, attend upon and co-operate with the independent commissioning agent during the course of his work.

The presence of the ICA does not in any way relieve either the Consultant or the Contractor of their duties in carrying out comprehensive commissioning activities.

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APPENDIX 1a

The EnergyWise Charter of Key Principles

Companies must have effective energy management policies and procedures and/or an energy management programme based on the following key principles.

1. Establish a corporate policy on energy efficiency.
2. Establish accountability for energy management.
3. Set targets for improved energy performance.
4. Monitor and evaluate energy usage levels.
5. Hold regular energy performance reviews.
6. Improve awareness of energy efficiency among employees.
7. Incorporate energy management into wider business or quality improvement processes.
8. Consider economic investment opportunities in energy efficiency.
9. Ensure energy efficiency considerations are taken into account in major (new or retrofit) building and factory construction projects.
10. Report energy performance changes and improvements to employees and, where appropriate, shareholders.

The Energywise Companies Campaign is run under the auspices of the Energy Efficiency and Conservation Authority (EECA).

For further information on the Energywise Companies Campaign contact:

EECA

Telephone: (04) 470 2200

Fax: (04) 499 5330

Website: www.eeca.govt.nz

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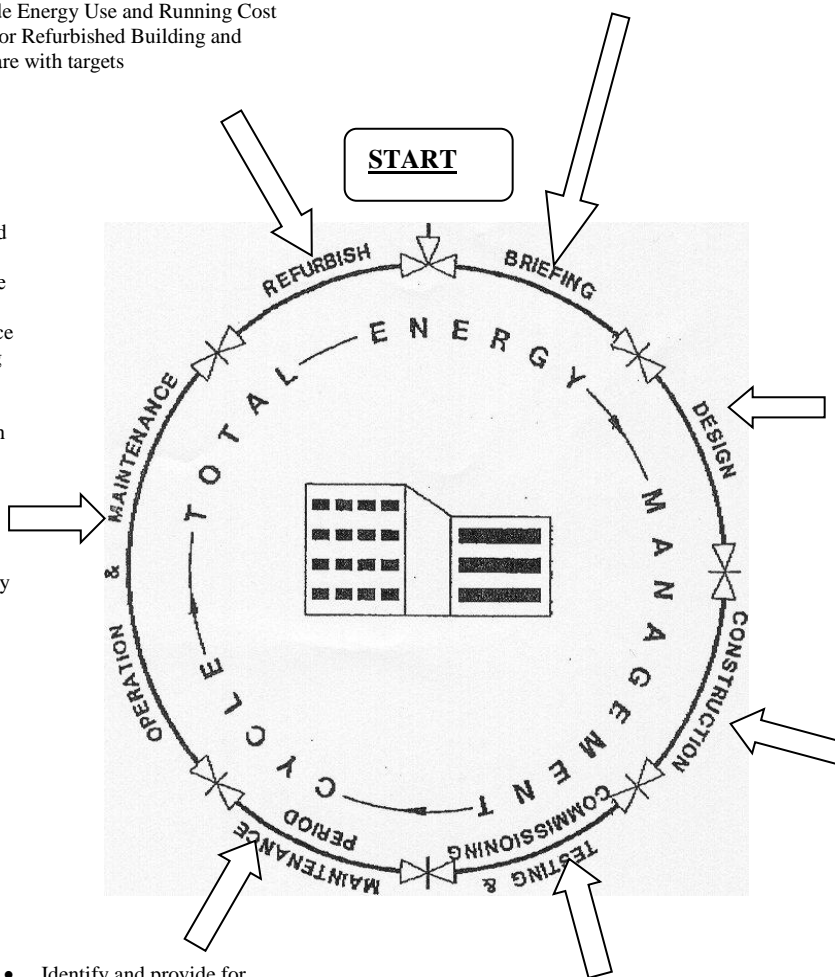
APPENDIX 1b

Total Energy Management Cycle

- Review Energy Use Targets against available technology and economic climate
- Provide Energy Efficiency Incentive of 2% Refurbishment Cost and allocate to measures which demonstrate a payback of less than 4 years
- Evaluate Energy Saving Options
- Provide Energy Use and Running Cost Data for Refurbished Building and compare with targets

- Provide Energy Efficiency Brief
- Provide Client and Design Team Briefing Guide for Energy Efficiency
- Establish Energy Targets

- Carry out Targeting and Monitoring of Building's Performance
- Carry out Monthly Energy and Performance Reviews and Reporting
- Carry Out Annual Energy Briefings and Saving Campaigns with Users
- Adjust targets as required
- Provide an Energy Efficiency Incentive of 5% of the annual energy cost to finance general aspects of the Energy Wise Campaign and small scale energy management improvement schemes



- Provide Energy Efficiency Incentive of 1% of Construction Cost and allocate to measures which demonstrate a payback of less than 4 years
- Provide Energy Use and running Cost Data for New Building and compare with targets
- Provide Metering and Monitoring Equipment within systems to assist in future energy efficiency operation of the building

- Ensure Energy Efficiency Measures and Standards of Construction are adhered to
- Ensure Quality Completion with zero defects in construction – link to Total Quality Management

- Identify and provide for specific 'aftercare' service from Design Consultant, Contractor/ Sub-Contractor and BMS Supplier to fine tune mix of Buildings, Systems and People during the Maintenance Period and to support FM staff during initial operation

- Provide for Commissioning and O&M Management Service to ensure new building is properly tested, commissioned and documented prior to handover.
- Set-up Maintenance Contracts or Maintenance Arrangements to ensure plant is operating correctly and efficiently

APPENDIX 1c

Key Design Issues Relating to Energy and the Environment

This design guide begins with a series of key issues relating to energy and the environment, which should be addressed in the design of any project. It applies to new construction projects as well as the refurbishment of existing buildings. Later portions of this document relate to other considerations, such as function, method of construction, cost and statutory controls, which may be regarded as equally significant determinants of design.

The key issues which must be considered in the design process are:

- Siting and orientation
- Built form
- Internal environment
- Means of ventilation
- Lighting and daylight
- Insulation levels
- Controls
- Fuel choice & monitoring
- Construction site management
- Other Reference Documents

1. Siting and orientation

Climate conditions will vary from site to site and it is important at the outset to establish the factors which may influence decision making. The University expects this examination to include seasonal temperatures, prevalent wind direction and strength, rainfall levels and sun paths.

On many sites there may be no options for significant repositioning of the building but these factors will nevertheless have an influence.

Choose siting and orientation for the building to benefit from solar gain. Consider the effect of adjacent buildings and the influence of the new building on its neighbours.

Ensure that maximum advantage is taken of unobstructed daylight in occupied spaces by optimum positioning of the building on site.

Give shelter to points of entry to the building.

Consider local factors such as noise or other environmental pollutants which may influence orientation.

At its simplest level a building merely protects its occupants from rain and wind. At its most sophisticated a building creates its own specific internal climate and may well alter the climate in its vicinity.

Influence the local microclimate where possible by modelling the ground form or by introducing planting to give shelter from the wind and driving rain.

2. Built Form

The form of the building is a significant determinant of the amount of energy utilised in its occupation and use. While the shape and size of any building will principally be determined by its function, the form and internal planning should be considered at the outset with a view to reducing the overall energy consumed. Decisions on built form and internal planning will ensure that principal occupied spaces are positioned to take advantage of daylight, natural ventilation and useful solar gain.

Generally, consider shallow plan buildings which can take full advantage of the natural external environment in terms of lighting and ventilation. Deeper plan buildings will usually require the provision of an artificially controlled environment with consequences for energy costs. Preferably, only specialist functions or processes which require a controlled environment should be serviced artificially.

As far as possible place principal rooms with a Northerly aspect to take advantage of solar gain which can contribute to the heating requirement in winter using carefully determined areas of glazing. Sunshading may be needed to prevent overheating in summer.

Use unoccupied rooms, storage areas, corridors or rooms with lower demands for heating or lighting to act as buffer zones on the colder southern faces of the building or in the western elevation which is difficult to shade.

Use the form of the building to modify the extremes of the external environment providing protection from excessive solar gain, or from wetting by rainfall which can 'chill' the fabric of the building.

3. Internal environment

In conjunction with the Design Team the University will determine the desired environmental conditions which are to be achieved in the building. The choice of temperature or lighting standards can have a significant influence on the overall energy consumption.

Select minimum temperature levels consistent with the provision of satisfactory conditions for the activity in the space.

Agree maximum comfortable temperatures with tolerance to allow for the occasional days when comfort conditions may be difficult to achieve naturally.

Choose appropriate lighting levels to optimise the energy required in achieving the desired visual standards.

Comply with any necessary statutory requirements.

Determine occupation periods or any periods when the building will only be in partial use.

Identify any particular activities or processes which will require specific environmental conditions, particular cleanliness or humidity control.

4. Means of ventilation

An adequate supply of fresh air is essential for our well being and is governed by the NZ Building Code. However, in the heating season the temperature of the ventilation air must be raised to ensure comfort. In a well insulated building the energy lost through ventilation can account for over half the total consumption.

Ensure that, in the heating season, the ventilation rate is kept to a minimum consistent with providing a satisfactory environment for the occupants while removing excess moisture or pollutants. Consider partial re-circulation where appropriate.

Construct a 'tight' building envelope to reduce uncontrolled infiltration losses. Detailing of the building must ensure satisfactory fit of components while allowing for movement.

Provide adequate seals for windows and doors to minimise heat losses due to uncontrolled air infiltration. Doors should be located in sheltered positions and provided with lobbies, revolving or automatic doors. Essential large openings into the building for traffic should be provided with draught lobbies or air curtains.

Always ensure that ventilation levels are adequate to remove pollutants and excess moisture which could otherwise result in condensation problems. Consider the use of 'heat recovery' systems to further limit the energy losses in exhausted air.

Out of the heating season and particularly in summer, sufficient ventilation is required to maintain a comfortable environment and avoid over-heating. Outside air temperatures are on the whole adequate to

provide comfort conditions without the need for air conditioning, except where specific activities, processes or equipment produce an additional heat input. Using natural ventilation to limit over-heating in summer and thus avoiding air conditioning can give savings of initial capital, energy and maintenance costs and, in certain situations, reduce the need for additional service spaces, suspended ceilings and the like.

Utilise natural ventilation in summer as far as possible with adequate size opening lights reducing the need for air conditioning.

Protect from direct solar gain which can be a cause of overheating.

Specific heat emitting equipment or processes should be cooled by local ventilation to keep the overall ventilation requirements to a minimum.

Consider the thermal mass of the building which can help to limit the peak temperatures by absorbing heat during the day, followed by overnight cooling when the temperature of the external environment is lower. This mechanism can be further enhanced by providing forced ventilation through certain building components at night.

Consideration should be given to the congregation of facilities/processes which emit a lot of heat into one area of a building so that it can be separately ventilated without affecting the remainder of the building. A similar procedure should be adopted for facilities/processes which have special cooling or climate control requirements.

Where there is no option but to air condition, utilise refrigerants with low ozone depletion potential or other alternatives such as ground water cooling.

Ventilation under buildings is also a very important design aspect which must be adequately considered.

The University's Environmental Temperature Control Policy is included as APPENDIX 2 and this should be used to guide the design process.

5. Lighting and daylight

As the energy consumption for space heating is reduced due to design improvements so the proportion of energy consumed in lighting becomes increasingly significant. Daylight can satisfy a considerable part of the lighting demand and provides a more acceptable visual and physical environment for the building users.

Where appropriate to the function, provide adequate glazed areas to give maximum utilisation of daylight.

Introduce borrowed light to landlocked areas such as internal corridors from adjoining spaces or rooms with access to natural light.

Design lighting layouts and switching arrangements to take advantage of the available daylight without using artificial sources. Use local lighting for the task in preference to overall illumination.

Consider the use of automatic controls for the artificial lighting to reduce electrical consumption as daylighting levels rise.

Adopt appropriate internal finishes to benefit from higher surface reflectances in the design of the lighting system.

Utilise the most efficient and appropriate light source and low loss control systems.

Glazing, particularly on the Northern and Western aspects of a building, admits radiant energy. Arrange glazing to take advantage of useful solar gain, but consider the need for shading to protect from overheating in summer. See also clause 2.7.5 – Solar Control.

6. Insulation levels

Increasing the overall levels of insulation in the construction of a building is probably the simplest way of reducing the energy consumption. Increased insulation can also give a more even distribution of heat throughout the building and therefore better and more comfortable utilisation of the space. The resultant higher surface temperatures will reduce the possibility of condensation, unsightly mould growth and damage to structure or internal decoration.

Require insulation standards to be increased to the maximum practicable level, usually well in excess of statutory minimum requirements. Insulation giving 'R' values of 3.5 for roofs, 2.0 for external walls and 1.5 for suspended/exterior floors should be exceeded in all but exceptional circumstances. Window:wall ratios should be kept to around 0.5:1. For areas where extensive glazing is proposed, double glazing should be considered to reduce heat loss and the likelihood of condensation.

Raise insulation levels evenly throughout the fabric of the building to avoid comparatively cold areas (which could result in local condensation problem.)

Pay particular attention to the detailed assembly of components at junctions to avoid poorly insulated construction, so called 'cold bridges', which result in heat being rapidly lost through the fabric.

Check that the build up of components and positioning of insulation in the external envelope does not give rise to condensation within the fabric.

Require good levels of insulation to pipework and water storage systems.

Ensure that all insulation products specified in the building are manufactured without the use of CFCs or HCFCs.

7. Controls

The installation of adequate control systems is essential to ensure that the internal environment closely matches the University's requirements in terms of temperatures, lighting levels, ventilation and periods of occupation.

Thermostatic controls must be provided to ensure that spaces are not overheated or overcooled and also to enable the system to actively respond to fortuitous gains from people, equipment, lighting or sun penetration through areas of glazing.

Install controls to allow individual occupied areas to achieve the required environmental conditions. In certain situations local heating for personnel may be considered, particularly where large spaces and low occupancy is a requirement.

Consider the zoning of environmental conditions to reflect different activities or orientation. Allow for future changes in occupancy pattern or function.

Control lighting to take advantage of day-lighting levels and to reflect occupancy patterns. Photoelectric controls and activity sensors may be appropriate and switching should be arranged to facilitate certain lights being turned off when not required.

Control Systems should be linked to the building management system (BMS) which can automatically determine optimum control regimes for maximum energy efficiency.

Buildings have traditionally been heated using gas fired boiler plant unless the requirement for heating was limited or localised such that a wet heating system could not be justified economically when compared to electric heating. The designer should critically evaluate this tradition in the light of changing gas supply circumstances in New Zealand.

Choose plant and heating systems which are matched to the building and convert supplied energy to useful energy with minimum losses.

Where functions or specific processes produce a surplus of heat, consider recovery systems to further reduce the requirement for supplied energy.

8. Fuel choice & monitoring

Energy targets at the briefing stage will enable the design of the building and its systems to be directed in terms of its ultimate performance. They will then provide a basis of comparison between the design consumption and the actual energy consumption in use. Computer modelling will enable the building's performance to be assessed at the design stage and this tool should be used to aid the setting of targets. Regular monitoring thereafter will ensure that systems perform satisfactorily and will identify options for improvement/ efficiency and give guidance for maintenance.

Adopt a Total Energy Management approach throughout the life cycle of the building as identified by the diagram in Appendix 1.

Install the necessary systems to enable ongoing monitoring of energy consumption when the building is brought into use.

Include planned maintenance schedules for all environmental/service systems, including planned cleaning and replacements of light sources.

User manuals for the various types of building occupants will give insight into the design philosophies used and they will provide guidance on the best and most efficient use of the environmental systems.

The University has a target campus-wide to achieve an aggregated maximum energy consumption better than 0.68 GJ/m². There is therefore an expectation that all new buildings will achieve substantially better consumption norms – figures in the order of 0.1 – 0.2 GJ/m² are envisaged.

9. Construction site management

The University is committed to being a sustainable business and wants its buildings to have the minimum impact upon the environment. Low energy design would suggest that we need to achieve a natural balance between the conditions created in the building and the external environment, wherever possible taking advantage of naturally occurring sources of energy; in effect using the building itself to modify the climate.

All these ideals and efforts will be negated if the same standards are not imposed during the construction stage as well. The construction of energy efficient buildings will demand careful control of site operations and a consistent management of quality if specified requirements are to be achieved.

In addition, the Design Team are to ensure that wherever possible standard sizes of material are to be used to minimise cutting and wastage, low total energy products are to be considered above those which have a higher total energy footprint and the contract documents are to have sufficient clauses, inducements and penalties to encourage the contractor to always have a well-managed, low wastage site.

Other design aspects which should be borne in mind to minimise wastage:

- Formally apply dimensional coordination where it will practically assist the efficiency of material use, particularly for modular components and materials supplied in set sizes or dimensions or where high levels of wastage may occur.
- Give design consideration to the future ability and ease of recycling construction materials and components at the time of refurbishment or completion of a facility's life.
- Prepare and implement waste management project plans during project in the construction phase for construction and demolition wastes. Plans should identify the alternatives to landfilling and describe procedures and management practices.
- Make provision in project programming for the recovery, storage and transfer of re-useable materials from demolition works including their transport from site to recycling and re-use stations; specify accordingly and supervise during construction. Consider the use of separable or early works packages where this is of advantage to the project.
- Adopt special procedures for disposal or recycling of hazardous materials in refurbishing existing buildings.

10. Other Reference Documents

The Design Team should also take every opportunity to refer to other reference documents, case studies, standards, guidelines, etc which may assist in developing a better and more sustainable, efficient design.

One such guide is “The Better Building Code” developed by the Waitakere City Council.

APPENDIX 1d

Checklist of Sustainability Issues to be Considered

Sustainability issues

A. Optimise the siting and orientation

1. Orientation (regarding sun hours, maximise northern aspects, prevailing winds)
2. Landscaping (natives, allow sunlight penetration, possible use of grey water, avoid contiguous impermeable surfaces)
3. Transportation systems (pedestrians & cyclists over motorists)

B. Minimise energy consumption

1. Passive design features & climate-responsive design (passive solar design & shading, window choices, walls & roof to be insulating, durable & reflective, building mass, high ceilings, exposed concrete ceilings, HVAC ducts within concrete floor beams, possible use of specialised aerated concrete)
2. Use daylighting (including atrium, roof lights, reflective surfaces), passive solar heating, photo-voltaics and daylight-sensitive lighting
3. Use efficient/intelligent HVAC & lighting systems (energy star products, modular components to enable part-load efficiency, pre-heating and pre-cooling incoming air, solar inputs, use high-performance lamps & ballasts, good balance of ambient/task lighting, individual controls where possible, avoid HVAC inputs where possible, use of heat recovery ventilation systems)
4. Building management system control of all lecture/computer spaces with manual overrides on timers
5. Use occupancy sensors, air quality alarms (manage lighting, HVAC)
6. Commission all plant & equipment (on installation and at regular intervals)
7. Set energy use targets (CO₂ emissions, heating loads, electrical loads, U values, etc)
8. Examine possible use of alternative energy generation
9. Measure and report on performances, consumption, etc

C. Protect and conserve water

1. Re-use water (grey water for gardens, toilets on lower levels)
2. Use water efficiently (low-flow or dual flush toilets, restricted volume taps, waterless urinals)
3. Control run-off (landscaping, catchpits to holding tanks)

D. Optimise designs and use environmentally preferable products

1. Minimise life-cycle impacts
2. Manage the process from raw material - manufacture - use - reuse/recycle/disposal
3. Packaging, transportation and installation
4. Use materials which have high recycled content (cellulose ceiling tiles, polyester fabrics)
5. Design for incorporation of standard material & product sizes
6. Good programming and logical construction sequencing to avoid extras/delays
7. Design for demountability/accessibility & future-proofing

E. Enhance indoor environmental quality

1. Value aesthetic decisions (provide windows for views & ventilation, ensure superior detailing & quality workmanship, integrate into local context, ceiling lighting to avoid cave effects, use colour to improve ambience)
2. Maximise daylighting and radiant temperature gains (by using high performance windows, daylight deflectors, skylights, clerestory windows)
3. Appropriate ventilation & moisture control (consider use of floor plenums, minimise ceiling voids, manage moisture dynamics, test & commission ventilation systems, carefully locate exterior intakes, monitor air quality continuously/regularly, ensure airtightness of the exterior fabric/windows/etc)

4. Avoid materials with high emissions (limit use of volatile organic compounds VOC's, use water-based paints/adhesives, provide safekeeping for chemicals/cleaning materials) during construction and in fixtures
5. Provide humane working environment (conviviality)

F. Optimise operational and maintenance practices

1. Involvement of maintenance/operations staff in planning/design
2. Impacts (environmental, energy) of operating/maintaining the building
3. Sufficient areas for refuse/recycling receptacles & servicing thereof
4. Reduce maintenance by improved design specification
5. Minimise fuel, water, energy usage
6. Avoid chemical/toxic/malodourous cleaners
7. Ongoing post-occupancy feedback by users

G. Construction Site Management

1. Staging & timing of work (excavations in dry period, close in building as quickly as possible)
2. Site management (clean & tidy worksite to avoid wastage)
3. Formal waste material management program (educate workers, on-site sorting of waste, reduce/reuse/recycle before disposal)
4. Packaging (minimise, reuse/recycle/sort)

APPENDIX 2a

Noise and Vibration Nuisance

1. Limit Construction Noise

Wherever possible, the Contractor shall minimise the effects of noise generation by including in the planning of the work such factors as placing of plant, programming the sequence of operations and other management functions.

Construction noise must be limited to comply with the requirements of NZS 6803:1999, the requirements of the Resource Management Act sections 326, 327 and 328 and the Health and Safety in Employment Act.

The works are to be carried out in or around occupied premises. It is the Contractor's responsibility to confirm the nature and times of occupation and use during all stages of the contract. The Contractor shall carry out the works in a manner to minimise inconvenience, nuisance and danger to occupants and users.

The Contractor shall also take cognisance of the nature of the operations of the University and the periods of the year which are critical and sensitive with regard to noise disruptions – examination periods being the predominant times in this regard. The dates of the various University activities as well as hours, when relevant, are given below. It is to be noted that examinations are held in numerous buildings, so disruptive noise which could affect examinations in these venues must be curtailed between 09:00 and 18:00 on all examination days, Monday to Saturday.

2. Acceptable Noise Levels

The Contractor is referred to NZS 6803 Table 3 for the upper limits of construction work noise permissible in industrial and commercial areas over the various time periods, particularly 0730 to 1800 hours. The Contractor shall not exceed these limits.

3. Provide Information and Liaison

The Architect will advise the Contractor of a University staff member who has been specifically nominated to be the primary liaison between the Contractor and the building occupants on noise and related matters.

The Contractor shall liaise closely with this individual to advise of any activities which may potentially give rise to extraordinary noise or vibration generation on the site. The Contractor must be prepared to:

- a) explain the means being used to minimise excessive noise/vibration and
- b) establish with the staff the most suitable time(s) for the noise/vibration-generating work to be carried out.

4. Noise/Vibration Complaints and Disputes

In the event of a complaint the Contractor shall re-assess the measures being used to minimise noise and/or vibration and modify these measures to accommodate particular circumstances where possible.

If a dispute arises, the Contractor shall determine the sound level at the location under discussion using methods and observation reporting as laid down in NZS 6803:1999. If the noise level is above the upper limits of Table 3, the Contractor shall cease the noise generating operation and remedy the problem.

5. Additional Noise/Vibration Constraints

The University Campus is a working environment and, from time to time, there may be extraordinary requests from the Principal through the Architect to temporarily (or otherwise for set periods) to stop all work the Principal in its sole discretion considers to be disruptive from time to time (which may include all work).

The Contractor shall immediately cease such work as requested pursuant to this paragraph.

This paragraph applies whether or not the Contractor is in breach of the Contract Documents (in relation to noise, dust, vibration or other disruptive work) and the rights given to the Principal under this clause are without prejudice, and in addition to the Principal's other rights and remedies.

A provisional sum has been allowed in the Schedule of Quantities to meet any additional Cost which the Contractor reasonably incurs arising out of the Contractor ceasing work pursuant to this paragraph, however no additional Costs may be claimed by the Contractor if the request to cease work is as a result of the Contractor not complying with its obligations in respect of noise, dust, vibration or other disruptive work as set out in the Contract Documents.

Any requests received from the Principal's staff or students in relation to the Contract Works should be referred to the Architect for direction and decision.

6. Critical Dates in the University Year

The dates of the critical activities in the academic year, especially the Study and Examination period will be provided. The Contractor is to take cognisance of these dates and plan his operations around these dates.

7. Activities which are Deemed Disruptive

The following is an indicative list of activities that are deemed to be very disruptive (i.e. they are activities giving rise to excessive noise and/or vibration). Careful planning is essential to avoid the use of these at critical periods or in the critical locations in and around the adjacent buildings.

- Percussion drilling
- Pneumatic/electric concrete breakers
- Concrete vibrators
- Power-actuated nail fasteners
- Concrete saws
- Pile driving

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APPENDIX 2b

Value Change Proposals (VCP)

1. Background

It is the intention of the parties that collective skills in design and construction be utilised on the Principal's behalf using collaborative principles to reduce total costs of the works consistent with the Principal's brief. As construction costs are a function of design solutions produced in compressed timeframes, it is acknowledged that traditional project delivery systems often mitigate against lowering project costs in the Principal's financial interest. Equally, the system does nothing to provide benefits or incentives to do better. This Contract seeks to attempt to rectify that situation to the mutual advantage and financial benefit of the Contractor and the Principal.

2. Cost Reduction Methods

The nature of the Contract Works is such that there is the potential for "alternative" methods of construction or design affecting the cost of construction, which could effect time or cost savings on the Contract Works. In order for this potential to be explored and the parties involved benefit from examination of such alternative methods the VCP as set out in this clause has been incorporated in the Special Conditions of Contract. The basis of the VCP is that any proposals identified by the Contractor, which are timely and practical and meet the VCP criteria, will be encouraged by the Principal (as set out in this clause) for adoption on the Contract Works. Due to the current Building Act consent requirements the use of the VCP approach generally needs to be undertaken at commencement of the Works and so the maximum cost reduction can be obtained through achieving benefits during each successive Stage.

3. Application

This clause applies to any VCP initiated by the Contractor and developed by the Contractor with the project participants during design evaluation. Whilst VCP's are administered within the provisions of Variations of the General Conditions, VCP's shall be identified separately from Client Initiated Variations which shall not be a VCP. VCP's shall be administered in accordance with the terms and conditions set out in this clause.

- a) It is intended that VCP's will result in net savings to the Principal by providing a decrease in the cost of performance of this contract. For a VCP to be acceptable it must meet the following criteria:
 - i) results, or is likely to result in actual savings to the Contract Price;
 - ii) not impair any required functions and characteristics such as service life, reliability, economy of operation, ease of maintenance, standardised features, aesthetics, fire protection features and safety features presently required by this contract;
 - iii) involves a Variation to the Contract Works;
 - iv) reasonably arises as a result of the actions or activities of the Contractor.

Nothing in 3(a)(ii) precludes the Contractor from submitting a VCP where the Contractor and Principal agree that the required functions and characteristics set out in 3(a)(ii) could be combined, reduced or eliminated as being a non-essential or excessive to the quality profile or function required by the project brief or the work involved.

- b) The following shall not be capable of being a VCP:
 - i) Adjustments in Provisional Sum allowances or where unit costs of material and/or labour are estimated in provisional and prime cost sums, the actual cost of those materials and/or labour when tendered.

However, where the Contractor, through its input and expertise, clearly effects a cost reduction in the settlement of Provisional sums, then the Architect ay, but is not obliged to, award the Contractor such cost reduction as a VCP.

- ii) A proposal to decrease the cost of performing the contract solely or principally by substituting another subcontractor for the one listed by the Contractor.

In considering a VCP which, as an incident thereof would entail substitution of a listed or nominated subcontractor, the possible replacement will be taken into account along with the VCP Criteria.

- iii) Pure substitution of one material or component for another, which leads to reduction in cost (but not in function quality).

However, where due to the circumstances, market forces and opportunity similar products and materials can be obtained at a lesser cost which can be to the Principal's cost benefit and the Contractor reasonably uses its skills and experience to obtain such products and materials such savings may be accepted by the Architect as a VCP subject to satisfaction of the Criteria set out in clause 3(a) (VCP Criteria).

- iv) A Client Initiated Variation.

4. Cost Saving Incentives

Incentive provisions are provided as part of the VCP process on the basis that proactive input and initiatives by the Contractor in decreasing the costs of performing the works should result in financial benefit on the following basis:

- a) Savings are to be measured against the Contract Price for each trade work package. They shall exclude the fixed margins for overhead and/or profit and/or preliminary and general costs and they shall also exclude any contingencies.
- b) Savings as calculated are to be the actual net savings achieved, which means that any costs incurred by the Principal to give effect to the savings (including but not limited to redesign) or arising out of the work associated with the savings are to be deducted from the amount of the savings.
- c) Reduction in the cost of performing the works pursuant to an accepted VCP shall be treated as work measured and described in the schedule of prices where equivalent items exist.
- d) Where a VCP Instruction is issued and resulting savings are achieved below the Contract Price in respect of the particular trade work package those savings shall be shared equally (50:50) between the Contractor and the Principal.
- e) The Contractor must incorporate into any sub-contract agreement with the major subtrades the potential for those subcontractors to also achieve cost savings where those subcontractors, initiate and offer acceptable cost reductions for their design work packages. In that case the savings share regime Sub-contractor:Contractor is to be 20:80 with the Contractor's share (80%) to then be shared equally with the Principal.
- f) Where a VCP Instructuion is issued pursuant to clause 3(b)(iii) appropriate savings will be negotiated between the parties by the Architect but the Contractor shall not be entitled to more than 50% of the savings achieved.
- g) Clearly the greatest potential to achieve cost reduction or options and alternatives arises upon and within three to six months of the appointment of the Contractor. During that period the Architect and the Contractor, with appropriate consultants will meet as required to identify, list and explore cost reduction potential on this project. The contractors and consultants time costs for these meetings will form part of the costs to be included as part of the assessment provided in compliance with 5(b) - *refer below*.
- h) Some VCP proposals may involve the transfer of risk to effect maximum cost saving potential. Where this possibility exists identification of how to manage the risk relative to the rewards offered will be agreed prior to acceptance.
- i) Common sense dictates that some items as identified are not worth exploring and these commonly involve suggestions where savings of less than \$5,000.00 in total are involved.

- j) Shares in savings due to a party pursuant to this clause shall be paid by way of an appropriate adjustment in the Contract Price in the Payment Schedule relating to the relevant work after savings have been achieved. The Architect may at any later time make any required adjustment to the Contract Price to reflect the actual savings achieved. No margin for Overhead and Profit will apply to a VCP.

5. Data Required from the Contractor

It is recommended that the Contractor raise any potential VCP's informally with the Architect and the appropriate consultancy design discipline leader before carrying out the steps set out below.

With each VCP, the following information shall be submitted to the project design consultants. Whilst the consultancy design team members will provide input and coordinate documentation particularly with regard to Architectural, engineering or other design analysis as below, it is the Contractor's primary responsibility to assess and provide the initial likely design impacts.

All VCP submissions shall include:

- a) A brief description of the difference between the existing contract requirement and the proposed change. The comparative advantages and disadvantages of each, including justification where function or characteristic of a work item is being reduced or altered.
- b) Separate detailed cost estimates for both the existing contract requirement and the proposed change, and an estimate of the change in contract price, including consideration of any initial or consequential costs of redesign and redocumentation by the Project Consultants and implementation of the VCP and the sharing arrangement set forth in this clause.
- c) Architectural, engineering or other design analysis in sufficient sketch detail to identify and describe each requirement of the contract which must be changed if the VCP is accepted, with recommendations as to how to accomplish such change and its effect on remaining unchanged work.
- d) The Contractor's reasonable estimate of the time/date by which the Architect must give approval to the VCP in order to obtain the maximum cost reduction during the remainder of this contract, including Building Consent, noting any effect on the contract completion time or delivery schedule.

6. Architect's Approval

- a) The Architect may modify a VCP, with the concurrence of the Contractor, to make it acceptable and the assessed actual net savings will be based on the VCP as modified.
- b) Pending written acceptance by the Architect of a VCP, in whole or in part, the Contractor shall remain obligated to perform in accordance with the terms of the existing contract.
- c) A VCP shall be approved through the issuing of a Contract Direction but with the value of Variation created by the VCP to be as set out in the VCP.
- d) The Architect or the Principal shall not be obliged or compelled to accept or proceed with a VCP and may in their sole discretion choose not to do so notwithstanding any savings that may be achieved.

APPENDIX 3

University Environmental Temperature Control Policy

Background: The heating of work spaces to meet winter conditions is routinely provided within the University, but air conditioning for personal comfort reasons is not ordinarily provided. Buildings constructed, or alterations done since have been detailed to comply with NZS 4303 (refer clause G4, ventilation). The University recognises its responsibility to provide a reasonable working environment for staff and students that is environmentally sustainable and economical. The climatic conditions in Hamilton are such that air conditioning is not recognised as essential, although to meet NZS 4303 it is certainly provided in certain circumstances, for example, in larger lecture rooms and theatres, and in spaces where there is considerable thermal load from equipment, for example computer laboratories. There are certain other localities where circumstances dictate that air conditioning is the only reasonable solution. The University's draft purchasing protocol requires that requests for air conditioning must be referred to Facilities Management Division (FMD).

Air conditioning is defined as a combination of mechanical ventilation, heating and cooling to provide equable working conditions. Air conditioning is expensive in terms of capital cost, in running costs, and in maintenance and replacement costs. It adds additional load to incoming power mains and has a cumulative effect, both on the electrical infrastructure, and peak load demand on electricity supply. Peak demand triggers a higher cost for the total electricity consumed by the University. It is therefore in the University's financial interests to keep that load to the minimum.

Air conditioning systems have been implicated in health and safety issues such as "sick building syndrome". Whenever possible a plentiful supply of fresh air should be the first priority. Staff who cannot open and close windows to help regulate their own personal thermal comfort often complain about their working environment and report a range of symptoms.

Note also the following statement from the Facilities Management Division Strategic Plan:

"IN ASSET MANAGEMENT FOR THE UNIVERSITY:

The choices which we make on the University's behalf in asset management and facility operation will be:

- (a) Fit for the purpose, and state of the art*
- (b) User friendly and client oriented*
- (c) Fully compliant with legislation*
- (d) Culturally appropriate*
- (e) Environmentally sustainable*
- (f) Future proofed*
- (g) Efficient, effective, and economic"*

Process: Requests for an investigation and report on environmental temperature control in work spaces (other than requests for ordinary maintenance) must have the support of the Dean or Director of the School/Division concerned. Supporting advice may be sought from the Health & Safety Coordinator. Requests will be made in the first instance to the Director who will arrange for an assessment to be done. FMD staff will first assess and report on existing conditions, ordinarily following the installation of a portable temperature measuring device for a period. They will interpret the results of the measurements, and advise on alternative solutions, if there is a problem.

Options to be considered: The following are options which FMD staff (or consultants) will be required to report on prior to making any recommendation for or against a request for air conditioning; either retro-fitted in an existing building, or in a proposed new building.

1. ***Shading, screening, tinted glass, blinds, insulation, external paint colours, and other passive solar options:*** Can heat loading in a space be reduced by one or a combination of these options?
2. ***Provision of fans*** - fixed or personal. Will this provide a satisfactory result?
3. ***Efficient building use:*** Are there alternatives by making better use of design of spaces relative to windows, etc to reduce the effect of solar gain? Can functions be relocated to provide better working conditions within existing buildings?

4. **External environmental changes:** Is it possible to grow trees for shade, or to introduce water features outside to effect an environmental improvement?
5. **Air extraction:** Will mechanical extraction improve conditions?
6. **Windows:** Would the provision of more (or a better kind of) opening windows produce a satisfactory result?
7. **The do nothing option:** Are the working conditions in the space concerned likely to be reasonable in ordinary circumstances, with existing ventilation in place and operating normally?

Some small minor improvements, for example, provision of blinds or curtains in an office can be met from the maintenance budget.

Only in the event of the exploration of the above alternatives producing an unsatisfactory result will air conditioning be considered. An approved scheme will be regarded as a capital improvement and charged to one of the University's capital budgets. The choice of which budget is to meet the cost of an approved improvement will be made on the recommendation of the Pro Vice-Chancellor (Resources).

APPENDIX 4

Approved Products

DEVIATION FROM THESE PRODUCTS ONLY WITH THE AUTHORITY OF THE PROJECT MANAGER

1. DOORS AND DOOR HARDWARE

LOCKS & LATCHES

In all locations -- LEGGE PACIFIC 990 Series with extended striker plate if required.

Only genuine Legge Pacific cams to be supplied for cylinders

LOCK TYPE:	FUNCTION:	FURNITURE:	
Office	V21 / V22	ALPHA 702 & 714	SCP(Satin Chrome Plated)
Passage	C 57 / C58	ALPHA 703 & 712	SCP
Privacy	C33 / C34	ALPHA 704 & 714	SCP
Store Room	V9 / V10	ALPHA 702 & 712	SCP

FOR ALUMINIUM HINGED DOORS:

Commercial sections (size 100x40mm for stiles) to accommodate Legge 990 lock assembly.

For exterior doors	ALPHA 702 & 712	SCP
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Doors requiring narrow stiles are to have prior approval in each case (see clause 2.9.4)

Doors with narrow stiled section must accommodate a 30 mm backset and must be fitted with Legge 995 V Series

With furniture	5300 Series	5300 & 5303	SCP
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Also to accommodate hold back cylinder for exterior doors or Cardax control

APPROVED DOOR HARDWARE

<u>DOOR STOPS</u>	Drake and Wrigley	1408 floor mounted	SCP
	Drake & Wrigley	1086 wall mounted	SCP
<u>FLUSH BOLTS</u>	Drake & Wrigley	1240-150 on face of door	SCP
	Drake & Wrigley	1240-200 on face of door	SCP
<u>DUST SOCKETS</u>	Drake & Wrigley	131	SCP
<u>PULL HANDLES</u>	Drake & Wrigley	1427 -- 250mm grip length	SCP

PANIC BARS - EMERGENCY EXIT DEVICES Briton or Lockwood
Van Duprin 22 series to all egress routes

HINGES Bloore & Piller 8560 100 X 75 or 100 X 100
If Stainless Steel, they must be of the ball bearing race type

DEAD BOLTS SCHLAGE B160 single cylinder
B162 double cylinder

DOOR CLOSERS SURFACE MOUNTED IS THE REQUIRED OPTION.

Exterior doors Schlage 1461 DE aluminium finish
internal doors on egress routes and lecture theatres Schlage 1461 DE aluminium finish
office doors Schlage 524 aluminium finish

TRANSOM CLOSERS – CONCEALED

non held open Dorma BTS 85 With extended pivots [no packing under pivots]
for exterior doors Dorma number 3
for internal doors Dorma number 2

NB Door stops must be used with transom closers.

2. TOILET FITTINGS AND FIXTURES

Toilet Flushing. – Zurn Z-6140 or Z-6010 flushing valves with push button for public toilets. The hydraulic remote valves are preferred. Available from Macdonald Industries Ltd.

W C pans – to be Coroma or Opal 2000 back to wall or Adaptacare accessible pan (in accessible toilets.)

Urinals - Ceramic urinettes where possible, to be Caroma Torres model.

Wash Hand Basins – to be Caroma Concorde 500 semi-recessed or Regent Mini whb generally, and in accessible toilets to be Caroma Integra 500 wall basin.

Taps – For w.h.b's, to be Alvita basin mixer 2000 series.

Electric Hand Driers – Supreme BA101.

Soap Dispensers – To be supplied by University.

Toilet Roll Holders – To be supplied by University.

Drinking Fountains in Foyers. – Burns and Ferrall Delux.

Hot Water Boiling Units – Zenith (7.5 litre electric hydroboil in white or hydrotap)

3. GALLAGHER (formerly CARDAX)

Exterior card access	Cardax swipe plus reader white T20 series
Interior card access	Cardax swipe reader white T10 series C300401
Interior card egress	Cardax exit reader T10 series white C300401 – must be used on all computer lab exit doors.
Push Button release	Heavy duty red push button. Light switch type is not acceptable
Door release	White break glass indoor call point with a piece of glass with hinged plastic cover face
Door clamps	Loctronic magnetic clamp Slimline 1710, 12 volt, with full width housing extrusion (silver aluminium finish) and bond sensing 13001bs Holding force
Door strikes	Trimec BS9000 electric strike (to suit metal or timber door as necessary), 12 volt
Door holdbacks	Loctronic FDH 40S, universal mounting Fire Door holding electromagnets, 12 volt DC (silver aluminium finish)
Door Controller	Gallagher FT6000 C300100 with 8H Module C300182 Expanded to 32 Inputs using expansion units
Licenses	Purchase licenses for any new equipment supplied.
Power Supplies	Use only Innovative SR100 or SR250 PSU's. Allow 50% surplus capacity. Allow sufficient 40 Amp cell batteries for 8 hours standby.

4. HIGH LEVEL SAFETY SYSTEMS

The UoW's preferred provider is Andrews Property Systems to whom all aspects of system selection, design and installation are to be referred.

5. FLOORING

The University has a Supply & Service Agreement for Carpet Tiles with Inzide Ltd (formerly Interface). No carpet is to be specified for use anywhere, unless with FMD approval or re-cycling of existing stock. The preferred range of carpet tiles is Inzide Cubic – and offices are to be floored with 'Cubic Dimensions' unless FMD approve otherwise. These tiles are random pattern. The tiles are not to be stuck down but rather secured with Inzide's 'Tactile' system. The exception to the use of Tactiles is on vertical surfaces and on stair treads.

The "walk on" product used at entrances can typically be either Autex Decord Storm Grey or Autex Widetrack Ash.

The preferred vinyl type is Halstead's Polyflor 2000, Larkspur 8350.

FMD holds a small quantity of all the above in stock.

6. SUSPENDED CEILINGS

The preferred grid size is 600 x 600, utilising USG's 'Mars Clima Plus' rebated tiles. Use only 24mm wide exposed T grid rails.

Where light fittings or air handling grilles occur in the grid, their trim must be consistent with the 600 x 600 grid and not require the use of cut ceiling tiles.

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APPENDIX 5

Facilities Management Permits and Control Documents

Some or all of these documents may be required in the course of any major building project.

The latest updated versions of the documents will be available from the Service Desk at the Facilities Management offices.

1. **Hot Work Permit**
2. **Confined Spaces Permit**
3. **Plumbing Permit to Work (described in Section F.1)**
4. **Registration of Fire Wall Penetrations (described in Section G.10)**
5. **Fire Alarm Isolations**

Lock-out Procedures - in addition to these, there is also the requirement for adherence to the Electrical and Machinery Lock-out procedures as described in Section I.6 and J.7.

General Procedures – Arrangements must always be made timeously when services are to be affected. Special attention is to be given to teaching spaces and those areas where critical scientific experimentation is taking place or where computer systems could be affected.

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