THE UNIVERSITY OF WAIKATO
*Te Whare Wānanga o Waikato*

**PROPERTY SERVICES**

# Standard Brief

# For Design and Construction

# of Campus Facilities

**October 2021**

# Standard Brief For Design and Construction of Campus Facilities

The quality of any University building project depends on the Design Team's complete understanding and correct interpretation of the University's requirements. It is, therefore, important for Designers 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. In all cases where detailed policies or statutory requirements are in place the guidance in this document does not substitute for a detailed study and application of the requirements of the specific documents. Safety-in-design techniques are to be employed to ensure that building users and maintainers have an optimum working environment.

**This Standard Brief is for use as a directive for the Design Team. It is not a substitute for complete and competent designs and specifications by the Design Team. It is NOT to be bound into the contractual specifications as a "catch-all" for items that may have otherwise been missed in the drawings and specification documents.**

Criticisms, suggestions and queries concerning this standard brief are welcomed – they should be directed to the Property Services (PS) staff of the University of Waikato, directly concerned as follows:

Mr Tony Kavanagh – Director, Property Services
Mr Grant McEwen – Assoc. Director, Facilities Operations

"University's approval", or similar expressions in this document, mean approval on the University's behalf, as given by the Project or Job Manager.(The terms Project Manager and Job Manager are used interchangeably to refer to the person nominated by Property Services to exercise control over a particular project.)
Throughout the document the term "Consultant" and "Design Team" are used interchangeably to refer to the consultant specialist/s who have been engaged to assist the University with a building project.

The following documents are to be read in conjunction with this brief:

1. **The New Zealand Building Code and NZS 4121.**
2. **The University Safety and Wellness Policy.**
3. **ITS Division - Standards and Requirements for Cabling on Campus.**
4. **ITS – Standard Teaching Room Requirements v2.**
5. **Security Standards for the University of Waikato.**
6. **The University's Emergency Procedures Brochure.**
7. **The University Standard Signage & Wayfinding Guideline.**

The University documents are available upon request.

**T Kavanagh** Director: Property Services

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# Section A – Sustainability & Environmentally Sustainable Design

## A.1 General

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 adopt the best Energy, Environmental and Sustainability practices in the development of their project.

This design guide refers to a series of key issues relating to energy and the environment, which should be addressed in the design of any project - see **Appendix 1**. 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.

Of particular concern are the following:

**Sustainability**

The University has a commitment to sustainability via its Strategy Action 6: Ensure sustainable practices in all aspects of University activity.

The term sustainability encompasses more than just environmental aspects. It includes social responsibility, ethics, culture, health, ecology, resilience and economics. In terms of including sustainability in building and design, practices must consider and include environmental and social responsibility, to ensure there is limited harm on the community and environment.

**Climate Change**

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 reputedly account for approximately 22% of our nation's fuel consumption and approximately 17% of carbon emissions are from the construction and operation of buildings. 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.

Designers must recognise and support the University's ongoing commitment to reduce our carbon footprint in relation to construction materials, types of energy and types of greenhouse gas emissions. The University has an obligation to ensure we do not add to our total footprint and lower carbon alternatives must be sought wherever possible. The cost of construction must be balanced with the University's target of becoming carbon zero by 2030, while ensuring that true costs are not deferred to some later date.

**Waste**

Most products purchased have some environmental impact but this needs to be minimised where possible. The University's Waste Minimisation and Management Programme has been developed to provide a basis for good practice, environmental responsibility, and methods for waste reduction/diversion methods on campus. The programme supports a holistic and integrated management approach, for which the reduction of waste generation and its environmental impacts are key.

The following need to be considered by designers and contractors:

- Minimisation of waste in the design and implementation process, and the effective reduction, reuse, recycling or recovery of products,
- Chemical composition and hazardous potential
- Cradle to grave life cycles of products, including their environmental and social impact,
- Products and processes that minimise waste and encourage durability.

**Water & Electricity**

The consumption of water and electricity are significant ongoing commitments that the University seeks to minimise wherever possible. The design team are to continually seek opportunities in this regard.

### A.2 Solar Control

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

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 significant 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 1 and Appendix 3**.

### A.3 At the Start of a Project

At the start of any large project, it is essential that the design team confirms the University's commitment to sustainability during the design, construction and subsequent operation and maintenance.

Clear directives are required and these should include the possible commitment to International Sustainability Benchmarking using the Living Building Challenge (LBC), the New Zealand Green Building Council's (NZGBC) Star Accreditation, National Australian Built Environment Rating System (NABERS), or other systems.

# Section B – Preliminary & General Matters

### B.1 Building Code, Resource Consents and Development Levies

Prior to submission to the Territorial Authority, approval of the outline plan and elevations has to be obtained from the University's Campus Development Committiee. The consultant will liaise with the University regarding the responsibility of the submission for Resource Consent approval. The Consultant is to be responsible for the preparation of all documents necessary to obtain Resource Consent approval, should this be required.

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 and 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 evidence that CCC has been applied for and granted and that a Certificate of Public Use (CPU) if required is in place for the interim period.

The Hamilton City Council's Development & Financial Contributions Policy currently provides for development contributions to help fund the growth of infrastructure and facilities in the city. To this end charges may be 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.

Documents which must be completed at the time of CCC application include:

- Evidence that all CCC inspections have been carried out and passed
- Letters of practical completion from each consultant
- Defects registers
- All warranties and guarantees
- All instructions relating to ongoing cleaning and maintenance
- Contact list of all project stakeholders

Further details concerning O&M Manuuals and completion handovers are included in Section B.25.

### B.2 Health & Safety

Site specific safety plans (SSSPs) are required from all contractors and must cover all activities on the site.

The Consultant is to include in the contract documents specific clauses covering Health and Safety at Work Act matters and control of all workers engaged in the project while on the campus, including any specific UoW requirements.

No worker engaged in any construction work on a University campus should begin any contract works without first undergoing a site induction.

The consultant team is to consider safety in design during all stages and disciplines of design. It is both a University and a legal requirement for the consultant to create designs tha twill reduce the risk to the safety of staff, students, visitors, buildiners, those who service and maintain the facilities and any other people who could be affected by the work.

Any area that provides a risk of fall must be adequately planned, and by elimination, mitigation or isolation, the risk must countered. Of special concern are roof edges, large penetrations and skylights which may require access for maintenance purposes.

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

Prior to the commencement of any contract work the contractor must familiarise themselves with all relevant legislation and UoW documents.

For all work that involves welding, cutting, or the use of a naked flame or other heat source, a Hot Work Permit is to be obtained from the University's Project Manager, 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 specific 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.2 regarding fire alarm isolations, which should take place for all types of work, hot or cold dusty or clean.

See also Sections I.8 and J.9. regarding Locking-out procedures when work is done on electrical and mechanical equipment.

## B.4 Design for Accessibility and a Maturing Population

All buildings shall be designed for access and use by those with limited mobility in accordance with NZ Building Code and applicable standards and guidelines including NZS 4121/2001. The University must be consulted on any specific requirements.

Designs must acknowledge the growing use of motorised wheelchairs. These are substantially heavier (up to 150kg total wt), bulkier (longer & up to 850mm wide) and less manoevrable (larger turning radii) than hand-powered wheelchairs.

Particular attention shall be paid to toilet facilities, showers, lifts, door sizes, door swings, floor finishes, hardware, hand rails, services, access and parking. Each floor of a building shall incorporate an accessible toilet for the disabled for males and for females unless the University agrees otherwise. (In smaller buildings, separate-access unisex toilets may be considered.) Pre-install dwangs/nogs for the future addition of grab rails.

Allow sufficient space in offices, bedrooms, etc for wheelchair access around the furniture. Provide taller and deeper kick spaces. Avoid placing storage spaces or drawers at low level. Also avoid any high level storage units. Provide low level counter areas or pull-out benches for use by wheelchair-bound users.

Main 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.) Mat wells are not to be specified or provided

Consider installing mechanised lifting equipment to eliminate manual lifting tasks.

Confirmation must be obtained that lift suppliers will comply fully with the details of NZS 4121:2001, especially with regard to grab rails.

Provide good visual indicators for changes in building features (eg doors, walls, glazed units, cabinets) and also ensure good lighting in all critical areas. Of particular interest are the leading edges on frameless glass auto doors and stair nosings which must provide clear colour contrasts to adjoining materials.

## 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 Teritorial Authority 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 & As-Built Services Plans

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.

All work is to be clearly indicated on "For Construction" drawings to guide the Contractor in the execution of the work. The design team must allow at least 10 working days for the University to study and approve these drawings, prior to issue.

Consultants are to pay particular attention to the numbering of features such as stairs, lifts, skylights and ducts in addition to the numbering of all internal spaces. The numbers of all these features are to be clearly indicated on all drawings and must remain consistent between different iterations of the drawings – this is required to facilitate communication with/between contractors and with the University.

The numbering of spaces will be managed and controlled by the University. At a suitable time during the design process – preferably once the internal layouts have been stabilised/confirmed – a request must be made to the University's Space Planning Manager for space numbers. Thereafter all plans must be updated to reflect the space numbers. Any further changes in layouts must be referred back to the Space Planning Manager for updating.

Such "For Construction" drawings are to be marked up, either by the Consultant or Contractor as agreed, to reflect all finished levels and changes made during the construction phase, and delivered to the University at handover as "as-built" records.

As-built drawings and records must indicate and include:

- The actual positions as constructed of all sewer, stormwater, sanitary plumbing, piped and ducted services, electrical and mechanical services. These As-Built details must indicate all underground service locations to the standard required by the University. (See also Section K.1. which relates to external services.)
- Inverts and locations of services at key points within the building and at the property lines.
- Dimensions of all services in relation to the structure and building grid lines.
- Ductwork, piping, conduit and equipment, including any such items provided for future use.
- Depths of various elements of foundations in relationship to the ground floor level.
- Any/all filed changes of dimensions.
- Other significant deviations and changes which are concealed in construction and cannot be readily identified by subsequent visual inspection.
- Details of all access doors and panels.
- Details of all alternative products and materials that were selected.
- All approved substitutions and changes/deviations to specified items.
- A copy of building elevations, marked up to indicate the colours used for all painted and special finishes. These colours must reference to NZ Standard colours and must include internal and external finishes.

The As-Built submission process will comprise three steps:

1. Submission of provisional As-Built documents. Prior to practical completion the Contractor must provide provisional/draft As-Built documents in sufficient detail to allow the University to review them for completeness regarding ongoing operation, maintennace, adjustment, re-assembly of the facilities.

2. As-Built review by the University. This review is only a review of the documents for completeness and legibility. It is not a check of the accuracy of the documents and the review does not relieve the Contractor of any responsibility for correctness and completeness.
3. Submission of complete As-Built documents. Following the University reviewer's final comments, complete As-Built documents must be prepared and submitted within a reasonable time frame – to be specified in the documents.

### 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 University's 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 'for construction' and 'as-built' drawings are to be made available to the Universty in hard copy as well as electronic format, the latter being in Autocad 2016 or later format.

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. The Job Manager will exercise a preference for full-size or reduced size copies of the drawings.

'As-built' drawings are to be handed over in electronic format at Practical Completion or as soon as possible thereafter, along with one A1/A2 hard copy of all drawings (for Drawing Office records) and an A3 reduced size copy which must be included within the O&M Manuals.

### B.9 Building Information Modelling (BIM) and Enterprise Asset Management (EAM)

Whilst the University does not currently have in place a comprehensive BIM (Building Information Modelling) framework, it is anticipated that it will in future follow this emerging industry practice.

The University has access to **REVIT** and all BIM processes used by Consultants and Contractors should be compatible with this software. It is essential that, very early in the design process, the Consultant team establishes whether or not a BIM model is to be one of the project deliverables. If it is, then the details and timing of the deliverables must be discussed and agreed to at that early stage to avoid any misunderstandings or rework later in the project.

One of the greatest potential advantages of BIM during the design and construction processes is the ability for 3-D imaging/depiction and for clash detection of services. It is essential that Consultants, if using BIM, make use of the clash detection services offered by the software.

The University is in the process of introducing an Enterprise Asset Management (EAM) System. This system is based on the **Maximo** and Trirega products. It will be necessary for all information about the new building and plant assets to be captured for input into Maximo in the correct format. This must be done prior to commissioning and handover of the new facility – in fact, the earlier that the parameters are confirmed, the better. Allowance must be made during the design and in the documentation for this work to be initiated by the Consulting/Design team and then provided by the Contractor. Details of the University's requirements must be resolved with the University's Project Manager so that there are no avoidable hold-ups with the issue of the draft O&M manuals.

Unless specifically agreed otherwise, all BIM documentation is to be to LOD 500 as defined in the NZ BIM Handbook.

## B.10 Architectural & Engineering Approaches to Energy & the Environment

Full details of the approach adopted by the Consultant team in relation to energy conservation, efficiency and the environment must be included in the design reports prepared for the project. See **Appendix 1** for details.

## B.11 Project Database & Communication Platform

This refers to Aconex or any similar system for managing the project database and providing a comprehensive communication platform for use on the project.

Where the platform is proposed by the Contractor, they will bear the cost of the provision of the platform.

The University will nominate the persons who will require access.

Once the platform is adopted, it is to be used as the primary channel of written communication for the following aspects of the project – Requests For Information (RFI), Contract Instructions (CI), Consultant Advisory Notes (CAN), issues of drawings, reports, meeting minutes, etc.

At the end of the project – ie. at the end of Defects Liability Period (DLP) or thereabouts – a fully searchable version of all documents relating to the University is to be handed over to the University for its permanent records. These records are to be issued in the name of (and to) the University staff involved in the project. This must be alterable by the University for possible future access by others.

A similar searchable record is to be made available to the design team members, commissioning agents and project managers who were involved with the project.

The cost of provision of this searchable version, including any ongoing costs for ongoing access to the records, must be borne by the party who initiated the use of the system.

## B.12 Contract & Work Programmes

The consultant team must ensure that the status of programmes on the contract is clearly set out and emphasised to the Contractor.

B.12.1 The Contract Programme – This is the programme prepared as part of the tender process and forms part of the contractual agreement between the parties. This contract programme is only changed or amended by way of approved Extensions of Time or other express notifications affecting the extent of the contract.

B.12.2 Contractor's Construction Programmes – These provide support to the Contractor and are generally prepared by the Contractor, but they do not not form part of the formal contract documentation. These programmes will assist with ongoing planning, site monitoring, changing/shifting priorities, testing of possible workflow changes, etc.

## B.13 Access Roads

All major contracts must require the Contractor to clean up roads at regular intervals to ensure there is no mud or dust nuisance emanating from the site. Clear and clean access for University's purposes is to be emphasised

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 or council 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. This applies to the site as well as all roads and paths in proximity to the site.

Contract conditions must also be inserted requiring the resurfacing or rebuilding of any roads which become distressed or badly damaged during the construction period.

### B.14 Flood Protection

The Contractor is to provide protection of the building work on the contract site against the 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. The contractor must remove and make good all temporary works upon completion.

### B.15 Noise & 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. The use of radios is not permitted on campus.

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

### B.16 Harassment

The following clause, or a suitable equivalent, 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 subcontractors and suppliers to the contract. Any site induction process must note and consider the rules and regulations outlined in the University’s induction process.

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 harassment, whether of a bullying, sexual or racial nature. 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 any formal complaint of 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 to 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 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, 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 harassment be made involving persons on the contract site.

### B.17 Builder & Consultant Sign

A combination sign erected to identify the project may be provided at/near the site entrance. This sign may be erected for the contract duration and is not to exceed 2400 x 1200 unless otherwise agreed. It is to be sited to the specific approval of the University, and is to be maintained, moved as required and removed upon completion. The area where the sign was erected should be made good after removal.

### B.18 Contractor's Site Supervision

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

### B.19 Site Fences, Site Services & Removal thereof

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

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.

Temporary underground services laid by Contractors can become a legacy after the construction is complete if not properly managed. To prevent this it is essential that all underground services are properly documented on site plans at the time of installation/laying. It is also a requirement that they are completely decommissioned and removed from site at the end of the construction if they are not required as part of the permanent works.

In general, the Contractor must allow for the complete removal of all temporary services which have been provided during the construction works. These include, but are not exclusively limited to, water supply lines, gas supplies, sewer drains (and sumps, manholes, etc), stormwater drainage pipes, sumps, telephone/data cabling, electricity supplies, fences, roadways and hardstand areas. All cables, especially heavy duty electrical cables, are to be laid in ducts and the cables are all to be completely removed at the end of the construction – no cable or duct abandonment will be accepted.

### B.20 Parking

All Contractors are to use the parking areas as designated – use of named or numbered parks or those marked for “Visitor” or “Res” may result in wheel clamping or towing. No parking on grassed areas will be permitted, unless

specifically approved, and in which case detailed requirements for reinstatement/rehabilitation must be met. Contractors must arrange for staff not requiring a site vehicle to park remote from the campus with appropriate transport provided by the contractor, and they must encourage the use of alternative transport. Contractors are not to occupy car parks provided for staff, students and visitors.

Vehicles must not be parked in any position which limits access by emergency services vehicles to any of the University buildngs. See also Section G.8.

### B.21 Bi-Cultural & Multi-Cultural Nature of the University

New Zealand is officially a bi-cultural country and the University of Waikato has for many years embraced the 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 reflect this bi-culturalism and incorporate a cultural narrative. In all significance projects, 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.

It is also essential to acknowledge the multi-cultural nature of the University's staff and student population. Designers must be sensitive to the variety of ethnicities, religions, customs and beliefs which are represented on the campus.

### B.22 Contingencies, Increased Costs & Savings

B.22.1 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 University Project Manager.

B.22.2 Notices to Contractor, Contract Instructions, Architects Directions & Variation Orders

The Consultant shall maintain a system of "Notices to Contractor", "Contract Instructions", "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 must consult the Project Manager for approval prior to the issue of any instructions. A copy of every Notice to Contractor, Contract Instruction, 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.) The authorisation under which the Archiect/Consultant functions will be limited to specifed financial bounds. All variations beyond those bounds may only be instructed once they have been given approval by the University. In addition, the Consultant shall include an approximate cost of the variation on the University's copy of the Notice/Instruction/Direction/Order.

B.22.3 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 which was not part of the original brief or authorisation, this must be referred to the Project Manager who will seek approval from higher authority, by way of a "Request for Change" to the Project Sponsor.

B.22.4 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 substantiated by a written Variation Order.

No VPRs are to be issued by the Consultant to the Contractor unless there has been prior and formal consultation with the Project Manager.

B.22.5 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 that can be inserted into the Special Conditions of Contract are given in **Appendix 2b**.

It is to be noted that clause 4d in Appendix 2b specifies that the benefits are to be shared 50:50 between the Contractor and the Principal. Before finalising the contract documentation this ratio may need reconsideration and amendment.

B.22.6 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 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.22.7 Payment to Contractor for Off-Site Materials.

This is not a favoured course of action and should only be considered in exceptional circumstances. The final decision rests with the Head of the Project Control Group or Director of Property Services. If agreed to, it must be fully covered by Bailment Agreements which assure the University's claim to ownership. Materials stored at a third party's premises is to be avoided wherever possible.
Any and all off-site materials must be clearly labelled to indicate the project name, the date and the ownership of the materials by the University.
All claims for off-site materials must be accompanied by detailed photgraphic evidence of the materials and their labelling.

## B.23 Permanent Signage & Labelling of Plant, Equipment, Piped, Wired & Ducted Services

### B.23.1 Standard Signage & Wayfinding Guidelines

The University has established a standard wayfinding and signage guidelines document for informational and directional signs on the Campus generally. The design principles and signs displayed in this guideline are to be adhered to and incorporated into the signage scheme for all new projects. The Consultant is to refer to Property Services for this guideline document.

### B.23.2 Building Identification Required

The external design must allow for the building to be appropriately named on the exterior, complementary to neighbouring buildings on campus. Refer to the Signage & Wayfinding Guidelines document for rules and requirements when adding building names to external signs.

### B.23.3 Internal Identification.

The interior design must follow the Signage & Wayfinding Guidelines at all times.

### B.23.4 Internal Door Signs

All spaces/rooms are to be numbered and informative signage is to be provided to selected doors. Details of space numbering will be provided by Property Services and must align with the Asset Management System.

All numbering of doors is to follow the Signage & Wayfinding Guidelines.

### B.23.5 Final Exits

Signs to indicate escape routes must be as required by Clause 8 of the Building Code.

The use of photo-luminescent emergency egress signage in lieu of illuminated signage will be considered provided it is acceptable to the local Territorial Authority.

In addition, flooring types and patterns should be used to indicate a clear route to a fire exit and to assist in keeping the route clear of furniture, etc.

### B.23.6 Accessible Signage.

Signs in accordance with the Building Code and NZS 4121:2001 are required.

### B.23.7 Labelling of Plant & Equipment

All plant and equipment must be clearly identified with engraved/traffolyte labelling indicating the Maximo number that has been allocated to that item. This labelling must be permanently attached using screws or rivets, not relying on glued mounting. All external labelling must be confirmed as UV resistant and durable for the long-term.

Where items of plant are located above ceiling level, labels visible from the room/space are required on the access hatch or on the T-rail of the ceiling panel closest to the plant item.

### B.23.8 Labelling of Piped Services & Ducting

Internal - All piped and ducted services must be clearly identified with self-adhesive labelling whether in plant-rooms, ceiling spaces or exposed positions. This identification must be appropriately sized, colour-coded and must indicate flow direction. Labels are to be regularly spaced along the pipework or ducting in order to facilitate tracing and identificattion.

A guideline for colours on piped services, per AS/NZS 5807:

| | |
|---|---|
| Water | Forest Green |
| Fire Fighting | Safety Red |
| Drainage | Black |
| Steam | Silver Grey |
| Gas | Yellow Ochre, Light Buff |
| Air | Light Blue |
| Electrical | Orange |
| Comms | White |
| Non-potable water | Lilac |
| Hazardous Waste | ??? |

External – where possible and practical, piped services should be identified with engraved/traffolyte labels indicating their function and purpose.

B.23.9 Labelling of Data, Audio-Visual & Electrical Outlets

All outlets – for data, audio-visual and general power – must be labelled on the cover plate as well as on the underlying outlet. This labelling must be of good quality, fade-proof, self-adhesive material. The numbers must be repeated at the other end of the cable/wire, with a suitable index or key in the patching or switch cabinet.

All control panels and switchboards must be externally and internally labelled using self-adhesive labels. Copies of wiring and panel diagrams must be kept in permanent sleeves on the inside of the switchboard or panel door.

B.23.10 Identification of Underground Services

All underground pipework must have a continuous identification tape installed above the pipe at an appropraite level as well as a tracer wire for all non-metallic services. All services locations must be surveyed and the information provided to the University in an approved digital format in order to update the University's GIS records.

B.23.11 Labelling/Tagging of Valves

All valves must be tagged when they are critical to the functioning of building systems. Of special concern are those valves which are normally left closed, those whose function will have a consequence that is not obvious at the valve location, those required for regular maintenance and those providing for future connections. Tags must be traffolyte-style and must be securely attached to the valve.

## B.24 Building Completion & Defects Maintenance

B.24.1 Building Defects Maintenance

The maintenance period for building trades is to be 12 (twelve) months after building practical completion on larger contracts. The maintenance period on electrical and mechanical services will also be 12 (twelve) months after building practical completion. Representatives of the Facilities Operations section of the University's Property Services 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 of charge.

B.24.2 Pre-Completion Inspections by Maintenance Staff

Apart from the obligation of Contractors and Services Consultants to instruct/ train the University's maintenance staff in the use/operation of new plant and equipment (as described elsewhere in this document), it is essential that the maintenance staff 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.

Records of these inspections are to be kept for checking and follow-up purposes.

B.24.3 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 by the contract.

If re-inspection or costs arise (under 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 payments to the contractor. Any dispute of this cost or its amount must be raised within one month of such advice of cost (or estimated cost).

B.24.4 Building Act Compliance – Proper Maintenance Records

Contractors are to comply with the requirements of the New Zealand Building Code with respect to IQP maintenance and inspections. Thecontractor must ensure that these requirements are undertaken and met during the contract maintenance period, so that a S12a Certificate 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 that will ensure compliance.

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

Any Consultants or Contractors who are unfamiliar with the Certificate/Warrant of Fitness requirements are to obtain timely clarification from the Project Manager, who will liaise with the University's Associate Director Facilities Operations.

## B.25 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.

One fully-indexed and searchable PDF digital copy and one hard/printed copy of each operating and maintenance manual shall be provided for all finishes and services, unless more copies are specifically requested. This means that a separate manual is required for each trade. These properly bound and matching manuals shall include but are not limited to:

- Letters of practical completion from each consultant
- Regulatory documents such as CCC and CPU certificates
- Defects registers
- guarantee and warranty certificates
- finishes schedule, interior & exterior
- colour schemes
- operating instructions and technical schedules

- cleaning and maintenance instructions and programmes, including special mention of any timing that could impact warranties or guarantees
- supplier information
- commissioning data, set points, flow rates, timer settings, etc.
- contact names, addresses and telephone numbers of consultants and contractors involved.
- signed confirmation that University staff have been trained and that their operational responsibilities have been clearly articulated
- confirmation that University Asset Registration Forms have been completed for all new assets installed as part of the project
- control and electrical plans shall be complete with terminal numbers corresponding to wiring ferrules and shall be cross-referenced as required.
- hard copies and electronic copies (AutoCAD 2016 or later format) of all as-built drawings (see clause B.8 for specific requirements)

The suggested chapter headings for each manual are:
Index/contents
Section 1 – Introduction/Scope
Section 2 – System Description
Section 3 – Assets
Section 4 – Operating Instructions
Section 5 – Routine/Planned Maintenance
Section 6 – Technical Data Sheets
Section 7 – Records of Inspections, Testing, Commissioning
Section 8 – Certificates, Guarantees & Warranties
Section 9 – Spare Parts
Section 10 – Contacts & Assistance
Section 11 – As-built Drawings

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 to the Contractor by the Consultant. No final retention monies will be released until the final documents have been approved by the Consultant and received by the University.

### B.26 Other Project Records

In addition to the O&M manuals, the consultant team must ensure that the following documents are formally handed over to the Property Services team at or before the completion of the project:

Fire Engineer's report

Geotechnical Investigation Records

Archeological report (if any)

Building Consents and Resource Consents (if any)

As-built drawings

## B.27 Miscellaneous Items

### B.27.1 Preventing Water Ingress to Sub-Floor & Ground Floor Spaces

There are several examples of construction on campus where insufficient attention was paid to the sealing of sub-floor and ground floor spaces against water ingress. These have been very problematic to the University over many years and every effort must be made to prevent like occurences in the future.

The consultant team are therefore urged to pay special attention to the prevention of possible water ingress. Specifications and plans must leave no doubt as to the required actions that are required and on-site inspections must ensure that installation requirements/standards are strictly adhered to.

### B.27.2 Raised Floors & Platforms

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

### B.27.3 Furniture in Offices

The University has a preference that standard joinery in the form of adjustable book shelves, a desk, chair and mobile drawer unit be provided in all single offices. Accommodation, and therefore furniture, will however vary according to activity and seniority so early discussions with user groups are essential to determine requirements. Tall furniture (such as bookshelves) must be seismically restrained.

### B.27.4 Dedication 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. As part of incorporating a cultural narrative into the facility carvings, sculptures or special building forms may be required to form part of the building or could be placed in a prominent location in/on/near the building. The installation of these would also be accompanied by a suitable ceremony. Full details should be discussed with the Project Manager.

### B.27.5 Asbestos

The University has developed a detailed Asbestos Register and relevant portions will be provided to the Design Team. Further investigations and exploratory sampling will be required to confirm the full extent of all asbestos-containing materials (ACM).

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. This work should preferably take place prior to other works commencing on site.

### B.27.6 Designing for Minimum Wastage

The Design Team are to design for minimum wastage wherever possible:

- by using standard sizes of material and applying dimensional co-ordination to improve efficiency of material use,
- by considering low total energy products, by including in the contract documents sufficient clauses, inducements and penalties to encourage the contactor to always have a well-managed, low wastage site.
- by considering the future ability and ease of recycling materials and components,
- by providing for the recovery, storage and transfer of re-useable materials from any demolition works.

– by encouraging sharing of vehicles and use of alternative transport.

### B.27.7 Waste Minimisation Procedures during Construction

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 University for approval at the commencement of the contract. The plan should be in keeping with the Hamilton City Council's REBRI (Resource Efficiency in the Building & Related Industries) scheme guidelines.

The Contractor must be directed to minimise waste through prevention of waste generation as a preferred and effective option, before seeking to reduce waste, reuse resources and finally to recycle.

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.

Specific approval must be obtained for any area used for the flushing out of concrete delivery trucks – it is preferred that contractors make suitable arrangements within their site for the collection of such waste.

### B.27.8 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 Contactor must establish central cutting areas for timber etc. Specific requirements for the waste management area include:

a) Establishing a single waste storage area with sufficient space for 5 (five) steel skips to contain the various waste streams – cardboard, timber, steel, gib board, residual to landfill.
b) Providing rubbish sacks or bins to handle plastic (recyclable and non-recyclable separately) and paper.
c) Ensuring the area is to be easily accessible to all trades and sub-contractors as well as the waste removal vehicles.
d) Clearly labelling all bins.
e) Cleaning up the general area at least weekly as part of general housekeeping.
f) Training all sub-contractors in the principles and practises of waste minimisation.

The implementation of the waste management plan is the responsibility of the Contractor's site manager.

The Contractor must be required to submit regular returns to indicate:

- what waste has been generated,
- what collection and reuse, recycling and disposal practises are being used, and
- what quantities of material that have finally been disposed of as waste.

Any proposed deviation from these requirements must be approved by the Project Manager prior to implementation.

### B.27.9 Digital Mbus Metering

In order to have the ability to centrally monitor and manage the use of piped/wired services, the University requires installation of digital Mbus meters wherever appropriate on all major services.

All electricity, gas, water being supplied to any new major facility should be metered using equipment that directly communicates with the Building Management System (BMS) by way of BACnet protocol/technology (latest version). All meters must be zeroed at formal handover to the University.

Overarching philosophies regarding metering are:

Each building should be measured for its total water, total electricity and total gas consumption.

All commercial spaces should be metered separately to facilitate cost allocation.

Any significant water which is used but will not go to waste should be measured as it may be used to reduce wastewater charges.

Accommodation facilities should be measured separately.

### B.27.10 Smoke Free Campus

Since 1st January 2014 the University of Waikato campuses have been smoke free. This ruling also applies to all contractors and their staff who are deployed on a University campus.

# 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 or repeated replacement 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 insulation levels, avoiding cold bridges, eliminating comparatively cold or overly hotareas, pipework insulation, optimised window:wall ratios and wind lobbies.

### C.1.3 Weather Protection

Building weather-tightness and durability of materials require specific attention. For larger buildings the services of a building enclosure specialist must be sought to peer-review all construction details of the building envelope. Such review should take place at various stages of the design process to avoid costly changes at Detailed Design stage.

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.

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

The external walls of a building must either abut paving or a concrete mowing strip at least 300mm wide. This paving or mowing strip is to be cast at least 150 - 200mm below the internal floor level and is to be sloped to ensure run-off away from the wall.

Cladding at ground floor level should be selected and installed to withstand impact damage.

### 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 and 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 & 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, steelwork protected by specially-designed coatings will be considered. In all cases the protective coatings are to be applied by experienced and expert tradespeople and any steelwork which is damaged on site must be immediately treated to restore the protective coating.

It is essential that galvanic corrosion 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. Sustainably-grown timber is to be used exclusively, unless by special arrangement with the University. For major works, certification of origin of the timber is required.

### 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 to prevent unauthorised entry. Opening windows that are at higher levels, should have restrictors to prevent unauthorised exit. Consultation on this should be made with either the Project 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, where the associated internal opening controls are not ordinarily accessible to a standing person, ie. controls should not be more than 1.6m above floor level.

In non-air-conditioned buildings, 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. If the main windows are openable, they should be an "awning" type opening outwards, except where a hazard exists to adjacent walkways. Such opening windows should be fitted with restrictors to limit the width of opening.

To avoid expensive window cleaning costs, large areas of glass should be avoided. In particular high level glass areas requiring specialist access for cleaning should be avoided. Where high level glass is incorporated then access design shall be identified and cleaning methodology shall be installed.

Where possible, external sun control devices (such as louvres or shades) should be detailed to allow for access to 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. Double glazing and special glass should be used to reduce heat and control light transfer.

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

### C.1.8 Metal Roofing

Roofing shall be minimum 0.55mm galvanised and pre-coated steel for roof sheet material (long run, etc including trough section roofing). Thermal insulation strips are to be used where there are steel purlins. Concealed fixings are to be used wherever practicable. Any fixing method which punctures the waterproofing layer, eg. drilled, screwed, rivetted fixings, is to be avoided

Roof pitches should comply with the current NZ Metal Roof and Wall Cladding Code of Practice – where existing roofs have pitches less than the Code, the re-pitching of these roofs must be addressed with Property Services.

If steel flashings are to be used, galvanised steel of at least 0.55mm thickness must be used. However, where possible, all flashings should be powder-coated aluminium with complex/compound shapes comprising 1.6mm material that is shaped, welded and powder-coated. This is particularly important where the flashings are in protected locations that are not rain-washed. If galvanised and pre-painted steel flashings are permitted, they must be primed on the underside with an approved galvanised primer prior to installation. All fixings and steelwork installed externally or near water shall be stainless steel or hot dipped galvanised. 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 Property Services 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 fitted 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 exterior walls, penetrating services must be inclined downwards on the outside to ensure water run-off.

The design team must confer with the University to ascertain whether or not there are likely to be solar panel installations on the roof, at this stage or in the future. The nature of the roof structure and its load-carrying capacity must be adjusted accordingly. As-built drawings must be suitably annotated to indicate the allowable live loads.

C.1.9 Membrane Roofing

Liquid applied membranes are not to be used. All applied membranes must be BRANZ accredited and must be laid strictly in accordance with manufacturer's specifications. Dual layer torch-applied membranes are preferred.

Substrate materials, ply or concrete, are to be kept completely dry until the membrane is laid. The provision of a water ingress detection system is to be considered for early detection of any loss of integrity in the membrane.

The minimum number of sheet joins are to be used.

As for metal roofing, the likelihood of solar panels needs to be confirmed.

C.1.10 Insulation between Upper Ceiling & Roof

The insulation at this level is to be designed and positioned in a manner that allows for unhindered access to services located in the ceiling space. A safe walkway or crawlway is to be considered for trades staff to reach services without disturbing insulation.

C.1.11 Roof Drainage

This should include emergency outlets to avoid the risk of flooding if the outlets, gutters, downpipes or drains become blocked. Generous eaves are to be provided where possible.

Valley and hidden gutters are to be avoided if possible or designed with an enhanced factor of safety to preclude any water entering the building. Welded stanless steel is the preferred material for gutter lining, but if membrane is used, joins in the material are to be avoided. Falls in gutters should be at least 1:100.

Overflows must be provided to all gutters – they should be at the high points of any internal gutters and they should be at a level least 50mm below the level at which water can enter the building. Such emergency discharge points are to be easily visible.

All gutters are to be sized and sited to facilitate easy access for regular cleaning and maintenance by hand.

C.1.12 Roof Access & Maintenance Anchor Points

The Consultant is to make provision for access onto the roof as well as anchor points to facilitate any cleaning and maintenance work on all of 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 also **Appendix 4**. Details of the anchoring system must be clearly documented in a register which is passed to the University at handover, along with the requirements for inspections, servicing and replacement of elements.

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 steel ladder (stainless or galvanised). 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. All major roof-mounted plant/machinery is to be accessed by a permanent safe walkway that does not necessitate the use of specialised access equipment.

C.1.13 Roof & Window 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.

Hose bib taps are also to be installed in suitable locations to assist with window washing.

## C.2 Internal – Walls, Finishes, Curtains, Blinds & Joinery

C.2.1 Internal Walls

Consideration is to be given to use of heavyweight internal finishes as this will assist in thermal control of the internal environment, particularly where natural ventilation is employed. Where plasterboard is used on walls, this should normally be of a 13mm thickness to better withstand damage.

If operable/folding walls are being considered, the following are important points:

- they should be considered for special circumstances only
- they must be robust and easily-operable by intuitive procedures
- acoustic performance/attenuation must be properly assessed and accommodated
- only recognised NZ suppliers with a good record may be utilised.

C.2.2 Finishes

Corridors and public spaces generally get hard use and require quality paint. A single brand of paint shall not be specified without the agreement of the Job Manager in each case.

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

The University requires the use of wearable surfaces with a good degree of acoustic treatment for sound attenuation and lack of reverberation. If a good, hard-wearing semi-gloss paint is used, plasterboard 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. These corner protectors should be colour-matched to the walls and should be installed by the main contractor.

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

Internal timber 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 in 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 the least visually obvious. Deviations from this colour scheme should be discussed with the University's Project Manager or Assoc Director Facilities Operations prior to a final decision being made.

Fire-rated finishes are to be used on egress routes as required by the NZ Building Code - this includes 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.

C.2.4 Sound Attenuation

Careful attention should be paid to transmission of sound between floors, between rooms, from corridors into adjacent rooms, from plant/equipment rooms and from stormwater & wastewater drains/pipes.

There are a number of existing 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 their proposed construction procedures for adequate sound attenuation characteristics between rooms.

Sound Transmission Class ratings are indicatively 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<br>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 or similar

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

Notwithstanding all the above, leaves on frequently-used double doors are not to be rebated – see Section D.5

C.2.5 Pinboards

Areas for displays, posters etc are normally required in various public locations in buildings. 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. Property Services 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 Property Services stockholding.

Door pinboards 300mm high across the full door width have traditionally been provided to selected doors, primarily office doors – the University Job Manager is to be consulted about the need (or not) for these pinboards. These pinboards are to match/complement the door signage.

C.2.6 Curtains & Blinds

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

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 (marine grade ply) 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 marine grade ply cores or by coving and welding all flooring.

All hinges and hardware on internal joinery must all be designed to withstand periodic wetting as well as heavy usage. Where used in laboratories, the effects of chemicals are also to be considered.

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

C.2.8 Penetrations through Fire Walls.

All penetrations of fire walls and smoke barriers are to be handled with great caution. All work is to be carried out as described in clause G.11 and G.12 below.

C.2.9 Waste Bins & Enclosures

Recycle stations are to be provided in as many shared spaces as practical. Three bins are to be provided at each station and where possible these should be built into simple joinery units to ensure they are always well-presented.

All resource rooms should be sized to accommodate two 240l wheelie bins – one each for paper and for confidential waste.

## C.3 Ceilings, Ceiling Finishes & Access Hatches

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). All suspended ceilings are to be designed and installed in strict compliance with the October 2015 ASCI Code of Practise for the Design, Installation and Seismic Restraint of Suspended Ceilings.

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). All other types of services, such as active equipment, dampers, controls, carrier trays, valves, etc. must also be accommodated. Unless detailed BIM modelling is used, services drawings are to be sufficiently detailed so that “pinch points” can be identified.

Allowance must be made for sufficent access points to services within the ceiling space and the location of these services must be indicated by labels on the T-sections of the suspended ceilings. Where required, sufficient and competent crawlways must be provided to enable staff to access and service/adjust plant and equipment which is mounted in remote areas in the ceiling spaces.

In all types of ceiling, including decorative or solid ceilings, access hatches must be provided at suitable locations to enable full access to all services and also to facilitate the future installation of additional new services. The siting of the hatches must be collaborativly resolved between the architectural and services design team members.

Attention must be drawn to the fact that all contractors who are required to enter ceiling spaces are to treat all services including cables as live.

C.3.1 Seismic Fixings & Separations in Ceiling Spaces

Any and all services in the ceiling voids are to be located and fixed strictly in accordance with the latest NZ Building Code and relevant NZ Standards requirements for non-structural seismic fixings and separations. Careful and thorough liaison and co-operation between all services trades during the design and the construction processes are essential.

## C.4 Use of Timber Preservatives

The following methods of timber preservative are listed in order of preference (1 being the most favoured). Contractors must 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.

Plant-rooms should have direct access from outside or from corridors. They should have full-sized walk-in doors and access only by ladders or stairs is to be avoided. Access to plantrooms will generally be by electronic access (new facilities) or by "Q" key (existing facilities).

Plantrooms should be sized and laid out to provide adequate space for regular servicing of the plant/equipment as well as the removal/replacement of any item of plant in the future. If regular access is needed to any items of plant that are above 3m in height, then a permanent ladder and safe working platform are required.

A facility (shelf or flat surface and general power outlet) must be provided for technical staff to position and power up a laptop/tablet. This is also to be the place where the plantroom logbook is to be kept.

Plantroom floors must be bunded and tanked as appropriate to prevent flooding into other parts of the building. All penetrations into other spaces must be sealed.

All floors are to be painted with non-slip paint and marked to delineate safe movement routes. All floors beyond the safe movement areas are to be painted or be coated with a concrete sealant.

### C.5.2 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 without servers is 2.9m x 2.9m (subject to confirmation), with double doors opening outwards. A thermostatically controlled extract must be provided and a suitable floor or door grille (with dust filter) will be required for make-up air. Dust seals are to be provided at floor level to limit dust ingress.

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 Assoc Director Facilities Operations and Information Technology Services.

### C.5.3 Cleaners' closets

These are to be centrally-located on all floors, equipped with a sink unit, shelving and a floor drain. The size should be 2.0m x 2.0m or larger and must be able to accommodate a parked trolley (size 1.1m x 0.6m) as well as a 'wheelie bin (size 0.7m x 0.8m). The closets are to be fitted with shelves and equipment hooks – details to be decided in consultation with the University's Assoc Director Facilities Operations. Access doors are to open out. The room must have at least two general power outlets to enable charging of battery-powered equipment. These outlets are to be sited at least 700mm above floor level. Lighting is to be preferably occupancy-controlled, minimum 350 lux. There must be a cleaner's sink with hot and cold water taps over it.

See also E.3 - facilities also required for large floor-cleaning machinery.

# 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 in Section C.2.2.

## 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 with limited effort 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.** It is recommended that the University's carpentry staff assist the Contractor in establishing the correct fitting of the door closers to ensure proper operation and to minimise future issues. This service can 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. All doors are to be fitted with middle rails. Stiles, middle and top rails are to be of 100mm x 40mm section and bottom rails are to be of at least 125mm x 40mm section (eg. the APL Commercial Magnum doors). 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 threated rod. 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.

The width of stiles must consider the location and use of the door. If a push-plate is required on the door, then the stile should be of appropriate width to accommodate a reasonably-sized push-plate. In this regard designers should locate push-plates and pull handles judiciously, so as to provide intuitive action by users.

## D.5 Internal Doors

Historically, the construction of certain smoke and fire rated doors has caused continued maintenance problems, so these need close attention. Our experience is that manufacturer's guarantees are useless - good initial design is essential. Vision panels on smoke and fire rated doors may not exceed 0.065$m^2$ per door leaf. The preferred panel size and location is shown in **Appendix 6**, but this layout is to be confirmed with the University's Assoc Director

Facilities Operations. All smoke and 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 and 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 – or wider - to facilitate movement of people, equipment and furniture. For doors up to 900mm, 38mm thickness is adequate but larger doors should be 48mm. Doors to accessible toilets should have a clear opening of 850mm to accommodate modern motorised wheelchairs. (This exceeds the requirement given in NZS 4121:2001).

Internal double doors are to be fitted with door closers – details of the closers to be used are given in **Appendix 4.** Where double doors are installed for general public access, their closing edges should not be rebated. The existance of rebates, even though they may improve the acoustic performance of the doors, have proved to be universally problematic in public venues.
If doors 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 - see **Appendix 6 – Size/Location of Vision Panels in Fire Doors.**

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

Kickplates and/or jamb protectors are required where heavy equipment and trolleys are regularly moved between rooms. The size, material and thickness of kickplates and jamb protection must be confirmed with the Job Manager. An example of jamb protection can be found in the service corridor of the Gallagher Academy of Performing Arts.

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 Heights of Doors

The clear opening of doors must be at least 2100mm in height, even when magnetic clamps or door closers are fitted to the doors. This implies that the desired door openings should generally be greater than that figure and a target height of 2200mm is suggested. No restriction on this requirement may be provided without the University Project Manager's specific approval.
(See also Clause H.2.4)

### D.7 Hinges

Hinges to doors must match the door weight. The details below apply to doors of normal height, width and weight. For any doors that exceed normal size/weight special hinge arrangements may be required.

Aluminium doors to have 5 (five) hinges in total -- double hinges at the top (150 mm down from the top and 50 mm apart), a bottom hinge 150mm up from the bottom edge and the other 2 hinges spaced equally in the gap between the upper and lower hinges.
Solid core timber doors to heavy use areas are to have at least 4 (four) hinges in total -- double hinges at the top (150mm from the top & 50mm apart), a bottom hinge 150mm 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). If 'fast-fix' hinges are used then these must bee 100mm units, of the ball-bearing type. Further details are given in **Appendix 4.**

Overheight doors or those which are wider/heavier than normal should all have proportionately more hinges fitted. Details are to be confirmed with the University's Job Manager.

## D.8 Hardware

Before detailing, please note specific requirements for door hardware in **Appendix 4**, i.e. closers, push 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.9 Locks & 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.9.1 Manual Locks & Keys

See also **Appendix 4** and Section D.9.2.
In general the use of Legge Pacific 990 mortice series hardware is required. 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.9.2 Electronic & Card/Fob-Controlled Locks

Specficiations for the electronic locking system must be developed with the Assoc Director Facilities Operations and the Security Manager. Aspects of special concern will include cost, robustness of hardware, appearance of the hardware, ease of programming, ongoing costs, interface with Gallagher security system, etc.

## D.10 Auto-Doors

Auto-doors (glazed and framed or frameless) are to be of approved design and manufacture only. Problems have been experienced with sub-standard products in the past and recurrances are to be avoided.

Access hatches which are hinged and latched, are to be provided adjacent to the upper mounting of the doors in order to ensure full access is readily available to all working parts of the auto-door and its machinery. This implies that the hatches will extend the full length of the track. Construction details must be provided for the Contractor indicating the ceiling support for the hatches and the construction layout/details.

# Section E – Floor Coverings

### E.1 Timber Flooring & Decking

All timber and composite timber products used in timber flooring and decking must be sourced from either, or a combination of, post-consumer re-used timber or sustainably-grown timber. Any variation from this must be by special arrangement with the University. For major works, certification of origin of the timber will definitely be required.

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. ( Low VOC products being those that contain less Volatile Organic Compounds than traditional products). The Contractor shall provide documentary evidence that, at the time of purchase, all materials used in the sourcing and manufacturing of flooring have been sourced from a sustainable or recycled source and that the flooring has valid Certification by the Environmental Choice labelling scheme or the US Carpet and Rug Institute Green Label certification scheme. The full environmental protocol for the product is to be provided including the policy on re-use of existing product.

It is the University's policy to use only Carpet tiles or planks in carpetted areas. Dispensation should be sought before selecting from a range of products different to that which the University possesses as stock and/or uses as standard. The preferred products and method of fixing are detailed in **Appendix 4.**

Notwithstanding the above, due regard must inevitably be paid to compatability 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 Property Services have sufficient product in stock. Property Services, through the Assoc Director Facilities Operations and Campus Development Project Managers, are happy to collaborate in the flooring selection process.

Decision-making on colours for carpets must involve the University's Assoc Director Facilities Operations. The preference is for darker colours (especially in high traffic areas such as near lifts, lecture room doors, stairs, etc) and mottled or varying texture effects (to reduce the visible effect of spills and stains).

A plan for the laying of flooring on each floor shall be approved by the Job Manager prior to any laying work on site being commenced. Cultural requirements and norms must be considered when determining colours and laying patterns.

### E.3 Exposed Concrete Floors

These may comprise floated or honed concrete surfaces, the latter being preferable. Care must be taken to ensure that such floors are separated from the building entrances by a substantial weather mat. This is to minimise the likelihood of wet footwear on the smooth concrete surface in wet weather. In such instances the weather mat (with good wicking capability) should be at least 3m wide. See also E.5 below.

Whilst the ongoing cleaning and maintenance of concrete floors is lower than carpeted floors it is essential that the surface treatment of the finished concrete surface is specified with care and an eye to longevity.

If large areas of exposed concrete floors are being provided, then accommodation for cleaning machinery is a special consideration. Large floor scrubbers will be required and these need to be very accessible to the floor area being serviced. The storage are must be equipped with a clear floor space, shelving for liquid products, a power point and good lighting.

## E.4 Vinyl & Marmoleum Flooring

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

Vinyl must have a smooth surface without deep graining and dark mottled colours are preferred. The products and colours are to be discussed with, and agreed to, by the University's Support Services Manager.

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 fixed 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, 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.

The design and installation of the flooring must ensure that the waterproof capabilities will not be compromised by later shrinkage of the flooring material.

See also Section C.2.7 regarding joinery design in wet areas.

The maintenance required for vinyl or marmoleum flooring may be greatly reduced by the initial application of a sealing layer. The University's Assoc Director Facilities Operations 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 Assoc Director Facilities Operations or by the Contractor to the required specification.

## E.5 Other Flooring Types

Rubber flooring laid in sheets has been successful in reducing noise and providing good all-weather traction (slip resistance). The downside of some of the rubber products has been the difficulty in keeping the surfaces cleaned and looking pristine. Samples and specifications of products should be discussed with the University's Assoc Director Facilities Operations prior to any decision being made.

## E.6 Entrances

An approved hard-wearing synthetic flooring (refer to **Appendix 4**) is to be used inside entrances – to help minimise the tracking in of dirt and/or water. Anti-slip capability is essential in wet weather when inappropriate flat-soled shoes are often worn by students. The material should also have a 'wicking' capability to draw moisture off shoes in wet weather. This floor covering should normally extend 4-5m (a minimum of 3m) inside the doorway. As previously mentioned, mat wells are to be avoided at entrances to buildings.

## E.7 Stairs

Consideration is to be given to maintenance issues in the selection of floor covering for 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 visually contrasts with the adjacent floor finishes.

### E.8 Plant Rooms

Floors are to be cement rendered and laid with falls directed to floor wastes where there is a possibility of water spillage. Bunding, etc. is to be provided to ensure containment of any fuels, oil or other contaminants. The edges of walkways are to be clearly demarcated and painted with non-slip 2-pack paint.

### E.9 Sealants & Adhesives

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

### E.10 Floor Finishes

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

### E.11 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 clean state immediately prior to occupation.

### E.12 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 – Hydraulics, Plumbing & Drainage

Note – For Natural Gas see Section I.

### F.1 Hydraulics - General

#### F.1.1 Permit to Work Requirements – Special Buildings

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 Property Services' Assoc Director Facilities Operations. 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 enable the update of Property Services records of work 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:

- accurately record exactly the work carried out and pass this identification back to the Property Services 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 reticualtion that may have been observed, and
- have the Permit signed off on completion of the work.

#### F.1.2 Water & Waste Pipes

**Water Supply**: Unless agreed otherwise, water pipework must conform to:

All pipework of 25mm diameter or greater is to be PE.
For diameters smaller than 25mm, higher pressure piping and all piping within the "core" buildings (C – G, R, TRU), copper is to be used.
In the "non-core" buildings on campus, a REHAU product may be used for small diameter pipework.
Consideration is to be given to leak controllers, water alarms and auto shut-off systems to prevent empty building flooding by leakage from plumbed appliances.
All pressure pipes above 32mm diameter must have welded joints and fittings. (Problems have been experienced with failures of mechanical fittings in certain locations.)

Installations using dissimilar pipework materials are not acceptable. Copper to NZS3501 is preferred over other copper types/specifications.

The design team must determine the adequacy of the local system mains pressure and volumetric capability relevant to the building being planned.

All water pipes to be contained in service ducts and within wall cavities or other concealed spaces must all be pressure tested prior to concelament.

Air release vents must all be positioned in plant rooms and service areas which are readily accessible.

All new potable water system installations must be cleaned and disinfected immediately prior to use in accordance with ruling standards.

Potable water supplies and fixtures must be separately colour-coded from any non-potable supplies. Safety signage must be appropriately installed in spaces where non-potable supplies are located to warn against human consumption.

**Backflow preventers** must all be readily accessible and installed in purpose-built enclosures where possible/practical. Individual backflow prevention in laboratories and fume cupboards is essential. All non-potable supplies and fire protection systems must have their own dedicated backflow prevention.

**Domestic Hot Water** systems must be set up to ensure BMS controls are possible, allowing the system to be turned off during times of building closure. All hot water reticulation pipework must be thermally insulated – this includes the supply beyond any thermostatic mixer valves.

**Waste/Drainage**: The choice of materials to be 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.

All water supply and drainage services which cross seismic gaps in buildings must be designed/installed in a manner that completely accommodates any expected movement.

### F.1.3 Water Meters

In order to monitor and manage the use of water on the campus, the University requires installation of digital Mbus meters on all major supply lines into buildings.

All water being supplied to any new major facility should be metered using equipment that communicates directly with the Building Management System (BMS) by way of BACnet technology. All meters must be zeroed at formal handover to the University.

## F.2 General Water Installations & Fittings

### F.2.1 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.2.2 Drinking Fountains & Multi-function Water Dispensers

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

The preferred solution is to have separate water filter/cooler units and wall-hung boiler units. (see **F.18**) instead of multi-function boiler/chiller units.

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

Details as per **Appendix 4.**

F.2.3 Hot Water Boiling Units

To be permanently plumbed-in and mounted above draining boards or sinks. Suitable products are listed in **Appendix 4.** Hot water boiling units are preferred above the multi-function dispensers mentioned in F.11 above as they are far more robust and cost-effective to run and maintain.

F.2.4 Placement of Dishwashers/Sterilizers

Where commercial dishwashers/sterilizers 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.3 Toilets & Toilet Areas

F.3.1 Proprietary Products are to be usedin these spaces

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

F.3.2 Toilet Pans & Wash Hand Basins

White ceramic units are to be used.

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 or wall level. Rimless toilet pans are favoured. WC's are to be fitted on top of floor finishes. Seats are to be white plastic, but "Soft closing" toilet seats are not to be used. Although generally toilets are to have flushing valves, any cisterns approved by the Job Manager must be ceramic with screw fixed lids.

WHB's are to have a soap recess and to have a mixer (not single taps).

F.3.3 Toilet Flushing

Unless there is good reason, all toilets which are likley to experience heavy use must be fitted with flushing valves - flushing valves are to be as per **Appendix 4** with a push button for heavily-used public toilets .

F.3.4 Urinals

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

F.3.5 Taps

See **Appendix 4.**

F.3.6 Electric Hand Driers

These are to be used in preference to paper towel dispensers. They are to be placed so that any spray is collected and does not wet the floor. See **Appendix 4.**

Isolating switches for power to hand driers are to be provided for each of the units, mounted at a high level above the unit.

F.3.7 Soap Dispensers

Units are to be supplied by the Property Services where needed. The units may be handed to the Contractor for installation and direction will be provided in this regard.

The layout of the mirror and dryers on walls above basins must be such as to allow for good positioning of soap dispensers.

F.3.8 Toilet Roll Holders

In all facilities which are serviced by Property Services, these units will be supplied by the University (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 provision must be paid to affix toilet roll holders, soap dispensers, shelves, etc to gib walls – extra nogging is to be provided.

F.3.9 Toilet Partitions & Walls

In all toilet stalls - indicator bolts are to be easily read. Two coat hooks on back of door and a door stop are required. Toilet walls and partitions must be fully washable. Doors are to be on falling butt hinges, falling to open (except accessible toilet doors which fall to close).

In rooms with single-sex toilets a gap of 75-100mm should be provided at the bottom of doors.

In unisex toilet areas – all stalls are to be fully separated and fully equipped with wash basin, hand-drier, soap dispenser, sanitary towel disposal unit. To accommodate the added features within each space, unisex toilet dimesions should be increased accordingly.

F.3.10 Mirrors above Basins & Shelves in Toilets

Mirrors are to be installed high enough to be clear of water 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 long mirror above multiple basins must also be considered.

In female toilets a 900mm or full length mirror would be advantageous if space permits.

Shelves should be provided in toilet stalls and near wash basins wherever possible. The Assoc Director Facilities Operations has developed several designs for shelves in various locations and spaces – these should be referred to and copied where possible.

F.3.11 Lighting

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

F.3.12 Sanitary Towel Disposal Units

None -–The University will arrange for a contract to supply/service these units, but the layout of the stalls should allow for their inclusion ie. larger stalls or off-centred pans.

F.3.13 Facilities for Persons with Disabilities

These shall fully comply with the NZ Building Code and NZS 4121:2001. This includes accessible showers, where required.

Doors are generally to be opening outwards on rising butt hinges, falling to closed. This requirement may be altered only if there is sufficient manoevring space within the toliet area.

Door widths must exceed the Code and NZS 4121. They are to provide a clear opening of 850mm to accommodate the modern powered wheelchairs. Where possible, toilet stall dimensions are also to exceed the code minimum due to the reduced manoevrability of these wheelchairs.

F.3.14 Drainage in Toilet & 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 practicable.

F.3.15 Ventilation of Toilet Areas

Adequate ventilation of these areas is essential: the University's experience is that many installations are deficient. Where possible, extracts should be placed at low height, near the toilet pan, to restrict odour spread.

F.3.16 Gender Designation of Toilets

Where possible and practicable, the gender designation of toilets should be such that the full range of gender identities is accommodated.

# 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 a full fire report for the building will be required. The fire design will minimise restrictions on intended and future users by avoiding normally closed fire doors where possible.

Fire hose reels and fire extinguishers are to be avoided wherever possible.

## G.2 Fire Alarms

The University has a number of automatic fire alarm systems connected direct to Fire and Emergency New Zealand (FENZ), who may charge for attendance to false alarms caused by malicious, accidental or fault activations. Alarms, whether real or false, 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 Isolations are required when the nature of work undertaken may generate heat, fumes or dust, or it physical damage to detectors may occur, as these can all result in alarm activation. Information regarding these fire alarms and isolations may be obtained from Property Services. Unless otherwise arranged and agreed to in writing, Contractors will not deal directly with fire alarm contractors, but will liaise through the Job Manager for any necessary work. In general, a minimum of one working day's notice will be required for any isolation or disconnection of a fire alarm system.

The Consultant is to ensure that the FENZ 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 or the Job 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 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 they have adequate procedures in place and that their 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 & 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 & 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 and the Job Manager of any anticipated/planned 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.

In some areas, such as in Science and Engineering labs, there are often critical and long-term experiments and activiities taking place that cannot tolerate unplanned shutdowns. This further emphasises the need for good cooperation and planning before any shutdown of services take place. The Design Team must ensure that these factors are adequately emphasised in contract specifications..

## G.7 Fire Service Call-outs

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

## G.8 Emergency Vehicle Access

Site 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 more, must be advised to the University in sufficient time to allow for contingency planning.

The Consultant is to follow the requirements of the NZ 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

Interfacing of all HVAC systems to fire protection systems and to the provision of FENZ control of these systems in an emergency, together with a BMS interface for monitoring purposes is expected. The details of the operation of these interfaces must be discussed with the Assoc Director Facilities Operations 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 how to ensure that the system is 'fit for use' of the system for particular areas. Smoke detectors in kitchens or laboratories, for example, may cause nuisance alarms. Consideration must be given to the use of composite detectors in locations with particularly complex situations.

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

In certain locations it will be appropriate for smoke detectors to be Acclimate Dual Technology heads. Possible locations are to be discussed with and approved by the University's Job Manager.

In the event of a fire, the fire panel must be set up to "fail open" any doors which are controlled by the Gallagher (Cardax) or other 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 University Security (07 838 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 notify occupants 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 and is to be clearly labelled/identified. Details of the layout are to be discussed with the University's Security Manager.

The University has the ability to remotely isolate fire alarms in many of its buildings and rooms. The chosen interface for this procedure is the "Petronics Fire Map" system and this should be included in any new installation – details can be discussed with the University's Assoc Director Facilities Operations.

All new fire detection installations are to have "FireMap Graphics" connection and capability provided as part of the installation. This work must ensure tha the new installation is fully integrated with the exisitng FireMap, including training and commissioning in conjunction with Property Services operations staff.

Noise from diesel-powered emergency fire pumps have been an ongoing problem on campus – to students in their accommodation, to staff at work and to neighbours trying to enjoy their home life. Special conditions are therefore to be inserted requiring the Contractor to ensure that the equipment being provided is suppressed to an acceptable level. This applies to the motor and the exhaust system installations and the max permissible noise level must be 60dBA $L_{Aeq}$ measured at 1m from the equipment.

### G.11 Passive Fire Safety

Passive fire safety has become an item of special interest to Territorial Authorities in recent years. Care must therefore be taken to ensure that any alterations to buildings fully address this aspect so that consents are not held up for want of acceptable fire safety solutions in the building.

All fire stopping works are undertaken as a contractor 'design and build' element. The contractor is responsible for fully reviewing the fire stopping situation, developing a solution and then implementing it to an acceptable standard.

It is essential that contractors install products strictly in accordance with the manufacturers' instructions and restrictions/limitations. This includes care with storage conditions, expiry dates, etc.

On conclusion of the work the contractor must present a fully-documented record of the solutions at every penetration, along with a PS3 or PS4 certificate as appropriate. Every penetration must be labelled and recorded to indicate what material was used, when applied, by whom. Record details of all sealed openings and materials used must be provided to the University in paper and electronic formats.

Fire stopping around fire dampers is regarded as being part of the installation of the fire damper and not part of the general fire stopping works.

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 in accordance with the original or approved amended fire philosophy for that building.

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

The fire-stopping contractor is responsible for the co-ordination of the fire stopping systems with all other trades, including briefing the other trades about correct fire stopping installation and how other services need to align in order to facilitate that installation.

### G.12 Marking of Fire Walls

Treat all walls as fire walls until otherwise informed.

The Design Team must ensure that any and all fire walls are clearly identified to ensure that Contractors and maintenance staff are aware of their location.

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

In above-ceiling spaces, advisory 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

This specification must be read in conjunction with the Univerity Security Manager's SECURITY STANDARDS FOR THE UNIVERSITY OF WAIKATO, latest revision.

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 or access cards 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.

Any and all services which are installed in the ceiling voids are to be located and fixed strictly in accordance with the latest NZ Building Code requirements. Careful and thorough liaison and co-operation between all services trades during the design and the construction processes are essential.

### 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 or 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 configuration, 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 positioned 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 & 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 or access cards are issued to them for the purposes of the work, shall be responsible for the security of such keys and cards. Any such keys/cards 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/cards provided may result in the Contractor being held liable for any costs incurred including, re-keying of affected areas if required.

Gallagher (Cardax) Swipe access cards can be obtained for contractors engaged in projects on the campus. For short term projects these are obtainable from the University Security Services Centre (B Block Annex) and for long term projects (ie several months) the University's Job Manager can make suitable arrangements with the Security Services Centre.

## 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). Use is also made of a complementary system, SALTO, which is used internally in a number of areas. If the latter system is used then the preferred lever and lock set is the Salto XS4 unit.

For keyed access to individual spaces and rooms within buildings refer to Section D.9. However, it is to be noted that, as far as possible, all new buildings will have electronic access control throughout. This will either be Gallagher or a system such as Salto which is compatible with Gallagher.

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 "Primary Access" doors (ie. on a building perimeter) 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 Property Services.

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 preferably to be 2200mm high. The clamps are to be fitted to the door-head only, ensuring a clear height of 2100mm.

See also Clause D.6 relating to heights of doors.

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 8 (eight) hours.

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

H.2.6 Activation Devices

All card readers, Break Glass units and Pushbutton door release units are to be installed on a wall closest to the door and at a height as specified in the Security Standards document, 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 | |
| Power Supply Mains Fail | |

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, 0.75mm$^2$, cable from the fire panel to the location of the power supply and is to allow for connecting to the Gallagher system. In conjunction with the Fire Alarm contractor, the Gallagher/Salto contractor must ensure satisfactory commissioning and ensure that 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 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 Property Services Carpentry staff.

The standard equipment currently in use is given in the University Security Manager's "Security Standards for the University of Waikato". 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 (two) Nidac speech diallers - one for the Gallagher-protected doors and the other for Fire Alarm activations and power failure.

All new connections of Gallagher equipment on campus must be made using equipment that is compatible with the latest versions of hardware and software as this restricts what can be connected.

# Section I – Heating, Ventilation & Air-conditioning (Mechanical Services), including BMS and Natural Gas

## I.1 General

The mechanical design shall be sympathetic to the building form and take maximum advantage of energy conservation features. All heating and air-conditioning 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 access to plant concealed behind buidling 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.

Any and all services in the ceiling voids are to be located and fixed strictly in accordance with the latest NZ Building Code requirements. Careful and thorough liaison and co-operation between all services trades during the design and the construction processes are essential (see Clause C.3.1).

Service risers must be sized to provide adequate space for ducts (including insulation), fire dampers, access panels, maintenance access, valves and sensors, all keeping within the restrictions of the seismic separation requirements.

Transfer of energy – heating and/or cooling – between buildings needs to be critically evaluated whenever there are significant changes to systems or building layouts and uses. In some cases the existing shared use may be questioned and in others the potential of shared use may present opportunities. These aspects must be discussed with the University team early in the design process to determine the best long-term approach.

All mechanical plant must be provided with the local isolation facility located adjacenty to the equipment and in an obvious and accessible position.

Variable speed drives (VSDs) are to be provided for all applications where the opeartional requirements include minimising high starting currents, speed control and flexibility to adjust pre-set speeds. Applications include air handling units, return fans on AC units, ventilation fans and mechanical services pumps of verious types and sizes. In locations where a VSD is not used, soft starting of equipment must be provided.

**Preferred types of plant and equipment - see Appendix 4**

## I.2 Air conditioning

Air conditioning will only be aagreed to in exceptional circumstances (Refer to **Section A** – Sustainability & Environmentally Sustainable Design, **Appendix 1** as well as **Appendix 3** – 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, obviating the need for mechanical systems wherever possible. Where it has been approved for large portions or the entire building to be air conditioned, the system must be correctly zoned to take advantage of solar conditions and differing usage. Air quality control with variable fresh air make up must be incorporated together with occupancy control to optimise the operation of the system.

In heating, the minimum temperature level is to be consistent with the provision of satisfactory conditions for the planned activity in the space. Heat recovery and transfer are to be incorporated into the system design when they are economically viable.

In cooling, the maximum comfortable temperature must be with tolerance to allow for the occasional days when comfort conditions may be difficult to achieve.

Expectations for temperatures in various spaces of a building must be discussed with, and agreed to, by the University Director: Property Services prior to the commencement of design. This discussion will require estimates of the implications for ongoing operational and of maintenance costs, evaluated over the design life of the facility.

Where air conditioning is installed into internal areas (rooms without opening windows), sufficient fresh air must be reticulated to ensure compliance with the NZ Building Code. $CO_2$ monitoring should be the primary factor used to determine/manage fresh air requirements in most non-specialist areas.

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. This applies to noise within the space from air distribution and plant noise, as well as the exterior noise of chillers, condensers, air handlers and the like.

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.

Care must be exercised by the design team in specifying the placement of velocity sensors in ducts. The manufacturers' recommended length of straight duct prior to a sensor must be adhered to if accurate readings are to be recorded.

Ceiling-mounted air-conditioning units must have a gravity or pumped condensate discharge - non-drained units are not to be used.

## I.3 Hot Water Heating Services

### I.3.1 Low Pressure Hot Water (LPHW) Heating

Low Pressure Hot Water (LPHW) heating systems shall include preferred features as detailed below. Any deviation from these is to be discussed wth the Assoc Director Facilities Operations.

- Pumps – Grundfos, 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 affix engraved labels to all equipment detailing asset numbers (from a list supplied by the Assoc Director Facilities Operations). These numbers should be noted on as-built drawings. All pipework must also be clearly labelled to identify usage and flow direction. (Refer B.23.8)
- BMS-controlled portions of any installation are to have manual override.

### I.3.2 Domestic Heating

The possibility of using solar panels for heating of water for domestic purposes should be considered. If such a system is viable then roofing and roofing sstructures will need to accommodate the system. Refer to Sections C.1.8 and C.1.9.

## I.4 Ventilation in Laboratory Spaces

Ventilation of these spaces can be difficult, especially when there are fume cupbaords in the room. The design for make-up air to cater for the demand of the fume cupboards requires careful placing of heating and cooling discharge points in relation to the fume cupboards. All fume cupboards must be varaible speed controlled and this must be interlinked with the delivery of comfort ventilation as well as make-up air.

The possibility of utilising manifold extract systems for fume cupboards needs to be considered but it is not without its own complications.

## I.5 Building Management System (BMS)

All heating/ventilation plant shall be connected to the installed Honeywell Enterprise Building Integrator (EBI) computerised building management system and shall allow the following operations:

- 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 (Mbus digital output tariff meters),
- Automatic monitoring of internal parameters of buildings as selected,
- Auto/Off/Manual switches are to be provided on all major plant items – and these are to be monitored by the BMS for Off or Manual status,
- Automatic monitoring and control of air handling and air conditioning plant,
- Temperature changing,
- Controlling lighting functions and scheduling.

The general/default settings for setpoints for occupied rooms are 20$^{o}$C for heating and 23$^{o}$C for cooling. For each room in the project, these parameters must be confirmed and adjusted where necessary.

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

Newly-handed-over buildings are not to have any active alarms.

See also Section J – item J.8 – Uninterruptible Power Supply (UPS)

See also Section N – Commissioning & Handovers.

## I.6 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 07 838 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 should have one mirrored wall surface where possible, 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 NZS 4121:2001 requirements for use by disabled persons.

Where access to particular floors may be restricted, the lift controls must be wired for interaction with the Gallagher electronic access control system. These controls are to be in-car, also on landings as required. The lift provider must be made aware of these wiring requirements at tender.

### I.7 Natural Gas

The University has committed to being carbon neutral by 2030 and, as a result, has implemented a goal to reduce and eventually replace natural gas as an energy source across all sites. Where practical, no new natural gas equipment should be installed.
The Design Team are to discuss all de-carbonisation opportunities with the University, including the costs thereof. If no viable alternative to natural gas is available, then the Design Team are to discuss all possible options with the University and gain approval from the Director Property Services before any installation. These discussions are to take place as early as possible in the design process.

In order to have the ability to centrally monitor and manage the use of piped services onto the campus, the University requires Mbus digital output meters at appropriate locations on all major services. All gas being supplied to any new major facility should be metered using equipment that directly communicates with the Building Management System (BMS) by way of BACnet technology. . All meters must be zeroed at formal handover to the University.

Seismic shut-off valves are also required on all new major supply lines. The locations of these are to be clearly shown on as-built drawings.

### I.8 Supplier Contestibility

Apart from a limited number of unavoidable exceptions, the University requires HVAC equipment to be maintainable by a number of service organisations under competitive tender, including the supply of spare parts and software. Where this unavoidablility appears to exist, full discussion with the Assoc Director Facilities Operations' section is required.

### I.9 Locking-out of Electrical Controls & 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 Assoc Director Facilities Operations. 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 Assoc Director Facilities Operations 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.10 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. that is required.

And they must confirm to the Job Manager that these endorsements have been made.

### I.11 Defects Maintenance of Plant/Equipment & 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 does not commence until the systems and manuals and maintence support 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 a timely manner.

Further instruction of maintenance staff may be required following receipt of the manuals and as-builts.

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 below, along with appropriate corrective steps which the University may take if the Contractor does not respond accordingly. University Property Services staff will decide the type of response required.

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

The rectification of defects shall be responded to 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 |

The regular maintenance of the system components during the maintenance and liability period such as filter cleaning and set point adjustment will be the responsibility of University Property Services personnel. If supply of spare filter sets is part of the installation contract, these shall be handed over to the University for safekeeping.

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

### I.12 Commissioning of equipment

See Section N.

# Section J – Electrical Installation & Lighting Requirements

## J.1 Conservation

The electrical and mechanical systems shall be designed so as to take maximum advantage of energy conservation features. (Refer to **Section A** and **Appendix 1**)

## 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.

The use of photo-voltaic panels or wind generated electricity should be considered. If such systems are viable then early involvement of the architectural and structural members of the design team is essential to ensure that the system is fully integrated into the design of roofing and roofing structures. Refer to Sections C.1.8 and C.1.9.

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 (ie. of domestic scale) will not be accepted. Consideration should be given to segregation back to the main switch board of all circuitry feeding switched mode power supplies and computer closets. It may be necessary in larger buildings to dedicate sub mains and switchboards specifically for this purpose. Cupboards or rooms housing distribution boards must be well illuminated, with dedicated lighting if necessary. At least one general power outlet must also be provided within the cupboard space for use by tradestaff when servicing the equipment.

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 from 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 either has suitable characterists to prevent it from producin unacceptable harmonics or has filters or chokes fitted to obviate the same. Reference to IEEE 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.

General power outlets for use by cleaning staff must be provided at regular intervals within each building. These power outlets are to be provided at a height of at least 500mm above floor level and are to be clearly identified by different colour cover-plates and a label endorsed "Cleaner"

## J.3 Lighting

Lighting services will in all cases be of highest efficiency with the use of approved LED technology and ambient lighting controls and occupancy sensors being considered. If the Consultant is aware of any other modern lighting developments, they should discuss these with the University's Job Manager.

The use of LED lighting is premised on the grounds of longevity as well as lower energy use. Extensive warranties, minimum 5 years, will therefore be required for all components in any LED system and these must cover labour costs that are incurred in any remedial work.

Feature lighting design must take into account the cost and ease of repairs and lamp replacement, as well as the energy efficiency of fittings. The need to use equipment other than ladders for lamp replacement will not be accepted without specific reference to the University's Assoc Director Facilities Operations. Three (3) metres is considered a reasonable working/reach height when working from a ladder or portable work platform – so the installation of lamps/fittings above this height may only be considered by special arrangement with Property Services.

The Design Team must clearly set out the target lighting/illumination levels which are being sought for the various areas in the building. They must also document clearly the lighting philosophy and the effects that are being strived for. The consultant is to seek comment and get University approval for all the proposed lighting levels for the various activities/spaces in the facility – this approval must be obtained prior to the finalisation of designs.

Consultants must be aware that the University is committed to space use optimisation and this means that activities in spaces may vary over time. Where possible, designs should therefore favour adaptability of use over designs for very specific users.

Lighting design should be sustainable and environmentally-conscious. The use of natural light should be maximised, with artifical light complementing the natural daylight, using controllers as appropriate. Skylights and other means should be considered to introduce natural light deeper into buildings.

Rather than merely specifying lighting products, the Consultant should target the design features which are critical. Wherever possible, alternative fittings should be identified prior to tendering the works. The consultant must justify the use of any design features that would limit the contestibility and price of components for both initial and lifetime supply.

All lighting specifications should include:
colour temperature,
expected longevity,
colour rendition,
light colour,
luminous flux, and
luminous efficacy.

Designs and specifications should target technically appropriate solutions, rather than 'best of breed' excellence which could be prohibitively expensive. A limited range of fittings should be used, providing a standardised approach – preferably based on using current-technology fittings already adopted by the University.

Wall-washing lights are not favoured as they often show up imperfections in the wall finishes.

Exterior in-ground lighting units must be avoided. Experiences of these units on campus have almost all been poor with a very high percentage of failures, despite the units being highest quality and having adequate IP ratings (eg. IP68).

Colour temperature of lighting needs to be discussed with and agreed by the University Project Manager and Assoc Director Facilities Operations. Determine when 3000k (warm white), 4000k (neutral white) or higher temperatures are most applicable for each situation.

For luminaires in exposed situations – such as sports halls – the units must be specified for high impact resistance.

Spaces that are normally unoccupied should have sensor/timer controls to turn lights on for the period of occupation only. This applies typically to plant rooms, storage rooms, comms closets, toilets, cleaners closets, etc.

Lighting in corridors, foyers and stairwells should be controlled by presence/occupancy detectors and, where safely possible, lighting levels should be reduced after-hours to conserve energy.

The University is committed to a dark sky philosophy and all designs must acknowledge and respect this – ie. no upward-facing luminaires where the light spill could be beyond the building perimeter.

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.

Exterior lighting – whilst maintaining a commitment to 'dark sky' there should be clear marking of paths, ramps, stairs and parking areas with the avoidance of darker zones. The University has an extensive campus open to the public. Unlit areas or uneven lighting levels are to be avoided – this will reduce shadowed areas that can cause personal security concerns.

### J.4 Offices & Seminar Rooms

All rooms will require artificial lighting, power outlets, telephone connections and CAT6A computer outlets, as well as Wifi connectivity. The actual requirements for each room are to be confirmed with the Project Manager.

### J.5 Seismic Fixing in Ceiling Spaces

Any and all services in the ceiling voids are to be located and fixed strictly in accordance with the latest NZ Building Code requirements. Careful and thorough liaison and co-operation between all services trades during the design and the construction phases are essential.

### J.6 Supplier Contestibility

The University is generally in favour of accepting equipment that is capable of being serviced without modification by a number of service organisations – ie. contestability for all work undertaken is a firm priority. Where this appears to be unavoidable, full discussion with the Assoc Director Facilities Operations' section is required.

### J.7 Component Identification

All lighting and power circuits will be identified with engraved/printed labels permanently 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 Assoc Director Facilities Operations can assist with suggested nomenclature.

### J.8 Uninterruptible Power Supply (UPS)

These units are generally required to provide a clean AC power supply for critical equipment and/or to provide continuity of supply in the evnt of a mains failure.

If it is not certain whether or not a UPS should be installed at design time, then provision should be made for a pre-wired UPS bypass switch to facilitate later installation.
As part of the allowance for UPS provision, the ventilation of the room must accommodate the appropriate level of ventilation/cooling that the UPS would require.

### J.9 Electricity Meters

In order to have the ability to centrally monitor and manage the use of piped/cabled services, the University requires installation of digital Mbus meters at appropriate positions on all major services.

All electricty, gas, water being supplied to any new major facility should be metered using equipment that communicates directly with the Building Management System (BMS) by way of BACnet technology. . All meters must be zeroed at formal handover to the University.

### J.10 Locking-out of Electrical Controls & 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 Assoc Director Facilities Operations. 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 Assoc Director Facilities Operations in order that arrangements can be made for timely 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.11 Defects Maintenance of Plant/Equipment & Instruction of Maintenance Staff

Refer to relevant clause in Section I.

### J.12 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 underground services can be supplied by the University's Property Services. Prior notice of one working day is required for the supply of drawings. Original copies of drawings will not be released as copies of all drawings are available digitally. Drawings of all known existing underground services will be provided to the Contractor on request. 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.

Where the project involves the provision of new underground services beyond or between buildings, consideration must be given to the construction of substantial subsurface ducting to carry the services. This ducting should be large enough to facilitate access for additions to, and replacement of, cables and pipes that have been laid therein.

### 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 Project Manager when trenches for underground services have been opened up or prepared, so that the Consultant and the University can arrange to 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, if required.

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 should be supplemented by photographs, but not substituted by them. Sketches and photos must be submitted via the Consultant to the University in a suitable digital format to be specifed by Property Services.

### K.1.3 Excavations

Within one metre (or appropriate safe distance) of known site services, trenches shall be hand dug or excavated by means of vacuum excavation (also referred to as hydro digging, hydro excavation, hydro trenching, air excavation). 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 , including mushrooms, are to be cast-iron. Plastics are unacceptable unless they are in a protected location. 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 Territorial Authority. 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 the Territorial Authority 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.

Aminimum of 48 hours notice is required before temporarily shutting down any water supply. All temporary connections made by the building contractor during the course of the contract must be fitted with backflow prevention devices. To prevent any cross-contamination, all new water mains are to be fitted with backflow prevention devices in accordance with the requirements of the Territorial Authority.

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 or areas. Unless agreed otherwise, a meter to record a building's water usage is to be installed on any new reticulation system.

All meters require digital Mbus capability to BACnet protocol.

In laboratory buildings the use of high level tanks feeding the laboratories is to be considered. Such a system will provide more surety of supply and will assist in accommodating the varying pressures which are encountered on the campus.

It is essential to maintain the integrity of any potable supply which has been established to serve toilets, drinking water points and emergency showers/eye-washes – this is especially important in Science/Engineering/laboratory buildings. Great care must 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 telecommunication 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 Assoc Director Facilities Operations is necessary when designing any new system or layout. Luminaires and poles/supports will be the same as those currently installed. 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 termination 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 Assoc Director Facilities Operations maintains accurate details of all exterior lighting. The Project Manager will advise what data is required for this record.

A dark sky commitment is to be adopted unless there are specific reasons to plan otherwise.

See also Section J.3.

K.1.8 Earth Spikes

Sufficient information must be provided to the Contractor to prevent earth spikes clashing with other underground services. Earthing studies must be undertaken to ensure new and existing earthing systems continue to operate as designed.

K.1.9 Routing of Underground 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 draw wires to facilitate cable-pulling.

K.1.10 Adequate Control Valves & 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 minimal disruption to users and to facilitate emergency operation and rerouting of supplies in the event of a fault. This applies to all wired and piped services.

## K.2 External Works & Landscaping

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 landscaping must also include all reinstatement of landscaped areas which are damaged during the construction works and protection against unnecessary damage to areas adjacent to construction sites. It is the consultant's duty to ascertain whether or not there are any significant plants that require protection within the development area. 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 Landscape Manager must be advised of any major roots which are exposed during excavation. They will then arrange for the roots to be properly cut by a University-appointed Arborist.

K.2.2 Overall Planning

The Consultant is to collaborate with the University's Project Manager and Landscape 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,
- taps for irrigation of planted areas,
- 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,
- ensuring that any/all manholes, ducts, cable markers, gully traps and sumps remain visible, accessible and clear of plantings,
- "street furniture" including rubbish bins, outdoor seats, outdoor notice boards, signs and bollards,

- ensuring that such landscaping does not create a security or personal safety risk for users of the University (CPTED principles), 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 involve a specialist Landscaper or Landscape Architect over landscape planning matters. In this regard, care must be taken to plan for plant maturity, not to plant too close to walls, ensure there is no overhang onto paths and walkways, etc.

K.2.3 Finished Surfaces for Grass & 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 Landscape Manager and their 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 Landscape Manager prior to handover. The Consultant must allow for sufficient funds in their estimate for the overall project to enable this work to be done. The University generally prefers not to have the Contractor sow grass etc.

In high-profile areas the decision may be to use turf grass (roll-out lawn) for immediate effect.

K.2.4 Concrete Mowing Strips around Buildings, Installations & 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 150 - 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. Site levels should be configured to provide stormwater over-land flow paths away from buildings.

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 also have a concrete mowing strip at least 300mm wide and 150mm deep around it. This is to facilitate maintenance work.

K.2.5 Roads & 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 and markings for the visually-impaired 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 or flatter is to be sought.) A non-slip surface is required on ramps. Drainage is required at 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 & 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 situations in critical and prominent positions.)

Side falls and drainage are required on extensive flights of steps. Handrails to all external steps are to be in accordance with the standards laid down by the NZ Building Code. 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 double-width and 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, and there must be a comprehensive drainage system behind the walls. There must be adequate falls to channels, and suitable arrangements for coping with potential flooding and overtopping. 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 approximately 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 Skateboarding & Illegal Access Prevention Measures

All exterior ramps, stairs, seats, handrails, etc. have the potential to attract skateboarders and climbers, 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 design features must be discussed with and approved by the University's Project Manager and Landscape Manager prior to installation. No routes to roofs or other features at height are to be readily accessible to determined urban explorers.

# Section L – Communications & Computers

## L.1 General

Any and all services in the ceiling voids are to be located and fixed strictly in accordance with the latest NZ Building Code requirements. Careful and thorough liaison and co-operation between all services trades during the design and the construction processes are essential.

## L.2 Computer & Telephone Systems

### L.2.1 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 computer. There may, however, be 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.2.2 Computer Cabling

Allow in the contract for the provision of a duct system from the comms closet to all specified rooms to take computer communication cables. Currently Cat 6, 6A and Cat 7 cables are used – Consultants are to confirm what is planned for their project. Allow for face plates in rooms, and via underground services, an optical fibre 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.2.3 Installation

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

### L.2.4 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. To be read in conjunction with the ITS Standard Brief Cabling. The latest version will be supplied to the Consultant by the Project Manager.

## L.3 Service Room Specifications

### L.3.1 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.3.2 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 2.9 x 2.9 m, with double doors opening outwards, and a thermostatically controlled extract. A suitable floor or door grille will be required for make-up air.

Floor covering shall be 2mm anti-static vinyl of approved quality.

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 Assoc Director Facilities Operations.

# 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 Assoc Director Facilities Operations and TTG. Critical areas which need to be addressed include location and end-spill of 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. Lighting systems in teaching facilities are to be controlled by Crestron units, the specifications being developed in conjunction with TTG.

### 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, samples for testing/evaluation must be submitted.

### 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.

### M.6 Nogging in Walls

Emerging technology is trending towards the use of large-format TV screens in mid-sized teaching rooms. To accommodate this trend as well as other needs for affixing items on teaching room walls, consideration must be given for the provision of 18mm plywood nogging between 800 and 2000mm above the floor. This is to be discussed with TTG and the relevant academic advisory staff.

# Section N – Commissioning & Handovers

### N.1 Commissioning by Contractor

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

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

The various aims of the commissioning process are:

- To ensure 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.

The Contractor must ensure that pre-commissioning quality assurance and testing is carried out in preparation for the commissioning process, including proving of all circuits, contactors, relays, actuators, interlocks, operation modes, etc.

It is imperative that systems testing and commissioning is carried out by experienced and suitably qualified commissioning specialists and that all work is thoroughly documented.

An essential and fundamental requirement of all commissioning work is that there is full access to all equipment required for the commissioning process – this includes balancing dampers, fire dampers, damper/valve actuators, flushing loops, bleed points, valves and measuring points. This access must be fully considered by all branches of the design team, inclusive of the architectural members, as the access points to certain items of plant may conflict with critical decorative elements. Shop drawings and as-built drawings must all be checked to ensure that they clearly indicate access to any and all commissioning equipment.

During the commissioning, all BMS points must be point-to-point tested and calibrated to confirm that they operate correctly, including any relevant time scheduling. All BMS readings are to be checked for accuracy over a continuous two week period using locally installed measuring equipment. All BMS points connected to the central EBI system must be confirmed as correct and complete with regard to the University floor plans, and commissioned to the satisfaction of Assoc Director Facilities Operations. They must also be approved by same as being in keeping with requirements for Maximo and other data/drawing definitions.

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 (ICA)

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 to provide quality assurance on behalf of the University as customer, and is separate to and in addition to any commisssioning requirements included in the trade specifications. The contractor and the Consulting team must allow to liaise with, attend upon and co-operate with the ICA during the course of their 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 1

# Key Design Issues Relating to Energy & the Environment

Here are a series of key issues relating to energy and the environment, that should be addressed in the design of any project. They apply to new construction projects as well as the refurbishment of existing buildings.

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 and monitoring
- Water
- Environmentally-preferable solutions
- Construction site management
- Plan for ongoing use and maintenance
- University-specific reference documents

## 1. Siting & Orientation

a. 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 evaluation to include seasonal temperatures, prevalent wind direction and strength, rainfall levels and sun paths.
b. On many sites there are 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 – maximise northern aspects where possible. Consider the effect of adjacent buildings and the influence of the new building on its neighbours.
c. Consider proximity to transportation systems and consider pedestrians, cyclists and public transport users over motorists.
d. Ensure that maximum advantage is taken of unobstructed daylight in occupied spaces by optimum positioning of the building on site.
e. Give shelter to points of entry to the building, especially those facing prevailing weather.
f. Consider local factors such as noise or other environmental pollutants which may influence orientation.
g. 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.
h. Influence the local microclimate where possible by modelling the ground form or by introducing planting to give shelter from the wind and driving rain. In landscaping, use natives where possible, avoid contiguous impermeable surfaces and allow sunlight penetration.

## 2. Built Form

a. 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.
b. 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. Use daylighting (including atrium, roof lights, reflective surfaces), passive solar heating, photo-voltaics and daylight–sensitive lighting.

c. As far as possible place principal rooms with a Northerly aspect to take advantage of solar gain which can reduce the heating requirement in winter using carefully determined areas of glazing. Sunshading may be needed to prevent overheating in summer. Maximise daylighting and radiant temperature gains by using high performance windows, daylight deflectors, skylights and clerestory windows.
d. Use passive design features and climate-responsive design -- passive solar design and shading, window choices, walls and roof to be highly insulating, durable and reflective, building mass, high ceilings, exposed concrete ceilings, HVAC ducts within concrete floor beams, possible use of specialised aerated concrete.
e. 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.
f. 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

a. 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.
b. For colder months, select minimum temperature levels consistent with the provision of satisfactory conditions for the activity in the space.
c. For hotter months, agree maximum comfortable temperatures with tolerance to allow for the occasional days when comfort conditions may be difficult to achieve naturally.
d. Choose appropriate lighting levels to optimise the energy required in achieving the desired visual standards.
e. Comply with any/all necessary statutory requirements.
f. Determine occupation periods or any periods when the building will only be in partial use.
g. Value aesthetic decisions (provide windows for views and ventilation, ensure superior detailing and quality workmanship, integrate into local context, ceiling lighting to avoid cave effects, use colour to improve ambience). Provide humane working environment (conviviality).
h. Avoid materials with high emissions (limit use of VOC's, use water-based paints/adhesives, provide safekeeping for chemicals/cleaning materials) during construction and in fixtures.
i. Identify any particular activities or processes which will require specific environmental conditions, particular cleanliness or humidity control.

## 4. Means of Ventilation

a. 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.
b. 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.
c. Construct a 'tight' building envelope to reduce uncontrolled infiltration losses. Detailing of the building must ensure satisfactory fit of components while allowing for movement.
d. Provide adequate seals for windows and doors to minimise heat loss due to uncontrolled air infiltration. Doors should be located in sheltered positions and provided with wind lobbies, revolving or automatic doors. Essential large openings into the building for traffic should be provided with draught lobbies or air curtains.
e. 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.
f. 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.
g. Utilise natural ventilation in summer as far as possible with adequate size opening windows reducing the need for air conditioning.
h. Protect from direct solar gain which can be a cause of overheating.

i. Specific heat emitting equipment or processes should be cooled by local ventilation to keep the overall ventilation requirements to a minimum.
j. With appropriate ventilation also provide good moisture control -- consider use of floor plenums, minimise ceiling voids, manage moisture dynamics, test and commission ventilation systems, carefully locate exterior intakes, monitor air quality continuously/regularly, ensure airtightness of the exterior fabric/windows/etc.
k. 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.
l. 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.
m. Where there is no option but to air condition, utilise refrigerants with low ozone depletion potential or other alternatives such as ground water cooling. Set energy use targets -- $CO_2$ emissions, heating loads, electrical loads, U values, etc.
n. 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 and ballasts, good balance of ambient/task lighting, individual controls where possible, avoid HVAC inputs where possible, use of heat recovery ventilation systems.
o. Ventilation under buildings is also a very important design aspect that must be adequately considered.
p. The University's Environmental Temperature Control Policy is included as APPENDIX **3** and this should be used to guide the design process.

## 5. Lighting & Daylight

a. 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 building users.
b. Where appropriate to the function, provide adequate glazed areas to give maximum utilisation of daylight.
c. Introduce borrowed light into landlocked areas (such as internal corridors) from adjoining spaces or rooms with access to natural light.
d. 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.
e. Consider the use of automatic controls for the artificial lighting to reduce electrical consumption as daylighting levels rise.
f. Adopt appropriate internal finishes to benefit from higher surface reflectances in the design of the lighting system.
g. Utilise the most efficient and appropriate light source and low loss control systems.
h. 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 and unnecessary glare in winter.
i. Toilets, teaching rooms, storage areas, cleaners closets, corridors, etc should all be considered for occupancy sensor lighting or timer controls.

## 6. Insulation Levels

a. 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.
b. Insulation standards should 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. Double glazing should be used in all but exceptional circumstances, coupled with hardware that eliminates thermal bridging, to reduce heat loss and the likelihood of condensation.
c. Raise insulation levels evenly throughout the fabric of the building to avoid comparatively cold areas (which could result in local condensation problem.)

d. 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.
e. Check that the build up of components and positioning of insulation in the external envelope does not give rise to condensation within the fabric.
f. Require good levels of insulation to pipework and water storage systems.
g. Ensure that all insulation products specified in the building are manufactured without the use of CFCs or HCFCs.

## 7. Controls

a. 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.Over-ride switches should be installed judiciously.
b. It is essential to commission all plant and equipment (on installation and then at regular intervals)
c. 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.
d. 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. Building management system control of all lecture/teaching/computer spaces with manual overrides on timers
e. Use occupancy and air quality sensors to manage lighting and HVAC.
f. Consider the zoning of environmental conditions to reflect different activities or orientation. Allow for future changes in occupancy pattern or function.
g. 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.
h. Control Systems should be linked to the building management system (BMS) which can automatically determine optimum control regimes for maximum energy efficiency.
i. 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. In the light of the University's commitment to decarbonisation as well as the changing gas supply circumstances in New Zealand, alternative methods of heating are to be sought.
j. Choose equipment and heating systems which are matched to the building and convert supplied energy to useful energy with minimum losses.
k. 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

a. 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 and Total Cost of Ownership. 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.
b. Adopt a Total Energy Management approach throughout the life cycle of the building.
c. Install the necessary systems to enable ongoing monitoring of energy consumption when the building is brought into use.
d. Examine possible use of alternative energy generation.
e. Measure and report on performances, consumption, etc – allow for full measurement, reporting and commissioning over a 12 (twelve) month cycle.
f. Include planned maintenance schedules for all environmental/service systems, including planned cleaning and replacement of light sources.
g. User manuals for the various types of building occupants are essential and must will give insight into the design philosophies used. They will also provide guidance on the best and most efficient use of the environmental systems.
h. The University has a target campus-wide to achieve an aggregated maximum energy consumption better than 0.68 Gj/m2. There is therefeore 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. Water

a. Re-use water (grey water) if pragmatically possible for gardens, toilets on lower levels.
b. Use water efficiently by utilising low-flow or dual flush toilets and restricted volume taps.
c. Manage and control water run-off from external surfacing (landscaping swales, catchpits to holding tanks).

## 10. Environmentally-preferable Solutions

a. Minimise life-cycle impacts.
b. Manage the process from raw material - manufacture - use - reuse/recycle/disposal.
c. Critically evaluate packaging, transportation and installation.
d. Use materials which have high recycled content, such as cellulose ceiling tiles and polyester fabrics.
e. Design for incorporation of standard material & product sizes – minimise wastage and offcuts.
f. Use good programming and logical construction sequencing to avoid extras and/or delays.
g. Design for demountability/accessibility and future-proofing.

## 11. Construction Site Management

a. 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.
b. 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.
c. 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 contactor to always have a well-managed, low wastage site.
d. 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 plans during 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.
- Staging and timing of work (excavations in dry period, close in building as quickly as possible).
- Enforce good site management (clean and tidy worksite to avoid wastage) and formal waste material management program (educate workers, on-site sorting of waste, reduce/re-use/recycle before disposal), including good management of packaging (minimise, reuse/recycle/sort).

## 12. Plan for Ongoing Use & Maintenance

a. Provide for involvement of maintenance/operations staff in planning/design.
b. Minimise impacts (environmental, energy) of operating/maintaining the building over its life.

c. Design in sufficient areas for refuse/recycling receptacles and servicing thereof.
d. Ensure the reduction of ongoing maintenance by improved design specification.
e. Minimise fuel, water, energy usage.
f. Avoid chemical/toxic/malodourous cleaners.
**g.** Consider a formal post-occupancy evaluation and/or ongoing post-occupancy feedback by users.

## 13 Other Reference Documents

The Design Team should 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.

# APPENDIX 2a

# Noise and Vibration Nuisance

**This is a proforma for a contract clause – it is to be amended/modified if necessary according to the particular situation of each project.**

**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 ay 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 imediately 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, vibratrion 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 criticial 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 activites 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)

**This is a proforma for a contract clause – it is to be amended/modified if necessary according to the particular situation of each project.**

**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 actvities 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 adjustent 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/Engineer 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/Engineer 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/Engineer 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/Engineer 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/Engineer 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 4303:1990 or later. 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 purchasing protocol requires that requests for air conditioning must be referred to Property Services.

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.

Property Services, in its duty of asset management for the University, considers the following aspects in asset management and facility operation – facilities should 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. Property Services 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 Property Services 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 Director Property Services or the Senior Deputy Vice Chancellor.

# APPENDIX 4

# Approved/Favoured Products

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

## 1. DOORS AND DOOR HARDWARE

### 1.1 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 |

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 |

Also to accommodate hold back cylinder for exterior doors or Cardax control

### 1.2 APPROVED DOOR HARDWARE

| | | | |
|---|---|---|---|
| DOOR STOPS | Sopers SPDS | A250 floor mount | SCP |
| | Drake and Wrigley | 1408 floor mounted | SCP |
| | Sopers SPDS | 1086 wall mount | SCP |
| | Drake &Wrigley | 1086 wall mounted | SCP |

FLUSH BOLTS (on timber doors)

| | | | |
|---|---|---|---|
| | Drake & Wrigley | 1240-150 on face of door | SCP |
| | Drake & Wrigley | 1240-200 on face of door | SCP |

FLUSH BOLTS (on Aluminuium Doors)

Manufacturer to supply samples for approval

DUST SOCKETS Drake & Wrigley 131 SCP

PULL HANDLES – Entrance Doors

| | | | |
|---|---|---|---|
| Legge | 1222 | 600 x 32 (or similar approved) | SS finish |

PULL HANDLES – Internal Doors

| | | | |
|---|---|---|---|
| Sopers | 1427 | 250 mm grip x 16mm | SS finish |
| 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, 100mm

If fast-fix, they must be of ball-bearing race type, 100mm

DEAD BOLTS Legge D Series Dead Lock

DOOR CLOSERS:

**Notes** – 1. Surface-mounted is the required/preferred option.
2. Drop plates are required for fixing to Fire Doors and Aluminium Doors.
3. Track model 1461 is not an option on exterior doors.

| | | |
|---|---|---|
| Exterior doors | Schlage 1461 DE | aluminium finish |
| Internal doors on egress routes & lecture theatres | Schlage 1461 DE | aluminium finish |
| Office doors | Schlage 4031 | 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 dual flush buttons on large face plate for public toilets. 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 or Integra 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 or similar approved. |
| 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)

These requirements are to be as described in the Univerity Security Manager's **SECURITY STANDARDS FOR THE UNIVERSITY OF WAIKATO, latest revision.**

## 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 currently has a Supply & Service Agreement for Carpet Tiles with Inzide Ltd (formerly Interface). No carpet is to be specified for use anywhere, unless with Property Services 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 Property Services 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.

Property Services only holds a small quantity of 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.

1200 x 600 may be considered in special circumstances.

## 7. MECHANICAL SERVICES

Manufacturer brands currently favoured for the various mechanical equipment types are:

| Type | Brands |
|---|---|
| AHU | Temperzone, Cooke Industries |
| Split units | Mitsubishi, Daikin, Toshiba, Temperzone |
| Attentuators | Fantech, Cooke Industries |
| BMS Controls | Honeywell |
| Boilers | Temperzone, Rendermax, Aquatherm |
| Chiller | York, Trane, PowerPax, Mitsubishi |
| Dampers | Holyoake, Halton, Trox |
| Elec Re-heats | Holyoake |
| Fans | Fantech |
| FCU | Temperzone |
| Filters | Filtercorp |
| Grilles, diffusers | Holyoake, Halton, Trox |
| Heat exchanger | Alfa Laval |
| Louvres | Holyoake, Colt |
| Pumps | Grundfos, Wilo |
| Radiators | Energy Products |
| Radiator valves | Heimier |
| VAV | Holyoake, Halton, Trox |
| VSD | Schneider Avatar, Siemens |

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# APPENDIX 5

## Property Services 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 made available.

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.11)**
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 **Sections I.8 and J.9**.

**General Procedures** – Arrangements must always be made in sufficient time for arrangements to be made 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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# APPENDIX 6

## Size/Location of vision panels in fire doors