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B. DEVELOPMENT AND PLANNING– SCHEDULE OF CHANGES – REV 4.1

As a guide only, attention is drawn to changes that have been made in the following clauses since the last revision

Clause	Date
General revision.	
B 2.2	August 2004
B.3 and B.4 transfered from App 4	

B. DEVELOPMENT & PLANNING

B.1. STRATEGIC AND FACILITIES PLANNING

B.1.1. Facilities Planning

(The responsibility for strategic capital planning and faculty and space planning.)
Strategic Planning for Capital Works flows out of four main documented areas of information:

UNSW Strategic Plan 2000
Campus Development Strategy Phase 2 1998
Kensington Campus Master Plan 2001 - 2005
Options prepared from Campus Development workshops

Faculty and space planning is carried out by Facilities Planning as a pre cursor to the design and construction phase to which these guidelines refer. If required, Facilities Planning staff can assist in the development of planning options and accommodation schedules.

B.1.2. Planning Controls

B.1.2.1. Statutory Compliance & Approvals

The responsibility for obtaining all required statutory and local authority approvals is the responsibility of the UNSW engaged principal consultant / project manager. The principal consultant / project manager is to consult with UNSW Facilities, Manager, Building Compliance to determine the specific approval requirements for each project.

B.1.2.2. New Buildings

All work is to be designed to meet all current relevant statutory and code requirements.

B.1.2.3. Existing Building

Where possible all new work to existing buildings is to be designed to meet all current relevant statutory and code requirements.

Building work planned for existing buildings provides both opportunity and obligation for compliance upgrading. The scope of upgrading of existing buildings in which work is to be undertaken will be determined on a building specific basis. Contact Manager, Building Compliance.
The design of works to occupied buildings should be mindful of the need for existing essential fire safety measures and the required egress of the building to remain fully functional during the construction period.

B.1.3. Design for Persons with Disabilities

B.1.3.1. Disability Discrimination Act

UNSW is committed to the provision of an accessible environment for its students and staff. This aim is part of the University's response to the elimination of discrimination as required by the Commonwealth Discrimination Act 1992 (DDA). The DDA places a general legal requirement on commercial and institutional building owners not to discriminate against people with disabilities, both physical and otherwise. In addition, as an education provider, UNSW has a special duty under the DDA to provide education free of discrimination.

The BCA and Australian Standards for access and mobility design provide for minimum design requirements only and adherence does not mean compliance with DDA.

It is essential that architects and designers regard accessibility as a design issue and not an additional feature.

The advisory notes further explain the rights and responsibility of building designers and managers under the DDA on Access to Premises prepared by the Human Rights and Equal Opportunity Commission. (HREOC).

In 1997 the HREOC recommended that where appropriate, the enhanced requirements of the Australian Standard, Design for Access and Mobility, AS1428 part2 are to be applied over the minimum requirements of Part 1.

See: http://www.hreoc.gov.au/disability_rights/index.html

B.1.3.2. Campus Access Audit

New construction, work to existing buildings, civil works and maintenance provide opportunities for implementing equitable access. A whole of campus access audit (Access Audit 2000) has been prepared for the UNSW Kensington Campus. The Access Audit 2000 forms the benchmark against which the next 10 years of achievement are to be measured. The audit identifies a long-term upgrade strategy to achieve full DDA compliance. Extracts of the audit are available on request.

B.1.3.3. A check list for best practice

Not withstanding the requirements of the Building Code of Australia (BCA) 1996 Part D3 and the Australian Standard (AS)1428.1 and AS 1428.4 as the standards for access, the following checklist will help planners, architects, designers and project managers ensure that physical access to facilities on campus is maximised. In some instances, these recommendations go beyond the minimum requirements of the BCA and Australian Standards.

B.1.3.3.1. Vision impairment

Ensure main paths of travel have a distinct edge to follow. This may be a kerb, wall or change of texture in paving material. Avoid obstructions such as columns and overhangs from protruding into the path of travel.

Install hazard Tactile Ground Surface Indicators (TGSI's) at the top and bottom of flights of stairs. Tactile indicator tiles shall also be used to mark hazards, change of direction in pathways and entry to major buildings and facilities (Further research should be undertaken regarding the effectiveness of directional TGSI's. The should be done with the assistance of the Guide Dog Association and the Royal Blind Society.)
;
Ensure all stair nosings have a contrasting edge;

Paint doors a contrasting colour to the wall or background colour
;
Where appropriate colour contrast is to be incorporated to enhance any change in floor finish or floor levels;

Install voice annunciation in lifts where possible. Additionally, tactile lift call buttons and floor number buttons should be installed in the lift carriage and on the lift door reveal;

On handrails, include a raised button at the top and bottom of the handrail;

Establish a protocol for advising staff, students and visitors (who may be vision impaired) of temporary works that my intrude on main paths of travel;

Install video monitors in large lecture theatres, teaching laboratories and other large teaching spaces;

Ensure main paths of travel and entries to buildings are adequately illuminated;
Letters and symbols on signage are to be in a colour that contrasts with its background

B.1.3.3.2. Hearing impairment

Include flashing lights on all Emergency Warning Indicator Systems (EWIS). Consider issuing vibrating pagers to people who are known to have a hearing impairment and who may be located in isolated areas. Vibrating pillows or pagers should also be issued to hearing impaired residents of college accommodation;

Install hearing loops in lecture theatres, large teaching spaces, at reception counters/desks and where ever public address systems are installed. New generation digital hearing aids should also be considered, as these may have significant advantages for uses.

B.1.3.3.3. Mobility Impairment

Provide at-grade access to the front door of buildings. Access ramps are to be designed as an integral part of the main building entrance and overall façade.

The major entry of the building in relation to surrounding site levels is to be evaluated so that steps and ramps are avoided

Ensure parked vehicles etc do not obscure the main entrance;

Where a change of level is introduced internally or externally to a building, an accessible path of travel must be maintained or provided;

Kerb ramps to footpaths shall be provided outside external doors;

A step ramp shall be provided in the place of a single step if any difference in level is unavoidable

Provide accessible parking bays close to the main entrances to buildings;

Install automatic electric opening doors at the front entrance of buildings. Where this is not possible, check the weight of the door complies with the relevant codes. Where main entrances also have a "required exit" function as defined under the BCA, separate manually operated swing exit doors are to be provided adjacent automatic doors.

Automatic entrance doors are to supplied and installed by either:

TORMAX (NSW) PL
121 Bath Road Kirrawee
Ph: 9545 1611.
Or

AUTOENTRY
PO Box 575 Chester Hill
2162
Ph: 9644 2000;

Manually Operated Doors will have a minimum clearance width of 850mm;

Manually operated doors shall be easily opened with standard lever hardware. See Section C

Hardware such as door handles, switches, pushbuttons, card readers and keypads must be accessible to wheelchair users.

Doors to toilets for persons with disabilities shall be sliding where possible. Where this is not possible, doors should swing outwards;

Provide lifts in buildings with more than one level. Where this is not possible, ensure reception areas, teaching spaces and offices that must be accessed by members of the public are located on the ground floor;

Lift controls are to be at a level that is accessible to wheelchair users;

Lifts should be fitted with visible audible and tactile systems of information
Provide complying handrails to all stairs and ramps;

Ensure door furniture and tap hardware is of an approved type;

Where possible, provide gentle graded paths in the landscape;

Provide at least one unisex accessible toilet in each building, preferably adjacent to the main toilets and close to the entrance to the building. Toilets should be clearly signposted;

Provide wheel chair positions at the front and back of lecture theatres and provide wheel chair access to podiums and stages in lecture theatres and other places of public entertainment;

Ensure circulation space within buildings complies with relevant codes

Ensure counters, lecterns, information kiosks, microphones, public telephones, drinking fountains, automatic teller machines and demonstration areas etc. are accessible to wheelchair users.

B.1.3.4. General Requirements

Where construction works temporarily restrict or prohibit access to a path of travel for people with disabilities, alternative access shall be maintained and provided for the duration of the works.

B.1.3.4.1. Signage –

Consideration is to be given to people with all types of disabilities, including vision impaired, wheelchair users, etc.

Entrances, toilets, egress routes, lifts and hearing augmentation systems should be clearly signposted.

Non-slip surfaces are to be provided to areas that are likely to be subject to water eg laboratories and foyers

Edge strips between differing floor finishes are not to exceed 3mm in height.

Floor mats at door entries are to be level with adjacent floor surfaces.

B.1.4. Crime Prevention Through Environmental Design (CPED)

B.1.4.1. Building Design Controls

All buildings, car parks, walkways, bicycle paths and their immediate environs shall be designed to incorporate Crime Prevention Through Environmental Design (CPTED) concepts and strategies to achieve a positive working and learning environment whilst reducing the opportunity for crimes against University property, staff and students.

In general terms, CPTED is a process, which reduces the incidence and fear of crime through the effective design and use of the built environment. The application of CPTED concepts and strategies in the design of buildings has direct benefit to the University by reducing losses through theft and vandalism, and enhancing the personal safety of staff and students.

Designers shall familiarise themselves with the application of CPTED concepts and strategies or engage the services of a specialist consultant to ensure that their designs meet the intent of these Guidelines. It is essential that designers clearly define the behavioral objectives for a given space and ensure that the design and use of that space supports those objectives. The following design factors shall be given specific attention.

Sightlines. The inability to see what is ahead because of sharp corners, walls, topographical features, landscaping, shrubs or columns is a serious impediment to feeling and being safe. These same features provide concealment for crimes such as assault, robbery, burglary, vandalism and graffiti. Designers shall maximise “visual permeability” and opportunities for “natural surveillance” and avoid “blind” corners, especially on stairs, in corridors, and in the location of toilets.

Entrapment Spots. Entrapment spots are small, confined areas, adjacent or near frequently used routes. They are typically shielded on three sides by opaque barriers such as walls or vegetation. For example, dark recessed entrances, loading docks; gaps in vegetation along paths, toilet airlocks, small courtyards or certain architectural features may create entrapment spots. Entrapment spots are to be avoided either through design, such as maze entry systems in toilets, or by restricting access to the space by using hardware such as grilles. Where entrapments spot it unavoidable, it shall be lit to a minimum of 30 lux and brought to the attention of the Supervisor.

Isolation. Isolated placement of facilities such as toilets, public telephones, car parks, but stops, pedestrian paths and tunnels, after-hours computer and science laboratories, libraries, etc. can increase fear on the part of the users and the opportunities for crime. Designers shall give careful consideration to mitigating the senses of isolation by using techniques such as incorporating windows to overlook pedestrian routes and locating the above mentioned facilities off high circulation areas where opportunities for “natural surveillance” are enhanced. Toilets shall not be located within isolated corridors or adjacent to a fire exit.

Loitering. Designers shall avoid locating toilets or bathrooms adjacent to public telephones, external seating, vending machines, notice boards, or any other item, which may legitimise loitering in the vicinity of the toilet.

Transitional Space and Signage. The ability to easily navigate the university campus reduces confusion and enhances confidence on the part of students, staff and particularly visitors. Designers shall incorporate techniques such as landscaping, changes in texture and/or colour, placement of furniture, etc. to aid with “legibility” of the site and clearly define the transition from public to semi-public to semi-private to private space. Where signs are used, their meaning shall be clear and unambiguous, and they shall be strategically located at entrances and near the intersections of corridors and paths.

The successful application of CPTED concepts requires designers to consider not only the proposed building and the activity which it supports, but also its relationship to neighbouring buildings and activities whether on or adjacent to the campus. Protective security measures shall be integrated with CPTED strategies, where appropriate, to further reduce crime risks and enhance personal safety.

B.2. BUILDING CONTROLS

B.2.1. Energy Management

"One of the great energy myths is that low-energy design compromises building comfort. The reverse is true. Incorporating energy into design is about optimisation – getting better value, longevity and productivity out of the design and construction process." Sustainable Energy Authority Victoria 2001.

B.2.1.1. Introduction

The motivation for energy efficiency within UNSW is driven by three factors. Responsibility for good economic management, care for the environment and the promotion of UNSW as a good public citizen, all provide sound arguments for energy efficiency. The guidelines are intended to encourage planners, designers and project managers to consider the benefits of energy efficiency for all refurbishment and construction work at UNSW, and apply appropriate energy measures to achieve success in the triple bottom line – economic, environment and community.

B.2.1.2. Environment

UNSW is a partner with the Commonwealth government in the National greenhouse Challenge. Partnership involves a commitment by the University to put in place cost-effective measures to reduce greenhouse gas emissions compared with business as usual projections, taking into account expected growth in the University's activities.

All construction then, should follow the general guidelines for Environmentally Sustainable Design.

B.2.1.3. General

User-friendly and effective control of all equipment, devices, lighting and plant is fundamental to energy management. Switches and other controls should be located intuitively and easy to use with minimal instruction.

B.2.1.4. Energy density

Energy density targets for specific buildings should be within 20% of best practice as defined by the Property Council of Australia (formerly BOMA) and in any case no more than 650MJ/m2/yr for office type accommodation.

B.2.1.5. Metering

Metering for electricity, gas and/or water consumption will generally be required for new buildings and/or major plant items, specified services or user groups. In general, all new meters must be fitted with pulse output to allow remote interrogation.

All metering shall be installed in strict compliance with UNSW BACnet guidelines, under the direction of the BACnet coordinator. Generally, the cost of metering will be the responsibility of the client.

Changes or additions to current metering must be reported via the Metering Notification Form and shall include a clear and complete description of the metered load.

B.2.1.6. Water heating

In general, natural gas should be the primary energy source for water heating, and where feasible, solar pre-heating should be costed as an option. Consideration shall be given to the use of solar hot water systems using either flat plate collectors or heat pump technology. For small domestic systems, consideration should also be given to the economic, energy and environmental impacts of storage systems versus gas or electric instantaneous systems.

In general, localized hot water services are more energy efficient than centralized hot water systems with circulating distribution systems.

Electric hot water systems (other than water boiling units) should not be installed without the specific written authority of the UNSW Energy Manager.

Design of the Domestic Hot Water Systems shall include the following:

The domestic hot water system shall be separate to the heating hot water system

Storage units shall be appropriately insulated to reduce standing losses

Circulating pumps shall be controlled to operate only when required.

The use of flow restrictors and pressure reducing valves in a water management system

The use of low flow fixtures

Dead legs on piping distribution systems shall be minimised

Boiling water units to be of low energy design and time controlled to limit hours of operation

B.2.1.7. Lighting

See Section E.3.2

The minimum energy performance for office type accommodation should not exceed 10W/m2. Corridors and storerooms should not exceed 5W/m2. Laboratories should not exceed 12W/m2.

B.2.1.7.1. Fluorescent ballasts

Provide electronic ballasts, with power factor correction. Where specified, install dimmable electronic ballasts.

B.2.1.7.2. Lamps and luminaries

In general, fluorescent luminaries with Triphosphor lamps shall be provided throughout.
In general, T5 lamps shall be the predominate source of artificial lighting for new buildings.
Dichroic downlights where used should be new design 35w lamp with electronic transformer.
High efficiency discharge lamps (i.e. metal halide or similar) should be used for large internal spaces.

B.2.1.7.3. Lighting controls

Consideration shall be given to the most efficient layout and zoning for artificial lighting systems to minimise energy consumption. As a general rule no more than 500W per single switch for open areas. All enclosed offices should be separately switched.

Occupancy sensing shall be incorporated in areas of infrequent use, i.e. lecture and conference rooms, storerooms and laboratories.

Consideration on the use of lighting controls should include the following:
Lighting control to perimeter lights in the form of dimmer controls sensitive to fluctuations in outside daylight levels

Switches should be in the locality of the lit area

Lighting control and dimming systems or lighting control integrated with the BACnet control system.

Locally initiated, timed after hours override provision for each separate operating area that may be used out of hours

Office lighting to be circuited to provide maintenance level cleaning lighting and after hours minimum-security lighting levels.

B.2.1.8. Motors

Many companies buy the motor with the lowest initial capital cost, but ignore its operating costs and energy efficiency. It is important to look at the entire life costs of the motor -including purchase price, installation costs and operating costs. By investing in a more efficient motor, the reduced operating costs achieved will far exceed the additional capital cost needed to buy one.

B.2.1.9. High efficiency motors

Many motor manufacturers have two lines of motors-standard efficiency and high (premium) efficiency. "High Efficiency Motors" (HEM) are about 2-4% more efficient and offer lower operating costs and reduced energy consumption when compared to standard motors. For example, a 10 kW HEM may have an efficiency of 93 per cent, compared with the standard electric motor's 88 per cent-a saving of 5 per cent in both energy and greenhouse gas emissions. The reduction in electricity costs will usually recoup the extra money paid for a HEM in about two years.

In many applications, the greatest improvements in drive power efficiency are likely to be gained in correctly matching motors with their loads. As actual load drops below 60% of the nominal motor rating, both motor efficiency and power factor begin to drop. In these cases, an oversized high efficiency motor is likely to have a lower operational efficiency than a normal efficiency motor correctly selected for its load.

B.2.1.10. Minimum Energy Performance

Australian Standard 1359.5:200X specifies "minimum" efficiency for high efficiency classification. In the 10- 25kW range, efficiency improvements on the order of 1.5-2.5% can be expected.
The reality, however, is that some manufacturers can offer a 3%+ improvement in efficiency over normal efficiency motors in their product line.

The designer should accept AS 1359.5 efficiency levels as absolute minimum and look for efficiency gains beyond this. Normally calling up "high efficiency" in the motor specification should suffice to obtain high efficiency motors. Sustainable Energy Development Authority 2000.

B.2.1.11. HVAC

See Section E.2

It is beyond the scope of this guideline to detail all energy efficiency opportunities with air conditioning systems.

The Architectural design is to minimise the need for air conditioning by maximising all means of passive design.

The consultant is to investigate and prepare designs and solution to;

Minimise overall energy consumption of the building

Maximise building fabric energy performance.

Maximise the use of natural ventilation solutions.

Within the parameters and promoting good accommodation standards.
Consideration must be given at least to the following;

a) Internal zoning
b) Reduction of minimum outside air quantities to suit the occupancy
c) Outside air economy cycles
d) Night purge options
e) Variable speed drives
f) Local zone time controls
g) Mixed mode ventilation
h) Radiant heating instead of air-conditioning
i) 4 Star energy rated Inverter split systems
j) Use the thermal mass of the building fabric for passive cooling solutions Develop concepts for hybrid ventilation solutions
k) Develop designs to create full cross building, cross ventilation solutions Examine designs to include full wall sun shading system with air gap backflow ventilation
l) Evaluate and specify appropriate glass after considering heat performance, shading coefficients against thermal loadings
m) Design glazing systems to allow ease of operation for natural ventilation.
n) Investigate where viable the use of thermal heat chimneys to facilitate thermal convection currents encouraging natural ventilation

Designs shall wherever possible shade/protect building fabric from external heat loads and increase thermal insulation and performance

o) Shading/protection using double skin, vented cavity solutions

p) Develop designs to aleviate thermal mass re-radiation

q) Consider suitable design solutions for all shading against lighting/natural lighting.
Evaluate insulation characteristics of external skins and develop solutions increasing thermal performance and reducing heat lag

Make all designs user friendly, understandable and effective in making the building more energy efficient

B.2.2. Acoustics

B.2.2.1. Introduction

Noise, impact, shock and vibration are generated from various sources both within and off campus. Any attempt to evaluate these sources, whether combined or in relative isolation, in the first instance would require their measurement, analysis and assessment be made. Elimination or reduction of these sources to specified levels may be subsequently necessary in order to satisfy the following:

Internal University ergonomic requirements such as speech communication, music presentations, facilitation of the work environment in the reduction of annoying noise, also vibration and the resultant noise.

Health, which includes not only reduction to eliminate annoyance, but hearing conservation for those who work in noisy environments such as workshops, plant rooms and even office areas. Also vibration to the hand and whole body.

Noise of any kind that is radiated from the University to surrounding areas and which exceeds the requirements for noise levels specified by local Councils.

It is necessary to consult with all local and government authorities to determine future happenings that are expected to cause disruption in order to take appropriate action at the design stage. Also the most economical approach will be facilitated if acoustic specialists are included during preliminary planning.
The total concept embraces many interacting aspects of the acoustic discipline, to include environmental; architectural and engineering noise control; room acoustics; hearing conservation; electro-acoustics; and acoustic measurements.

B.2.2.2. Noise, Impact, Shock And Vibration

Where new facilities are being considered, the following sources shall be addressed, via.

B.2.2.2.1. External to the University:

Aircraft including helicopter noise; road works; construction projects; road traffic to include heavy vehicles; building works; planned future works; railways surface or tunnels; sirens, thunder and other kinds of noise that are unexpected, transient or random. At the planning stage of a proposed new building, the possibility for seismic activity should be investigated and allowed for in building design.

B.2.2.2.2. Internal to the University:

Building and road works and road traffic to include heavy vehicles; air conditioning and mechanical ventilation; hydraulics; laboratories; workshops; student movement and activities such as sporting activities and outdoor music concerts; rain noise on roofs; office equipment and computers. The future possibility of a helicopter site on campus.

B.2.2.2.3. Sound Radiation To Areas Outside The University:

Where plant or workshop or building noise or other noise sources can be the source of annoyance to areas surrounding the University, it is necessary to consult local councils to establish the criteria for noise levels at receivers in the area.

It may be necessary to log the noise levels in these areas to establish L90 values over a 24 or 48-hour period to determine the noise reduction necessary at sources within the University.

Achievement Of Optimum "Noise Balance" Within The University:

In designing a new facility, the aim shall be to achieve a balance between the background of noise from all sources and the optimum noise level requirements to suit a particular activity. In these regard, the acoustic properties of enclosures such as lecture theatres, laboratories, lecture rooms, libraries and the like, shall be addressed for such things as reverberation, acoustic colourations and noise transmission in order to achieve the desired environment.

Consideration shall always be given to noise reduction from noise generators, preferably at the source, and the removal of annoying components within noise spectra.

B.2.2.3. Siting Of Buildings:

B.2.2.3.1. General:

In siting a building on campus or on a new land acquisition, a thorough environmental study all aspects of noise shall be carried out in accordance with:-

AS 1055-1997 Acoustics - Description and measurement of environmental noise

B.2.2.3.2. Procedures

The following procedures should be adopted in determining the impact of all aspects of noise in the sitting of buildings, via:

Consideration of the spatial relations between buildings and extensions, and relative building orientation to enable the most economical acoustic designs in achieving required noise balances.

B.2.2.3.3. Consideration of road traffic and aircraft noise.

Consideration of future development external to the University such as proposed new major construction works, road works, rail and other major noisy proposals that are expected to result in acoustic noise and underground shock and vibration that is likely to affect operations within the University.

The following Standards shall be consulted

B.2.2.3.4. Road traffic noise:

Australian Standards "AS 3671-1989 Acoustics - Road traffic noise intrusion - Building siting and construction", and AS 2702-1984, "Acoustics - Methods for the measurement of road traffic noise". AS 2702-198 should be read in conjunction with AS 3671-1989.

B.2.2.3.5. Aircraft noise:

Australian Standard "AS 2021-2000 Acoustics-Aircraft noise intrusion building siting and construction". This Standard includes guidelines for the assessment of potential aircraft noise exposure at a given site based on that Australian Noise Exposure Forecast (ANEF) System.

B.2.2.3.6. Helicopter noise:

Where appropriate the following two Standards shall be consulted and applied to achieve the criteria necessary for building function:

AS 2363 -1999 "Acoustics-Assessment of noise from helicopter operations"

B.2.2.4. Consideration For Reduction Of Noise, Impact, Shock And Vibration

Construction joints in large multi-story buildings, where other means to inhibit

The conduction of impact, shock, and vibration and resulting noise via the structure is not considered feasible.

Non-resilient floor coverings and/or under-lays to reduce impact noise on floors from walking and other movement.

Flanking paths shall be designed out of new facilities:

Flanking paths can result, for example, from vibrating pipes hard mounted to floors or walls; from vibrating machines hard mounted on concrete floors or walls; via air conditioning ducts between adjacent areas; from ducts not separated from plant via flexible couplings; via unfilled holes in walls; through common walls, floors and ceilings; and the building structure.

Mechanical services noise sources:

Particular attention is necessary in the reduction of noise and vibration from air plant rooms, diesel generators, fluid supply and fluid waste systems. Location within the building of plant rooms, toilet blocks, workshops, laboratories and lifts away from noise-sensitive rooms is of primary consideration. But since attenuation of vibration and noise via the structure and service pipes is small, design remedies should include:

Choice of low noise plant, to include compressors, pumps and valves,

Vibration isolation of plant, pipes, fixtures, pipe lagging, flexible hoses in lieu of solid pipes, caulking around pipes and ducts at wall openings, and acoustic absorption material in plumbing wall chases.

B.2.2.5. Consideration Of Internal Noise Levels And Acoustics For Particular Room Functions

B.2.2.5.1. General:

In designing internal building layouts and areas of occupancy, consideration shall first be given to locating noise creating areas such as plant rooms away from those enclosures requiring low ambient noise levels. Nevertheless specialist acoustic design is usually necessary to provide optimum background noise levels in areas of occupancy. Acoustic advice at the design stage is expected to result in significant cost savings at a later stage by obviating future noise reduction after the work is completed.

B.2.2.5.2. Internal room noise:

"AS 2107-2000 Acoustics - Recommended design sound levels and reverberation times for building interiors" shall be consulted first to postulate ambient room noise to suit particular function. It may be necessary to modify the recommendations therein for certain specialist functions, or seek other sources that appear more relevant.

Where air plant of any description exists, the design sound level refers to that of the air plant at the ears of those within the enclosure. Extraneous sound from outside or adjacent areas either direct or via flanking paths are required not to exceed this design level, thus maintaining a non-annoying spectrum of background noise.

Where the noise contains a tonal quality it may be necessary to reduce that part of the noise to approximately 5dB below the background noise spectrum. Known and predicted noises can be designed for, but it may not always be possible to entirely eliminate transient high intensity random sounds such as sirens, low flying aircraft, and thunder.

The AS 2107 recommendations are expressed in either dBA level for various kinds of room function together with optimum reverberation times, or Noise Rating Number (NR), for such as concert and recital halls, auditoriums, conference and convention centres, radio and drama theatres, together with recommended reverberation times.

Note: "AS 1469-1983 Acoustics - Methods for the determination of noise rating numbers" sets out two methods for determining a unique number called the noise rating number (Pertaining to the noise in a given environment.) from the measured set of octave band sound pressure levels between 31.5 Hz and 8 kHz center frequencies.

Classroom and auditorium acoustics for speech:

Limitation of background noise, acoustical colourations, attention to reverberation time and room shape. Published criteria for background noise and reverberation are derived empirically and describe a basic minimum. However for best speech intelligibility the limitation of background noise, acoustic colourations and attention to reverberation time and room shape is essential.

Acoustic reflectors and distribution of sound absorbing material to promote highest possible speech levels to enable best communication: lecturer to students, students to lecturer, and between students.

Speech reinforcement system systems are often unsatisfactory and students tend not to favour them. Custom design may help in some situations, but amplification should only be applied in difficult situations where the room acoustic cannot be satisfactorily adjusted using the natural acoustic. To completely supercede room acoustic requires a low reverberation time. Also, these systems work only one way, between lecturer and students.

Requirements for speech privacy and speech intelligibility: AS 2822-1985 - Acoustics Methods of assessing and predicting speech privacy and speech intelligibility" describes methods for prediction of speech communication and speech privacy in a given environment. This applies to auditoriums, classrooms, and lecture rooms conference rooms, offices. It is necessary that this standard be employed as a basic guide in achieving these requirements.

Noise from office machines and computers: Noise from office machines, computers and vocal communication between workers shall be evaluated and consideration given to noise reduction for both ergonomic and health reasons.

The following Australian Standards shall be consulted, via:
AS 3755-1990 Acoustics-Measurement of noise emitted by computer and business equipment.
AS 3756-1990 Acoustics-Measurement of high-frequency noise emitted by computer and business equipment.

B.2.2.5.3. Open planning:

A useful way to limit building costs and promote efficient working and teaching. However it can defeat these purposes if not well designed. Ideally its application can provide speech privacy and enable good communication, with increased worker efficiency.

The success of open planning requires the resolution of two apparent conflicting

Requirements, viz. speech privacy and speech intelligibility together with the reduction of noise from office equipment and computers. Designs require balances between speech and listener sound levels; background noise, for example air plant noise levels, office equipment and computers; and room acoustic.

Electronic sound masking systems using constant level shaped sound spectra are usually necessary, since the background noise from air plant noise often fluctuates somewhat to cause variations in efficiency of the open plan system.

B.2.2.5.4. Room acoustic in open planning:

Successful open planning requires short reverberation times, acoustic ceilings and carpeted floors, acoustic screens that both absorb and attenuate. An acoustic consultant best accomplishes design and tuning of the system.

Radio and television recording and broadcast studios, control booths, music performing rooms and listening rooms:
These enclosures require particular attention to the choice of reverberation time, freedom from acoustic colourations and low ambient noise levels. Consideration shall be given to isolating studios on "floating floors".

B.2.2.6. Health And Hearing Conservation

B.2.2.6.1. Introduction:

Noise studies shall be made in all areas where staff, students, maintenance personnel, on site workers and visitors are likely to be exposed to intense and/or annoying noise. Appropriate action shall be taken to control these exposures as necessary.
Intense noise can have a deleterious effect upon health with the possibility of noise-induced hearing loss as well as other biological effects. For example, intense noise can cause hypertension, headache, nausea, and feelings of disorientation. Noise can also disrupt work activities.

B.2.2.6.2. Acoustical products:

Where applicable, consideration shall be given to the use of alternative acoustic absorption products such as "Tontine Fibres", which to date has no known or suspected health effects.

B.2.2.6.3. Vibration and health:

The current trend in multi-storey buildings is towards lightweight construction with greater propensity for vibration due to smaller mass and damping within structures.

The following Standards shall be consulted as appropriate, via:
AS 2670 - 2001 Evaluation of human exposure to whole-body vibration

B.2.2.6.4. General requirements

Other relevant Australian standards ISO Standards and "BS 6472: 1992, Evaluation of human exposure to and measurement of vibration in buildings.

It is necessary to assess anticipated degrees of exposure for daily exposures, via; 1) exposure limits; 2) fatigue or decreased efficiency; 3) discomfort, in relation to peak amplitudes and sinusoidal acceleration.

At the design stage, the criteria from Standards can be used to calculate the expected vibration properties for particular configurations of beams and slabs for both intermittent and steady state vibrations. Note that the usual degree of furnishings and partitions may provide sufficient natural damping.

B.2.2.6.5. Hearing conservation:

The criteria for hearing conservation in New South Wales have been set by legislation, as stated below. It is assumed these criteria will have application within the University, although they can be modified to be more stringent.

Occupational health and safety act 2000

WorkCover Code of Practice entitled "Code of Practice: Noise Management and Protection of Hearing at Work". This Code is designed to suggest practices that will minimise the risk of persons being exposed to excessive noise levels.

It is necessary also to refer to:
AS/NZS 1269.0 - 1998 - Occupational Noise Management Overview:
AS/NZS 1269.1 – 1998 - Measurement and assessment of noise emission and exposure
AS/NZS 1269.2 – 1998 - Noise control management
AS/NZS 1269.3 – 1998 - Hearing protector program
AS/NZS 1269.4 – 1998 - Auditory assessment.

B.2.2.7. Acoustic Measurements And Tuning Of Acoustic Spaces

The methodologies and choice of instrumentation for acoustic measurements can be obtained in Australian Standards documents. It is important these recommendations be observed.

Wherever an enclosure has a specific acoustic design,
for example radio and television studios and ancillary areas, music rooms, classrooms and auditoria for speech, consideration shall always be given to acoustical tuning to ascertain if design criteria are met, and thus provide optimum functional conditions.

B.2.3. Maintenance

B.2.3.1. General

Simple maintenance procedures throughout the building are essential.
The design and construction materials shall reflect low maintenance

considerations. All building fabric, structural and service components shall be readily accessible and shall not be labour intensive if requiring repair.

Buildings higher than three floors in height are to be designed to take swing stage scaffolding or other approved building access systems for maintenance and external window cleaning.

B.2.3.2. Parts Replacement

Selection of fittings and equipment should consider the ongoing availability of spare parts and consumerables.

Items requiring frequent and regular maintenance such as light fittings should be readily accessible.

B.2.3.3. Cleaning

Cleaner's rooms, size and locations determinant on number, type and disposition of floor finishes.

The room must contain a hopper sink with tiled splashback, cold water supply, and power point. Cupboard space sufficient to store reserve supplies of cleaning materials and suitable area for required floor cleaning/polishing machines must be provided.

B.2.3.4. Safety

Floors are to be of non-slip and low maintenance finishes.

B.2.4. Electronic Security and Access Control

B.2.4.1. General

It is the policy of the University to use electronic security and access systems in new buildings and promote its use in existing buildings. Electronic security and access systems work in conjunction with traditional mechanical locking systems where a more sophisticated level of security and control of access are required.

The UNSW Security Service is responsible for assessment, installation and operation of all new and existing security alarm and access control systems installations at the UNSW.

A Security Representative will be appointed to each project for brief development and project co-ordination. This will include recommendation on the most appropriate type of alarm or access control system.

B.2.4.2. Nominated Specialist Consultants and Sub-Contractors

Design and installation of the electronic alarm and access control systems will be by UNSW Security Services nominated consultants and sub-contractors.

B.2.4.3. Types of Systems

B.2.4.3.1. Access Control Devices.

The University of NSW specifies CARDAX magnetic stripe card readers. These devices are utilised to secure and open areas and to control and monitor access to secured areas.

Electronic Alarms.

Security alarm protection is divided into three categories:
Emergency (Panic)

Installation of panic alarms is limited to areas where authorised personnel control the use of the alarm.

Duress/Panic Buttons_Keypad terminal to be fitted from floor level 1200-1400. 1m for disabled.

B.2.4.4. Intrusion Alarms.

This protection may be used in conjunction with panic alarms to provide 24 hours coverage of critical areas.

B.2.4.4.1. Robbery (Hold Up)

These alarms are reserved for use by cashiering points or those areas where money is handled.

They are to be activated only when a robbery (or attempted robbery) takes place.

All hold up alarms to be monitored by CCTV.

Closed Circuit Television, CCTV utilised at the University of NSW is "Event" generated and used to verify alarm activations.

Purchase, that unit must purchase all security systems, which are dedicated to a specific Unit or Department. Facilities department will provide the necessary infrastructure to monitor access control devices centrally and will also provide perimeter access control where appropriate.

A written quote will be provided and no work will commence without written approval from the client, which must be accompanied by a correctly authorised works and services form. An account number must be provided for future monitoring costs to be debited from.

B.2.4.5. Fire Safety

The provision of electronic access control must be considered in association with the maintenance of emergency egress from buildings. "Required exits" and "paths of travel" as defined by the BCA cannot be compromised by access control and must be available at all times for emergency use. The user requirements for security zones within buildings should be considered early in the planning process to avoid complex or compromised solutions.
Door Release

Push button door release (on side seeking egress) for electronic controlled latching is to be 38mm palm operated green mushroom impact switch. Location height: 900mm to 1200mm above FFL.

B.2.4.6. Installation and Monitoring

UNSW Security Service will enter into a contract with an approved security company. The contract will include design and installation specifications, prices for installation, and maintenance of the systems.
In areas where intrusion alarms are installed, signs warning of the alarm are to be posted at all entrances to the alarmed areas.

B.2.4.7. Related Policies/References

Policy on Installation and Use of Security Devices
Installation Standards & Specifications
Monitoring Costs
Contractor Access Policy
Parking Arrangements for Trade & Service Contractors

B.2.4.8. Proprietary Security Systems

Building access control systems; CARDAX

Equipment alarm monitoring; INNER RANGE

Closed circuit television monitoring (CCTV): PHILLIPS – Burle

A minimum requirement, all work shall comply with AUSTEL standards,

AS2201 Intruder Alarm Systems, AS3000 Wiring Rules, and all other relevant regulations and standards. In addition, both UNSW Campus Services and Capital Development Branch shall specifically approve all design work.

B.2.4.9. Building Requirements

B.2.4.9.1. Location of Equipment.

All power supplies and termination equipment is be located in the Communications Riser, unless otherwise specified.

B.2.4.9.2. Power supply.

Maximum of (2) two card readers to each power supply; (2 amp) unless otherwise specified. To be hard wired from dedicated 240v mains supply for all equipment from nominated distribution boards. Liaise with Security representative for locations.

Magna locks – To have own power supply. Output maximum only to be used.

B.2.4.9.3. Conduits.

Built-in and in-slab conduits to be part of Builders work.
Doors

All electronic controlled door to be minimum 90 degree opening. PIR monitoring for automatic doors.

B.2.4.9.4. Door hardware options:

Electric Strikes.

Magnetic Locks.

PADDE EML6 for single leaf doors

PADDE EML 10 for double leaf doors.

Magnetic locks to include bonding sensor, LED on lock and provide 1500 pounds holding force. All locks to include appropriate mounting equipment for inward and outward swing doors.

Transfer hinges

(Note: The above hardware is acceptable for fire rated doors).

Refer also: Section C

B.2.4.10. Programming

The nominated sub-contractor will carry out all operating system programming and data entry. Detailed plans, cable schedules and drawings showing equipment zones, alarm inputs etc must be made available to the Superintendent for approval prior to the connection of devices. Client data access levels etc will be programmed by UNSW.

B.2.4.11. Testing And Commissioning

The nominated sub-contractor will fully test and commission the complete installation.

The tests shall be carried out in the presence of the Security representative.

B.2.4.12. Manuals

Manuals by Security Contractor to UNSW Documentation requirements.
See Appendix 4

B.3. FIRE SAFETY SERVICES

Under the Environment Planning and Assessment Regulation 2000 (Reg 2000) UNSW has ongoing responsibilities in respect to fire safety services installed as part of building services. These responsibilities commence with local government approval of the project and are ongoing through out the life of the building.

B.3.1. Certifications

Certification of fire safety services is required at the following stages:

By the services' consultants at completion of the Design/documentation phase of the project.

By the installing contractor at completion of the installation at practical completion of the project. Certification of the individual fire safety services will form the basis of Final Fire Safety Certificate as required by reg 2000.

At the completion of the Defects Liability Period (DLP) the contractor is to provide an Annual Fire Safety Statement

B.4. RELATED UNSW POLICIES

B.4.1. Code Compliance Policy

a) *Preamble*

The facilities, which the Department manages for the University, are subject to various codes and statutes.
Recognising that the facilities it manages:

i) Are of a varying age, condition and standard
ii) Are subject to many and various codes and statutes which are liable to change over time

iii) May not at all times be able to comply fully with current codes and standards
iv) The University and the Department has limited resources and needs to prioritize those resources
v) The University must give proper consideration to
- The personal health and safety of staff, students and visitors
- The environment and
- Its statutory duties

b) *UNSW Facilities will:*

i) Work to the goal of upgrading existing facilities and ensuring that new facilities comply with relevant statutory codes and standards

ii) Apply the resources available to it by developing and using appropriate criteria to set priorities to achieve this goal

c) *UNSW Facilities will achieve the above by*:

i) Identifying all relevant codes and standards with which it must comply in relation to its facilities. It will develop a register of standards and codes of practice identifying the mandatory requirements
ii) Liaising collectively with those bodies responsible for the administration of codes and standards, communicating its rationale and risk management approach
iii) Identifying and compiling a list of non-compliance areas of work in relation to occupational health and safety and the environment
iv) Developing a risk assessment framework for prioritising areas of work and formulating a system for the allocation of resources based on a proper risk management approach.
v) Allocating its resources as effectively as possible, bearing in mind its statutory occupational health and safety and the environment obligations.

B.4.2. Roof Access Policy

B.4.2.1. Preamble

Building roof forms an integral part of the building fabric and unless activities on roofs are strictly controlled a number of adverse outcomes can arise, including:

a) Damage to roof fabric leading to water ingress
b) Compromises to roof safety
c) Adverse aesthetic appearance

d) Interference with valuable and critical engineering services located on roofs.

It is therefore necessary to have strict control over any activities that are conducted on the roofs of University buildings.

B.4.2.2. Policy

a) Any access to the roof of a University building is controlled by the Facilities Department.

b) It is acknowledged that there are some pieces of plant located on buildings that relate to academic activities carried out within the buildings.

   i) Each of these activities is to be registered with the local Facilities Zone Office and a protocol for gaining access to the roof is to be developed with the Zone Manager.

   ii) No new activities may be commenced on any roof without the written permission of a senior manager from the Facilities Department.

   iii) Should there be a dispute regarding roof access, the matter will be determined by the Deputy Vice-Chancellor (Academic Affairs).

   iv) Any proposal to use University roof space for commercial gain (e.g. mobile phone relays) must be directed to the Facilities Department for technical assessment. If the concept is technically feasible, the financial aspect will be discussed with the Business Office.

B.4.3. Authority to Perform Building Work - Policy

B.4.3.1. Preamble

The ownership and control of all University property is vested in the Council, however Council has approved delegations to the Vice-Chancellor and other senior officers in respect of approving work, authorising expenditure, etc. in respect of such property.

As a result of these specific delegations, it then follows that only specific individuals within the University are authorised to alter, renovate, etc. University property.

Any proposed alteration, addition, maintenance or modification to buildings and associated services on University property must be approved by UNSW Facilities.

B.4.3.2. Policy

Schools/Departments are not permitted to carry out any building works or alterations to services without the express permission of UNSW Facilities. UNSW Facilities is responsible to the University for managing all building works and alterations to services in accordance with project management and design standards, the requirements of the University's Policies and Procedures, the requirements of Statutory Authorities, Government Legislation, Australian Standards and the Building Code of Australia. UNSW Facilities is also required to maintain records relating to UNSW assets. This cannot be achieved if works are performed without the Department's knowledge. There are of course instances, such as in the provision of painting, carpet and basic joinery, when approval can be given by Facilities for schools/departments to carry out works directly. Schools/departments must always contact their zone office first when considering any work, regardless of whether school contractors or zone staff will be carrying out that work.

Where work is undertaken by budget units without consent of UNSW Facilities and is found to be unsafe or non-conforming with UNSW standards, then the work will be rectified by Facilities and the cost charged to the budget unit.

a) *Reasons for Facilities Department Approval*

Notwithstanding that initial responsibility for the facilities function is assigned to UNSW Facilities, and not to budget units, there are sound reasons for this central approval of property related works. Some of the more important reasons are:

i) Safety

There are instances of unauthorised and/or illegal works having been undertaken without the knowledge of UNSW Facilities. There are examples of electrical installations where switchboards have been overloaded or ledgends not updated; live wires have been left exposed in ceilings and walls; electrical circuits left isolated, resulting in damage to other activities; partitions being erected which inhibit egress (breaches of fire safety regulations); and unauthorised plumbing connections have led to laboratory water contaminating drinking water. Fire systems such as sprinklers and smoke detectors, fire doors must also be integrated into building works

Contractors must also be supervised to ensure they comply with safety and other regulations. Any person supervising works has statutory obligations under Workcover legislation.

ii) Contract and Tender Procedures

It is mandatory that University procedures be followed for tendering and contractual arrangements. These procedures are consistent with those applying to all publicly funded organisations and must meet the standards of prudential authorities such as ICAC, Auditor-General etc. There are instances where work has been authorised without adequate plans and specifications and without following established tendering procedures that may result in additional costs being borne by the University. See Section 11.2 of the Accounting Manual.

iii) Statutory Requirements

The University is not exempt from compliance with State and Local Government Regulations. To undertake alterations work the submission of relevant applications (usually a Development Application and/or Construction Certificate) to the local Council is essential. Failure to observe these requirements may result in action against the University whereby additional and unnecessary expense is incurred and/or notices of non-compliance issued by local authorities.

iv) Insurance

The University's insurance cover may be void if illegal work, e.g., non-compliance with the Building Code of Australia, is executed. All building projects must be registered with UNSW Facilities to meet requirements of the University's Contractors All Risks Policy.

v) Industrial

The use of unqualified contractors, staff or students to carry out work can lead to industrial problems and, ultimately, inconvenience to all concerned and can result in additional costs in effecting remedial work.

vi) Maintenance of Asset Information

It is important that the University's buildings and site service records be updated when changes are effected. Information to be updated includes floor plans, electrical switchboards, environmental waste records; building life cycle cost records; and, for work involving essential services, reports must be submitted to local government authorities.

b) *Project Management Tasks*

Co-ordination of works involves a number of factors including:

i) Obtaining local government building approval before work commences (an authorised Facilities Department officer must sign any application);
ii) Competitive prices are obtained in accordance with the Accounting Manual Section 11.3.1;
iii) The safety plan;
iv) Induction of builder to the University's operating standards and code of behavior;
v) Dealing with noise which is interrupting other University activities, particularly examinations;
vi) Controlling parking for building workers' vehicles;
vii) Managing site deliveries;
viii) Security of builder's area;

ix) Access roads being kept open unless there is prior agreement with Security;
x) Issuing of keys to contractors;
xi) After hours callout being arranged through Security;
xii) Contractor payment in accordance with Building & Construction Industry Security of Payment Act (1999)
xiii) Obtaining statutory declarations that all sub contractors have been paid
xiv) Security being notified of any alarms which might be installed;
xv) Ensuring any shutdown of services is efficiently managed;
xvi) As built drawings being provided to UNSW Facilities within 4 weeks of completion of the works;
xvii) Where building essential services have been altered, Facilities Department's records must be adjusted;
xviii) Disconnection of building services;
xix) Ensuring contractor cleans up.

These items need to be effectively managed for a project to be successful.

c) *"Budget Unit Builder"*

It is neither the intention nor the policy for UNSW Facilities to exercise absolute control over all aspects of building alterations, additions, etc. The requirement is that UNSW Facilities be aware of all property related works, approve/endorse the scope of work, procurement method, receive as built plans at the end of the project to update existing records and ensure all statutory regulations including OH&S are observed.

Works that might be carried out by budget units under their own direction include painting; carpeting; blinds and curtains

Should a budget unit wish to manage a project beyond the scope mentioned above, it must demonstrate to UNSW Facilities that it has the necessary expertise and resources to manage the project. Budget units should not expect zone teams to be part-time managers of such projects.