Australasian Health Facility Guidelines

Part B - Health Facility Briefing and Planning
0550 - Pathology Unit

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Australasian Health Facility Guidelines

Website: http://www.healthfacilityguidelines.com.au
Email: HI-AusHFGteam@health.nsw.gov.au

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01 INTRODUCTION

01.01 Preamble

PURPOSE OF GUIDELINE
This Health Planning Unit (HPU) has been developed for use by the design team, project managers and end users to facilitate the process of planning and design.
The Pathology Unit HPU was originally developed for NSW Health and issued for Australasian use in 2007. This revision has been informed by an extensive consultation process that began in late 2012 and was completed in 2013.

ACRONYMS
Acronyms used extensively throughout this HPU include:

- NATA: National Association of Testing Authorities;
- RCPA: Royal College of Pathologists Australasia; and
- NPAAC: National Pathology Accreditation Advisory Council.

01.02 Introduction

GENERAL
This HPU outlines the specific requirements for the planning and design of hospital Pathology Units.
The scale and complexity of Pathology Units varies depending on factors including the services role/level, networking arrangements, operational practices and location of the service. These services may range from small health services with point-of-care testing to large tertiary hospitals or networks with sub-specialty services.
This HPU does not address the following (that would only be found in major tertiary hospital site, reference / research laboratories or specialised units):

- laboratories utilising radioactive materials;
- teaching and research laboratories; and
- IVF laboratories.

This document should be read in conjunction with the Australasian Health Facility Guidelines (AusHFG) generic requirements and Standard Components described in:

- Part A; Introduction and Instructions for Use;
- Part B: Section 80 - General Requirements and Section 90 Standard Components, Room Data and Room Layout Sheets;
- Part C: Design for Access, Mobility, OHS and Security;
- Part D: Infection Prevention and Control; and
- Part E: Building Services and Environmental Design.

Pathology is the branch of medicine involved in understanding the cause and processes of disease by observing changes in the tissues of the body, and in blood and other body fluids. Some of these changes show the causes, while others reflect the severity of the disease and are used to monitor the effects of treatment.
The aim of the Pathology Unit/Service is to actively contribute to the overall ability of the related facility to ensure quality care for its user population. This contribution is achieved through:

- screening and diagnostic testing to determine the existence of disease or condition;
- determination/confirmation of appropriate treatment to counteract given conditions;
- activities to monitor the effects of treatment or the progress of disease or condition; and
- investigating the cause of death.

01.03 Policy Framework

The following organisations provide a wide range of information on Pathology Services:

- the Royal College of Pathologists of Australasia (RCPA) advises the Commonwealth, State and Territory Health Ministers on matters relating to the accreditation of pathology laboratories;
- the National Pathology Accreditation Council (NPAAC) plays a key role in ensuring the quality of Australian pathology services and is responsible for the development and maintenance of standards and guidelines for pathology practices. NPAAC is made up of representatives from all States and Territories, nominees from peak professional bodies and the Department of Health and Ageing. It is responsible for the development and maintenance of standards and guidelines for pathology laboratories;
- audits against these standards and guidelines are conducted by National Association of Testing Authorities, Australia (NATA), Australia's government-endorsed provider of accreditation for laboratories and similar testing facilities; and
- International Accreditation New Zealand (IANZ), New Zealand's national authority for the accreditation of testing laboratories, radiology services and inspection services.

Project staff are encouraged to familiarise themselves with the websites and the information contained therein:

- International Accreditation New Zealand (IANZ), International Accreditation New Zealand (IANZ);
- National Association of Testing Authorities, Australia (NATA), National Association of Testing Authorities, Australia (NATA);
- National Pathology Accreditation Advisory Council (NPAAC), National Pathology Accreditation Advisory Council (NPAAC); and
- the Royal College of Pathologists of Australia (RCPA), The Royal College of Pathologists of Australia (RCPA).

RELEVANT AUSTRALIAN AND NEW ZEALAND STANDARDS
There are a significant number of standards that apply when planning, designing and operating laboratories. These standards are listed throughout this HPU.

01.04 Description

DEFINITION OF HEALTH PLANNING UNIT (HPU)
The Pathology Unit is a discrete unit of the hospital designed to cater for the examination of body tissue and fluids. This HPU is designed to provide the "building blocks" for a Pathology Unit of any size. Activities include:

- specimen collection services through fixed locations (e.g. outpatient clinic), mobile services (e.g. phlebotomy service to Inpatient Units) and outreach services (e.g. home based collection service);
- specimen reception, sorting, labelling and distribution to the appropriate laboratory areas;
- specific analytical tests;
- preparation of reagents and instruments;
- calibration and quality control activities;
- calculations, reporting and interpretation of results;
- preparation of back-up facilities to cover instrument breakdown;
- preparation for specialised procedures;
- equipment maintenance; and
- ordering supplies, receipt and storage.

RANGE OF SERVICES
Pathology is divided into seven 'specialist' disciplines (or areas of activity) comprising:

- **Anatomical Pathology/ Cytopathology:** diagnosis of disease using tissue or small specimens of separated cells (including fluids and tissue smears) taken from a living patient or at post-mortem;
- **Clinical Chemistry:** detecting changes in a range of substances such as electrolytes, enzymes and proteins, in blood and body fluids and detecting and measuring tumour markers, hormones,

poisons and therapeutic and illicit drugs. This specialty is also known as Chemical Pathology or Biochemistry;
- **Genetics:** clinical cytogenetics (which is concerned with the microscopic analysis of chromosomal abnormalities) and molecular genetics (which uses DNA technology to analyse genetic mutations);
- **Haematology:** concerned with diseases that affect the blood and with the management of blood transfusion services;
- **Immunology:** concerned with the immune system and involves, for instance, analysing the ability of the immune system to identify and destroy agents that are foreign to an individual's blood;
- **Microbiology:** concerned with diseases caused by organisms such as bacteria, viruses, fungi and parasites. Clinical aspects involve control of outbreaks of infectious disease and dealing with the problems of infections caused by antibiotic-resistant bacteria; and
- **Forensic Pathology:** a subspecialty of pathology focused on the medico-legal investigation of sudden and unexpected death.

This information is an edited extract taken from the Royal College of Pathologists website The Royal College of Pathologists of Australia (RCPA), The Royal College of Pathologists of Australia (RCPA).

LEVEL / ROLE OF SERVICE
Descriptions of role delineation and levels of service vary between jurisdictions. The role/ level of pathology service will support the role/ level of the hospital or health service.
The broad roles include:

- no on-site pathology service. A specimen collection service is available on-site and samples transferred via courier to an approved laboratory;
- an on-site service for urgent testing with some testing performed by trained health workers using point-of-care testing devices. Blood storage on-site;
- an on-site core pathology service. An RCPA/NATA accredited laboratory undertaking a range of tests. The complexity of this service will depend on the range of clinical services provided by the health service; and
- a tertiary hospital/health service that provides a range of clinical, laboratory and business support services. This service will have a significant teaching and research role and may be a "hub" of a pathology network.

LABORATORY CATEGORIES
The NATA/RCPA accreditation scheme currently registers laboratories in five main categories that parallel the categories defined by the NPAAC. Categories are determined by the range of pathology tests performed and the level of supervision provided by the designated person in charge of the laboratory.
These laboratory categories are currently under review.
For further details relating to the existing categories, refer to NPAAC Department of Health and Ageing, 2007, Laboratory Categories - Requirements for the Supervision of Pathology Laboratories.
As a basic requirement, hospitals should have access to an approved 24 hour on-call pathology service for the performance of tests in:

- haematology;
- blood banking;
- clinical chemistry;
- microbiology;
- anatomical pathology; and
- cytopathology.

It is likely that a full range of testing in each sub-specialty will be available at all times.

PHYSICAL CONTAINMENT LABORATORIES
Australian / New Zealand Standard Microbiological safety and containment defines four levels of risk and specifies four levels of physical containment for laboratories. For the purpose of this HPU document the following will apply:

- all microbiology laboratories will be classified PC1, possibly PC2, and major Pathology Units may include a PC3 laboratory; and
- virology / serology laboratories, where provided, will usually be classified PC2 or higher.

For further details of containment levels, refer to the Appendices and to Standards Australia, 2010, AS/NZS 2243.3: 2010 Safety in laboratories (SAI GLOBAL).

02 PLANNING

02.01 Operational Models

FUTURE TRENDS
Design teams should be aware of the rapidly changing patterns of pathology practice. These changes may have major implications for spatial requirements for some functions and Unit design should wherever possible provide flexibility for future usage. Some of the changes that may impact on design are as detailed below.
Demographic changes such as:

- an ageing population with co-morbidities;
- prolonged survival of patients with previously untreatable diseases, with an ongoing requirement for monitoring disease status and response to treatment;
- patients of different ethnicity with diverse genetic disorders and cultural needs; and
- consumer demand for easy access to pathology services.

Developments in medicine including:

- genetic testing driving treatment options e.g. pharmacogenetics; and
- increased numbers of biopsies in general (in part due to the clinical emphasis on early diagnosis).

New developments in pathology including:

- increased use of point-of-care testing (PoCT) with increased consolidation of high cost and/or specialised services;
- increasing convergence of disciplines and shared use of staff and equipment;
- conversely, increasing specialisation of sub-specialties with unique equipment; and
- electronic systems for test ordering and reporting of results.

MODELS OF SERVICE DELIVERY
In most jurisdictions across Australia and New Zealand public pathology services are organised as networks, delivered across geographic regions. In many cases, operational accountability is devolved to an area or region with an overarching strategic responsibility for system development residing with jurisdictional health departments.
A major trend affecting the distribution of and access to pathology services will be the increasing use of PoCT. This local provision will in turn be supported by the consolidation of specialised services that provide services to a defined catchment. In order to reduce duplication and resulting costs, the provision of PoCT system will be as good as traditional testing.
With the increasing use of PoCT, it is more difficult to describe a typical pathology service. In addition, there will be many sustainability issues that may affect the model of care including rapidly changing technology and workforce shortages.
As demand for pathology services grow, so will the use of specialised testing equipment. This equipment is often large and can process high volumes of specimens. The main focus of this HPU is provision of an integrated on-site hospital service with basic core services. In addition, the document provides some guidance relating to specialised needs.

POINT OF CARE TESTING (POCT)
PoCT is defined as pathology testing performed in close proximity to a patient by a healthcare worker, with testing performed outside the precinct of a traditional Pathology Unit. PoCT may be carried out in a variety of settings such as Intensive Care Units, Emergency Departments, Inpatient Units and Community Health Centres.
PoCT is a supplement to, and not a replacement for, central laboratory services. It does not impact on the overall design of a laboratory other than by affecting throughput and maintenance needs when assessing staffing requirements. The management of PoCT will:

- be supervised by the local pathology service to ensure that clinical supervision is provided along with maintenance to improve the reliability of this equipment; and
- ensure that all units are NATA accredited.

02.02 Operational Policies

GENERAL
Operational policies have a major impact upon the planning and design, and the capital and recurrent costs of health facilities. Design teams should be constantly reviewing their design proposals with these in mind. Project teams should be able to demonstrate that the capital and recurrent cost implications of proposed operational policies have been fully considered.
Operational policies may have hospital-wide application or be unit-specific. A list of general operational policies that may apply can be found in AHIA, 2010, AusHFG Part B: Section 80 General Requirements.

HOURS OF OPERATION
The Pathology Unit will usually provide services on a 24 hour seven day a week basis, particularly where the hospital has emergency and critical care units.
As a rule, the laboratory will be fully staffed between 8.00am and 5.30pm Monday to Friday. Commonly there will be reduced staffing between 8.00am and 5.30pm on weekends, public holidays and evenings. After-hours services have implications for access and staff security.
As the turn-around time for pathology services is usually measured in hours rather than minutes, the opening hours and location of this service requires consideration to ensure benchmarks are achieved.

AUTOPSIES
The Autopsy Suite, where provided, will be collocated with the Mortuary Unit. These facilities are not generally collocated with the Pathology Unit (including the Anatomical Pathology service) as mortuaries have special requirements relating to access. These requirements are addressed in AHIA, 2013, AusHFG Part B: HPU 490 Hospital Mortuary / Autopsy Unit.

FROZEN SECTIONS
Frozen sections involve the microscopic examination of small portions of rapidly frozen fresh tissue removed surgically, and the subsequent provision of a diagnosis, often while the patient is still anaesthetised. Although the need for a frozen section may be pre-arranged between surgeon and pathologist, the actual procedure is considered “urgent”. Unless the volume is very high (such as supporting a neurosurgery service) or biopsies are done on a sessional basis, the process should be undertaken in the Pathology Unit and any proposal to undertake all or part of the task in an operating suite itself should be discouraged. However, this has implications for the very necessary rapid transport and the distance between the laboratory and operating suite. Specimens are usually hand-delivered but if the decision is made to use a pneumatic tube system, there should be a “station” in the area of the laboratory where the frozen section will be processed.
It is also now possible to attach a video camera to the microscope and view and discuss specimens through a CCTV system. Alternatively, access to a hands-free phone/intercom should be included.

LABORATORY CLEANING, DISINFECTION AND STERILIZATION
Laboratory disinfection is needed to decontaminate reusable equipment.
The need for sterilization has been reduced significantly or eliminated with the use of commercially provided media. Local practices will influence the selection of equipment.
In addition, systems for waste streaming means that certain categories of waste (e.g. clinical waste) will be contained in bins prior to removal by waste management staff.

LINEN
Provision will be made for the delivery, storage and retrieval of linen used by staff (e.g. gowns and lab coats) and linen used for patient care.

MEDIA PRODUCTION
Media, such as agar plates may be prepared in-house. Increasingly, media is being provided by commercial suppliers. Should the decision be made to continue local production, a dedicated suite will be required for the preparation of these materials.

PATHOLOGY REQUESTS
All pathology requests, test information and reporting of results will be computerised with authorised access to verified results being available at selected points throughout the health service. However, some use of

paper within the work areas associated with request forms, notes etc. can still be expected. Tests not able to be performed by the laboratory will be referred to appropriate reference laboratories.

RECORDS AND SPECIMEN RETENTION

Specimens and reports will be retained in accordance with the requirements of the NPAAC and for documentation of requirements of the Health Insurance Act for inspection by the Health Insurance Commission. Increasingly however, the adoption of Public Key Infrastructure (PKI) systems will eliminate the need to provide physical storage of records. Instead requests and results are transmitted securely using PKI and an electronic version will be retained.

Jurisdictions may have their own local policies and requirements. A table of relevant state and territory legislation is available at Appendix B of the NPAAC report: Retention of Laboratory Records and Diagnostic Material. This document also contains the Medicare Australia Notice of Information Technology (IT) Standards under the Electronic Transaction Act 1999 for scanning and storage of referrals and requests (Appendix A).

For these specific documents refer to NPAAC Department of Health, 2013, Requirements for the Retention of Laboratory Records and Diagnostic Material (Sixth Edition 2013).

REPORTING

Reporting of results will be carried out by staff of the Unit. The Unit Director will have the ultimate responsibility for reporting accuracy.

The reporting system will aim to:

- minimise delays in preparation and dispatch of test results;
- ensure a same-day service for basic tests; and
- accommodate immediate reporting of results which indicate the need for urgent therapeutic action.

Planning needs to ensure the capability for results to be entered into a computer database. Direct interfacing of instruments is desirable when justified by volume of work.

After validation results may be available by:

- SMS, email or through an electronic download;
- in writing (hard copy) reported either in the laboratory or at remote sites; and
- telephone reporting of results for critical care patient management ("critical values").

Design should enhance an efficient and effective work flow.

SPECIMEN COLLECTION / PHLEBOTOMY

Provision is needed for the collection of specimens from patients in both inpatient and outpatient settings. Inpatient specimens are routinely collected by the pathology phlebotomy service with other samples collected by medical and nursing staff. A dedicated specimen collection service is also provided and services may include:

- adult and paediatric venepuncture and heel/finger pricks (phlebotomy);
- urine and faeces (collected in an adjoining toilet);
- mantoux testing for TB reactions;
- glucose tolerance testing;
- skin and nail scrapings;
- urethral, vaginal, cervical, wound and throat swabs and sweat;
- bone marrow and fine needle aspirations (under aseptic conditions and by a pathologist); and
- venesections.

Depending on the size of the overall facility, a Specimen Collection Unit will generally be collocated as a discrete service in an ambulatory care zone. Increasingly, rooms for selected procedures (e.g. fine needle aspirations) will no longer collocated with Pathology Units. Instead, pathologists will access procedure rooms in clinical areas.

SPECIMEN TRANSPORT

Transport of specimens will involve both internal (to laboratories) and external (between facilities/buildings) systems. Due to the speed at which many specimens deteriorate, and the instability of some specific analytes, it is critical that the interval is minimised between specimen collection and analysis. Planning should facilitate the appropriate traffic and delivery systems for the specimen collection process. In some

instances the transport interval may be as little as one hour, requiring the patient to be transferred to the test site (e.g. Reference Hospital) for specimen collection. The design must facilitate unhindered delivery of all specimens to and from the Pathology Unit. Transport systems must support specimen processing within the specified Australian Council of Healthcare Standards turnaround time requirements.
Automated transport systems, such as pneumatic tube systems are commonly used to transport specimens between clinical services and the Pathology Units on health service sites. The benefits of these types of systems is that samples are delivered quickly, reducing the need for secondary storage within clinical units. Operational costs are also reduced.
Other logistics systems such as “trains” may be used within Pathology Units to internally transport specimens between the core laboratory and specialty areas (e.g. microbiology). The systems may utilise floor and ceiling space.
Where specimens are to be forwarded to an external facility, they may be dispatched in batches at set times, rather than individually as they arise. It will therefore be necessary to provide suitable storage facilities such as refrigerators, freezers or incubators for the batch specimens.
It will be essential to ensure that specimens are suitably packaged for transportation to avoid breakage, spillage or deterioration whilst in transit. Packages should be clearly identified and addressed and any special temperature requirements noted (e.g. chilling or temperature control). The design should include functional packing space and surfaces, a range of conditions for packed specimens awaiting transfer (e.g. refrigeration) and adequate storage for packing materials.
Refer to the publication NPAAC, 2013, Requirements for the Packaging and Transport of Pathology Specimens and Associated Materials (Fourth Edition).

STORAGE - GENERAL
Storage facilities may include:

- external bulk area;
- internal bulk area;
- internal separated zones for designated items;
- storage within each laboratory area; and
- reagent storage at workstations (do not include service outlets so that the shelves can be removed as necessary).

The Australian Standard (AS) for laboratory construction (AS/NZS 2982:2010) details quantities of various potentially dangerous materials that can be stored in one place (see references below).
Special storage requirements include:

- cabinets for flammable solvents and other designated materials such as paraffin blocks;
- stationery to be stored away from inflammables;
- adequate temporary storage for waste due to the large amount of disposable items which will be used by such a Unit. Access to such storage areas for collection personnel must not be through laboratories; and
- discrete areas for items such as liquid nitrogen, which requires purpose-designed insulated storage containers located in an area that is well ventilated. This store may require environmental monitoring depending on the volume of liquid nitrogen and location of the store. Decanting of liquid nitrogen should preferably be done in an isolated area of the laboratory on an impervious bench designated for the purpose. Adjacent storage for face masks and gloves should be included in the design of the zone.

Planning related to storage and use of liquid nitrogen and other chemicals needs to consider Standards AS/NZS 2243.3:2006 and AS 1894:1997.
Project teams are recommended to familiarise themselves with the following publications:

- Standards Australia, 2010, AS/NZS 2982:2010 Laboratory design and construction (SAI GLOBAL);
- Standards Australia, 1997, AS 1894:1997 The storage and handling of non-flammable cryogenic and refrigerated liquids (SAI GLOBAL); and
- Standards Australia, 2006, AS/NZS 2243.2:2006 Safety in Laboratories - Chemical Aspects (SAI GLOBAL).

STORAGE - SPECIMENS
Specimens may need to be stored:

- out-of-hours (e.g. when delivered by night staff to the Unit);
- in the specimen receiving area prior to distribution to the appropriate laboratory; or
- by individual laboratories for re-testing.

Storage systems for blood, serum and plasma include refrigerators, walk-in cool rooms and freezers (i.e. -20°C and -80°C).
Equipment such as refrigerators, freezers, ice machines and a small incubator will be located in the appropriate zones. As well as ice machines and refrigeration, the Unit should have the capability to produce dry ice (carbon dioxide / CO2).
The Anatomical Pathology services will need to keep residual specimens that have been used to generate blocks. These specimens can be large and are held in storage buckets usually for between one and three months. These specimens need to be stored in a separate room or purpose built storage unit within the Anatomical Pathology area. This storage will be well ventilated as the samples are stored in formalin.
Note that there are specific requirements for holding and use of CO2 in a laboratory area. For safety issues refer to TOMCO2 Systems, 2014, Safe Handling of Dry Ice (dryiceInfo.com).

STORAGE - BLOOD AND BLOOD PRODUCTS
All blood products must be stored in accordance with the Australian Red Cross Blood Transfusion Service requirements. Separate storage will be required for cross-matched and non-cross-matched blood. AS 3864.1: 2012 specifies requirements for the manufacture of medical refrigeration equipment such as reach-in cabinets and walk-in rooms for the storage of blood and blood products in the temperature range 2°C to 6°C, and for the storage of frozen blood plasma at a temperature of -25°C or lower, within an ambient temperature range of 10°C to 43°C.
Blood refrigerators and freezers for storing fresh frozen plasma must be connected to the emergency power supply and require continuous temperature monitoring devices and alarms. Alarms will be activated in the case of a power failure or when the temperature falls outside the specified range for the particular product and must ring into a 24 hour seven day per week staffed area.
Blood refrigerators located outside Pathology Units in critical care areas must also be monitored and alarmed, and remain the responsibility of pathology staff.
Platelet concentrates must be agitated gently and continuously in a single layer on a platelet shaker during storage and may be stored for up to five days at 20-24°C.
Temperature controlled devices are required as room air-conditioning is not sufficient to provide constant temperatures and may fail or be switched off at night.
Frozen blood products must be thawed under the control of the Blood Bank or other trained personnel.
Blood and blood products are transported in refrigerated boxes. The ice machine should be located in close proximity to the transport area to enable the packing of blood products into the boxes.
Refer to Standards Australia, 2012, AS 3864.1: 2012 Medical refrigeration equipment - For the storage of blood and blood products - Manufacturing requirements (SAI GLOBAL).

STORAGE - SLIDES AND TISSUE BLOCKS
Comprises bodily specimens, samples or materials examined in a diagnostic pathology procedure including slides, films, blocks, cultures and related material.
To be retained in accordance with current NPAAC minimum standards for the retention of diagnostic material.
Space required for storage will be considerable and heavy but it is assumed that the majority of slides would be stored in a secondary storage facility. Some materials will be kept in the Pathology Unit and the capacity for between 12 and 18 months of storage will be needed.

STORAGE - MEDIA
Storage requirements will be dependent on the model adopted by the Pathology Unit. For most services, commercially prepared media will be used and a “just-in-time” delivery and storage system will be used. Should media be prepared locally, bulk stock will be refrigerated within the Unit in the media preparation room if provided.

STORAGE - REAGENTS
Reagents may require storage:

- at room temperature;
- at four to 60°C;
- frozen; and
- desiccated.

Supplies may be stored within the Unit, in a well-controlled central cool room.

WASTE MANAGEMENT
All pathological waste should be considered as potentially hazardous and be treated as clinical waste.
The means of handling general clinical waste and soiled linen from the Unit should comply with measures implemented for other areas of the hospital.
The following categories of waste require further consideration and may call for the development of special policies:

- body parts and tissue (both fresh and preserved);
- radioactive specimens and reagents;
- large volumes of sharps requiring special sealable containers of large capacity;
- chemical waste; and
- flammable liquids.

Suitable areas should be provided for the safe temporary storage of solid or liquid wastes collected from laboratories until they are removed by a waste collection agency or disposed of by other approved means. This waste will be streamed and collected in waste specific bins including: body parts and tissue waste, cytotoxic waste, clinical waste etc. This waste will be removed by Environmental Services staff for disposal. It is anticipated that solvent recycling facilities will be used to reduce solvent water and its associated costs. This will be located within the tissue processing room. Consideration must be given to minimising the manual handling risks associated with handling the solvent to reduce the risk of injury while maintaining efficient work practices.

UNIT MANAGEMENT
Requirements for laboratory supervision and management must comply with NPAAC guidelines. Other requirements will be dependent on the size and complexity of the service.

OPERATIONAL STAFF
The range of staff working in a pathology unit is broad and can include:

- visiting medical officers, staff pathologists and pathology trainees;
- researchers;
- scientific officers;
- technical officers;
- nurses;
- laboratory assistants;
- post mortem staff;
- phlebotomist;
- couriers; and
- clerical staff.

02.03 Planning Models

GENERAL PRINCIPLES
The operational model for the Pathology Unit HPU will greatly influence the planning model adopted.

LOCATION
There is no definitive locational requirement, however the planners will need to consider and resolve the conflicting needs of the internal and external users of the service. Local and regional policies may also affect the locational requirements.
Ideally it should be in a discreet location to minimise unnecessary and undesirable traffic (e.g. “lost” patients or visitors from an adjoining clinical service).
The following requirements and issues need to be considered:

- proximity to the operating suite for frozen sections; and
- proximity to the Intensive Care, Emergency and Inpatient Units for urgent tests and blood products.

The provision of a pneumatic tube system may reduce the priority of placing the Pathology Unit within close proximity to the critical care areas of the hospital. When reviewing the need to incorporate pneumatic tubes, the planning team would need to analyse the capital cost versus recurrent costs and the clinical need to justify the installation of such a system justify the installation of such a system.

BUILDING DESIGN

The shape of the Unit should be assessed at an early stage but this will be influenced by the service profile and operational model the service seeks to implement to optimise the use of staff and equipment while providing a quality work environment.

Depending on the overall size of the Unit, a deep plan that provides a double corridor system versus a linear single corridor system should be evaluated.

The laboratories will be highly serviced, hence the location of plumbing and air exhaust ducts will need to be carefully placed to ensure future flexibility. In addition, the appropriate environmental and safety elements are accommodated.

Ease of external access to storage areas for bulk items (reagents, cylinders etc.) and provision of safe storage areas must be a consideration at early design stage as must storage / treatment areas for waste.

CONFIGURATION / ZONES

It suggested that laboratories be organised into three flexibility zones (highly flexible, semi-flexible and least flexible) that correspond to technological requirements since the equipment is central to the function of the lab. Analysis of the workflow suggests that organising the laboratory by technologies (e.g. automated versus manual processing, rather than by the traditional lab-specific departments) is an important consideration. This information has been sourced from the article Battisto, Dina, 2009, Change in Clinical Labs in Hospitals.

HIGHLY FLEXIBLE ZONE

The highly flexible zone, known as the Core Laboratory, would comprise of clinical areas primarily using automated systems (e.g. Clinical Chemistry, Haematology, Serology and some Immunology) together with central receiving and processing areas. This area will process the majority of routine testing and account for approximately 75 per cent of the testing volume. This area is also the most susceptible to change and is also the area where the most convergence of disciplines is occurring, in terms of equipment sharing and staffing expertise. The most frequently used automated systems should be physically located closest to centralised processing and receiving areas.

Specialist laboratories for Immunology and Endocrinology may also be included in this zone.

As more automation and technology become available, more testing will move to a Core Laboratory. The design needs to support this change in function.

The instrumentation configuration will dictate the design of Core Laboratories. Automated sample handling systems (tracks) vary in shape. Open Core Laboratories provide the greatest flexibility for future instrumentation configuration such as changes to instrument type and the number of units. Power and other services provided via flexible trunks from the ceiling allow flexibility in configuration.

The location of Core Laboratories next to specimen collection and specimen reception areas are very efficient by allowing the quick transfer of specimens from collection to analysis. These laboratories should be designed to promote the efficient transfer of samples through the laboratory from collection, labelling, registration, processing, and storage.

Core Laboratories will consist of high volume testing in the disciplines of Haematology (full blood counts, coagulation), Biochemistry and Transfusion Medicine (blood grouping, cross matching, provision of blood and blood products).

Second tier testing should be adjacent to the Core Laboratory (e.g. specialist coagulation or biochemistry testing). Samples can be obtained from the Core Laboratory storage area when completed. This could be an automated storage unit attached to a track system.

SEMI-FLEXIBLE ZONE

The semi-flexible zone would include semi-automated and manual processing and include those functions requiring a greater degree of enclosure such as microbiology, anatomical pathology and special laboratories. It would also include the blood bank. The open plan from the highly flexible zone must extend into the semi-flexible zone to accommodate equipment that spans lab areas.

LEAST FLEXIBLE ZONE

Shared support areas (such as clean-up rooms) should be located adjacent to the central core to promote ready access from all laboratory areas. Offices and staff amenities should be located on the periphery to avoid workflow disruptions and provide access by other staff and visitors.

02.04 Functional Areas

FUNCTIONAL ZONES
Functional zones are as follows:

- specimen reception / processing;
- laboratories;
- support areas; and
- staff areas.

This HPU assumes that clinical procedures will not be undertaken in the Pathology Unit but will instead be undertaken in suitably equipped procedure rooms in other areas of the hospital (e.g. day medical unit).

SPECIMEN RECEPTION / PROCESSING
A single location should be provided to accommodate the receipt of all specimens from sources including the pneumatic tube system, couriers and other staff. The area should be easily visible / recognisable from the Unit entry and visible from within the Core Laboratory but access to the receiving area should not permit any unauthorised access.
It should be possible to deliver specimens to the area throughout a given 24 hour period and the receiving area may be designed to ensure that only a small zone with appropriate refrigeration / warming storage is accessible for after-hours specimen delivery.
The specimen reception / processing area should provide for:

- receipt of specimens with accompanying request forms; specimens may arrive singly or in batches following a courier delivery, collection staff or via pneumatic tube system;
- convenient out-of-hours drop-off point for specimens and means of alerting on-duty staff;
- identification and administrative processing of information of all specimens;
- sorting of urgent from routine specimens;
- distribution of specimens to the relevant internal laboratory;
- separate storage for specimens waiting to be forwarded to a specialist laboratory;
- safe storage of retained portions of specimens (aliquots);
- immediate access to hand washing facilities and safety shower/eyebath; and
- ready access to staff amenities for after-hours staff.

LABORATORIES
Laboratories need to accommodate significant volumes of staff, specimens and other materials (e.g. consumables).
For the most part open-plan laboratories work well for Haematology, Clinical Chemistry and Immunology. The flow of work from initial specimen reception needs to be fully understood to ensure that all steps in the process are accommodated. Internal logistics and automated transport systems may be used to transport the sample within the Unit. These large open-plan areas can generate significant noise and heat and both factors will need to be considered and managed during planning.
The need to physically confine a laboratory is based primarily upon the physical, chemical or biological hazards generated in laboratories including Microbiology, Anatomical Pathology and Virology / Serology laboratories. These laboratories must be physically separated by means of walls and doors including air handling, from other laboratory work areas and may incorporate associated specialised areas for sterilization and media preparation facilities.
The design of sub-areas that have special equipment or work processes needs consideration. For example:

- fluorescence microscopes, where installed, need a small work area that can be completely darkened - either a dark room or inherent in the equipment itself;
- areas dealing with blood and blood products may require special construction to comply with TGA requirements (e.g. no visible joints, all timber fully-sealed etc.); and
- a rectangular module shape of three metres wide for an open plan laboratory will allow for a bench on two walls 750mm deep and a corridor space of 1400mm between facing benches. This complies with the requirements in AS 2982: 2010 Section 3.6.2 which allows for two people working at both sides of the aisle.

Refer to Standards Australia, 2010, AS/NZS 2982:2010 Laboratory design and construction (SAI GLOBAL).

SUPPORT AREAS
Dedicated areas will be required for instrument decontamination, media preparation / storage (depending on local policy), refrigerators, freezers and cool / cold rooms, distilled water, clean linen, waste holding and general consumables and equipment storage.

STAFF AREAS
Senior staff offices may be collocated in an administrative cluster with access to office supplies and equipment and readily accessible to authorised visitors. Some pathologists and senior scientists will however prefer to have offices or work stations close to their area of clinical laboratory work and there will need to be write- up stations within the laboratories.
Meeting room/s, toilets and showers and the staff lounge / beverage will be collocated in a “Staff Only” zone with access by corridor and not through the laboratories.
The allocation of office space and staff amenities will be in accordance with jurisdictional policies.

NIGHT STAFF
Consideration must be given to ensuring that the night staff have ready access to necessary facilities such as toilets, beverage bays and office equipment without having to travel outside the immediate work area.
Also refer to Part C: Section 790, Safety and Security Precautions.

02.05 Functional Relationships

EXTERNAL
Ready access to/from critical care units, emergency unit and inpatient units for urgent tests such as blood gas analysis and supply of blood products will be required if no point-of-care testing and/or pneumatic tube system.
Proximity to the operating suite for frozen sections needs to be considered. Pneumatic tube systems are not generally used for the transport of unique or irreplaceable samples such as tissue for frozen section analysis.

INTERNAL
Haematology and Clinical Chemistry areas will be collocated with Specimen Reception where the bulk of general work is carried out. All laboratory areas will have ready access to Support Areas and Staff Areas to minimise staff travel distances.
Administrative offices easily accessible to visitors without accessing any laboratories. The staff lounge should not be accessed via laboratories.

03 DESIGN

03.01 Accessibility

EXTERNAL
The following requirements and issues need to be considered:

ACCESS FOR COURIERS
Access for couriers from the local pathology service, the Australian Red Cross Blood Transfusion Service and/or outside laboratories. This access includes short-term parking bays for vehicles in close proximity to facilitate the drop-off/ pick-up of specimens and supplies. Access pathways and issues for out-of-hours courier deliveries direct to the Pathology Unit needs to be considered.

MOVEMENT OF MATERIALS
The movement of materials and equipment to and from the loading dock including:

- a broad range of supplies (e.g. large boxes of consumables, flammable liquids and reagents, Dewar tanks of liquid nitrogen). Where supplies are delivered directly to the Unit, they may be placed in a central storage zone or distributed to individual laboratories. Provision should be made for container collection by suppliers e.g. gas cylinders. This may involve either a local or a central collection facility;
- waste disposal with centralised waste holding areas (Disposal Rooms) being located on the periphery of the Unit so waste can be removed without the need to pass through laboratory areas; and
- access for equipment. Some chemical analysers are extremely large, consequently installation service and equipment replacement issues need consideration early in the design phase.

STAFF AND PUBLIC ACCESS
While the Pathology Unit will be a staff only area, the public will need access to specimen collection areas. These should be easily accessible to facilitate the high volumes of service.
Staff will gain access to the Unit via the main entrance or a separate staff entrance. Any additional access points will increase the unit's security requirements. Separation of staff from public areas must ensure staff security, particularly if working out-of-hours.

INTERNAL
The Pathology Unit design needs to ensure that internal paths of travel accommodate the safe movement of staff, specimens and equipment.

03.02 Parking

The delivery of specimens should be supported by an adequate number of short-term spaces with time limits not less than the delivery time required.
For information regarding staff parking, refer to Part C: Section 790, Safety and Security Precautions.

03.03 Disaster Planning

The Unit must have plans in place in case of disaster. For further information refer to the relevant sections on safety in Part C and to Part B HPU 80:

- Part B: Section 80 General Requirements; and
- Part C: Section 790, Safety and Security Precautions.

03.04 Infection Control

Pathology Units require special consideration in respect of infection control.
On a daily basis Pathology Units deal with potential sources of infection such as:

- a broad range of body tissue / fluid specimens; and
- the growth of living pathogens which, themselves, are capable of causing infection.

It is essential that the design contributes to the prevention and control of infection and incorporates:

- a layout to minimise cross-contamination between laboratories and work areas;
- efficient work-flow design and detailing;
- suitable materials and finishes;
- adequate numbers and location of hand wash basins;
- appropriate cleaning, waste storage and disposal facilities;
- effective specimen storage facilities; and
- first aid facilities (Refer NATA/RCPA. Requirements for registration: medical testing).

Additionally, for those areas that grow organisms and handle known infectious materials, the design must include:

- appropriate isolation of space and ventilation systems which present potential hazard (see Australian Standard AS 2982: 2010); and
- provision of effective extraction apparatus to specific equipment items such as biological and chemical safety cabinets and to specimen storage, temporary holding and disposal systems.

Refer to jurisdictional infection control policies for further details, and to:

- Part D: Infection Prevention and Control;
- National Association of Testing Authorities, Australia (NATA), National Association of Testing Authorities, Australia (NATA); and
- Standards Australia, 2010, AS/NZS 2982:2010 Laboratory design and construction (SAI GLOBAL).

03.05 Environmental Considerations

HEAT GENERATION
Heat generation is a significant issue in laboratories which needs to be managed through air handling systems ensure that accurate specimen testing results are provided. This heat is generated from staff, computers and equipment such as instruments, fridges and freezers.

ACOUSTICS
Noise is a major issue in laboratories and should be a major consideration during planning and design. Core Laboratories are generally open plan and accommodate staff and equipment. This arrangement can generate significant and constant noise. The design should aim to reduce the impacts of this noise on staff and create a pleasant and productive work environment.
Some equipment items generate significant noise (e.g. refrigerators and freezers). Where possible, the design should locate these units in locations that are accessible by staff but separate, to reduce the impact of this noise.
Some areas, such as administration and office areas may be carpeted.

NATURAL LIGHT
Controlled natural light is desirable to provide a pleasant working environment for the staff, however, direct sunlight onto benches and equipment should be avoided not only to minimise glare to staff but also because some chemicals may become unstable, or their properties altered, if exposed for extended periods. Some equipment may also be unsuitable or intolerant to direct sunlight.

03.06 Space Standards and Components

ERGONOMICS
Most bench top equipment will be located flush to the edge of the bench for easy use.
For further information refer to Part C: Section 730, Human Engineering.

HUMAN ENGINEERING
Human engineering covers aspects of the design that permit effective, appropriate, safe and dignified use by all people, including those with disabilities. It includes occupational ergonomics, which aims to fit the work practices, fixtures, fittings and equipment (FF&E) and work environment to the physical and cognitive capabilities of all people.
In the case of office and laboratory areas, access to height adjustable benches and workstations should be considered.
For further information refer to Part C: Section 730, Human Engineering.

ACCESS AND MOBILITY
For further information regarding access and mobility refer to Part C: Design for Access, Mobility, OHS and Security, Space Standards and Dimensions.

DOORS, WINDOWS AND CORRIDORS
Subject to the appropriate building and fire codes, for the purpose of this HPU, it is suggested that minimal doors are provided between the laboratory areas. Doors to enclosed laboratories must be sized to accommodate the equipment to be installed. Standard doors may not always be large enough especially if lifting equipment or large trolleys are required for transport.
Day/sun light control may be achieved by means of blinds etc. but also by placing benches located near windows at right angles to the windows and not parallel under windows. Louvers are not recommended.
For further information refer to Part C: Design for Access, Mobility, OHS and Security, Space Standards and Dimensions.

PLACEMENT OF EQUIPMENT
Project staff will need to itemise the various items of equipment, particularly floor-standing equipment to ensure it can be suitably housed. Adequate space for maintenance of any major equipment must also be considered.
Technology in pathology is constantly changing with large equipment items often replaced by bench-top units and conversely, multiple smaller equipment items being replaced with large processing instruments. Where possible the design of the Pathology Unit will reduce the amount of fixed benches and cabinetry to accommodate changes in requirements over time.
The Unit will need to accommodate further replacement of major instrument platforms. A new instrument needs to be installed and correlated before the old instrument is removed.

03.07 Safety and Security

SAFETY
Corrosive, toxic, flammable, infectious, pathogenic materials are handled in the Unit and effective levels of health and safety must be maintained (NPAAC – Requirements for Pathology Laboratories).
Safety issues to be considered when designing a Pathology Unit include:

- provision of non-slip flooring materials for areas where floors are subject to water and chemical splashing and paraffin/wax spills;
- installation of effective extraction units for the removal of toxic fumes (particularly formalin);
- provision of sealed centrifuge units for protection against aerosols;
- inclusion of safety cabinets;
- adequacy and location of collection and holding system for sharps, contaminated waste and soiled linen;
- appropriate disposal of fluids a) into sewage system or b) by off-site high temperature incineration;
- appropriate location and number of emergency shower and eyewash facilities relevant to laboratories;
- appropriate handling and storage facilities for flammable and highly explosive substances including fire blankets, fire hoses, fire extinguishers; and

- appropriateness of equipment used in specimen collection (e.g. use of reclinable chair in anticipation of patient feeling faint during blood withdrawal and provision of resuscitation equipment).

Also refer to clause 550.16.30 for details regarding risk/ hazard management, local occupational health and safety (OHS) policies and procedures and to:

- National Pathology Accreditation Advisory Council (NPAAC), 2007, Requirements for Pathology Laboratories (2007 Edition); and
- Standards Australia, 2010, AS/NZS 2243.3: 2010 Safety in laboratories (SAI GLOBAL).

FORMALDEHYDE
There are specific recommended workplace controls for forensic/hospital mortuaries in relation to formaldehyde. These include:

- use of local exhaust ventilation at each specimen station;
- relocation of specimen vats to areas with isolated ventilation or use of local exhaust ventilation over vats;
- avoiding the need for dilution of concentrated formalin products by purchasing diluted formalin products; and
- ensuring effective ventilation, especially in areas where formaldehyde levels may be high, such as exhaust ventilation in storage areas, and down draught arrangements at dissection areas.

This information is extracted from Recommendation 6 (pages xii-xiii) of the National Industrial Chemicals Notification and Assessment Scheme (NICNAS), 2006, Priority Existing Chemical Assessment Report No. 28 - Formaldehyde.

FLAMMABLE AND COMBUSTIBLE LIQUIDS
Health services will usually have a central bulk storage area for flammable and combustible liquids. Only small quantities of these materials will be held within the Pathology Unit. Storage requirements depend on quantities stored.
Refer to AS 1940:2004 - The storage and handling of flammable and combustible liquids, which provides requirements for the planning, design, construction, and safe operation of all installations in which flammable or combustible liquids are stored or handled. In separate sections it deals with minor storage, package storage and handling, storage in tanks, fuel dispensing, piping and tank auxiliaries, operations and fire protection facilities.
Refer also to:

- Standards Australia, 2006, AS 1940-2004/ Amendment 2-2006 The storage and handling of flammable and combustible liquids; and
- Standards Australia/Standards New Zealand, 2005, AS/NZS 2381.1:2005 Electrical equipment for explosive atmospheres - Selection, installation and maintenance (SAI GLOBAL).

SECURITY
Security must encompass the physical well-being of staff and the integrity of specimens, equipment and patient information and the design for the Unit will essentially involve controlled access on a 24 hour basis. Issues requiring further consideration include:

- monitoring of access to and from the Unit during daylight hours;
- control of after-hours access to specific areas of the Unit;
- security of Unit for staff working after hours;
- authorised access to emergency after-hours blood storage facility; and
- provision of a duress alarm system. This needs to consider the mobility of pathology staff to determine whether a fixed or mobile system is required.

Location of computer terminals should be such that the 'public' cannot readily read the screen, especially at reception points.
Access control may be achieved through the provision of minimal access points and electronic door controls. Refer to Department of Health, NSW, 2013, Technical Series TS11 - Engineering Services and Sustainable Development Guidelines.

RISK/HAZARD MANAGEMENT

The physical environment has a significant impact on the health and safety of staff. A risk management approach ensures risks are managed systematically utilising a process that supports the anticipation, identification and avoidance of risks that may have an impact on users and services.
Broad consultation with all stakeholders and other identified processes may be utilised to identify risks according to the availability of expertise to ensure security, health and safety risks are proactively managed.
Individual jurisdictions should refer to their local legislation for further requirements for plant and buildings.
OHS legislation requires designers to identify, assess and control risks in order to provide an optimal ergonomic design and to do this in consultation with stakeholders.

03.08 Finishes

WALL PROTECTION

Walls must be washable, impermeable and non-porous. Refer to Part C: Design for Access, Mobility, OHS and Security, Space Standards and Dimensions.

FLOOR FINISHES

Floor wastes, where installed, should not be graded as this impedes easy movement of equipment and mobile benches; rather grids should be located at door entries if overflow can be expected. In “wet” areas where floor hosing may occur, wastes should be located in the far corner of the room.
Non-slip flooring will be required in Anatomical Pathology owing to the potential for paraffin and wax spills. In addition, the colour of the flooring will need to contrast with the colour of the wax so that staff can easily identify spills. This will complement the use of other strategies to control slips including footwear and safety mats.
The use of carpet and other porous materials should not increase the risk of contamination by infectious material in the interests of noise suppression and the comfort of the occupants.
Where a floor surface is part of a containment area for spills, as is required in flammable and corrosive store rooms, a drop-down floor may be required rather than bunding.
Also refer to Part C: Design for Access, Mobility, OHS and Security, Space Standards and Dimensions.

CEILING FINISHES

Ceilings must be washable, impermeable and non-porous. Consideration needs to be given to ceiling finishes in significant negative pressure areas such as PC3 laboratories.
Refer to Part C: Design for Access, Mobility, OHS and Security, Space Standards and Dimensions.

03.09 Fixtures, Fittings & Equipment

GENERAL

Refer to Room Data Sheets (RDS) and Room Layout Sheets (RLS) for further detailed information and to Part C: Section 710, Design for Access, Mobility, OHS and Security.

LABORATORY FURNITURE

Modular furniture, adjustable height tables, and mobile units are recommended so that workstations and equipment can be removed or reconfigured as technological processes change. The laboratory should have little or no fixed joinery.
Project staff are recommended to refer to Standards Australia, 2010, AS/NZS 2982:2010 Laboratory design and construction (SAI GLOBAL).

FUME CUPBOARDS AND SAFETY CABINETS

Fume cupboards and safety cabinets should comply with the following standards:

- Standards Australia, 2009, AS/NZS 2243.9:2009 Safety in laboratories - Recirculating fume cabinets (SAI GLOBAL);
- Standards Australia, 2002, AS 2252.1: 2002 Biological safety cabinets (Class I) for personnel and environmental protection (SAI GLOBAL);
- Standards Australia, 2009, AS 2252.2: 2009 Controlled environments - Biological safety cabinets Class II - Design (SAI GLOBAL);

- Standards Australia, 2010, AS 2252.4: 2010 Controlled environments - Biological safety cabinets Classes I and II - Installation and use (SAI GLOBAL);
- Standards Australia, 2011, AS 2252.3: 2011 – Controlled environments – Biological safety cabinets Class III – Design (SAI GLOBAL);
- Standards Australia, 2011, AS 2252.6 2011 Controlled environments - Clean workstations—Design, installation and use (SAI GLOBAL); and
- Standards Australia/Standards New Zealand, 2006, AS/NZS 2243.8 Safety in laboratories: Fume cupboards (SAI Global).

REFRIGERATION / FREEZER NEEDS
The laboratory will require a range of walk-in cool rooms and/or refrigerators and freezers most requiring emergency power supply and temperature alarms.
Refrigeration and freezer units will require central monitoring of temperature with provision for alarms and automatic notification. Refer to Section 550.6.65 of this HPU document for details regarding blood products storage.

SAFETY SHOWERS AND EYE WASHES
A safety shower and eyewash or eye/face wash equipment should be supplied with potable water. Eyewash equipment should permit a constant flow of water without requiring one hand to hold open the tap/valve.
For details regarding safety shower and eye/face wash equipment location refer to Standards Australia, 2010, AS/NZS 2982:2010 Laboratory design and construction (SAI GLOBAL).

DECONTAMINATION AND STERILIZATION
Sterilizers are not generally required in Pathology Units unless they are needed to support highly specialised laboratories or when media is produced in-house. Instead, decontamination of reusable equipment is required. Should items require sterilization, they should be processed through the Sterile Supply Unit.
It is likely that waste will rarely be sterilized prior to disposal and will instead be “streamed” into approved bins and removed by waste management staff.

EQUIPMENT - GENERAL
All equipment should be itemised and located during the design phase to ensure that:

- the necessary space is provided for its operation and maintenance;
- the necessary services are available with appropriately located connection points;
- doors are sized to accommodate the passage of equipment;
- heat loads are estimated and catered for;
- weight loads are estimated and checked structurally; and
- the need for special anti-vibration benches can be assessed.

03.10 Building Service Requirements

GENERAL
High cost engineering systems requiring careful consideration by design teams include:

- lighting and the impact of deep planning on lighting requirements;
- the number of sanitary fittings and the potential for reducing these by strategic location;
- extent of the required emergency and uninterrupted power supply (UPS) and the necessary cabling and power outlets;
- extent of provision of emergency doors;
- extent of provision of essential back-up systems (e.g. dual generations, back-up UPS plant, chillers, boilers and dual electrical circuits); and
- the need for and the cost benefit/implications of pneumatic transport/ communication systems.

For further information refer to:

- Part E: Building Services and Environmental Design;
- Department of Health, Western Australia, 2006, Western Australia Health Facility Guidelines for Engineering Services; and

- Department of Health, NSW, 2013, Technical Series TS11 - Engineering Services and Sustainable Development Guidelines.

AIR-CONDITIONING / VENTILATION

Air-conditioning should be provided both for human comfort and to minimise variation and fluctuation of temperature and humidity for sensitive equipment, especially in the blood storage areas.

Each type of laboratory should be evaluated in terms of the permissible amount of air recycling. For instance, anatomical tissue processing rooms and microbiology PC3 rooms would need 100 per cent exhaust to the atmosphere.

Air intake filters must not be contaminated by expelled air or fumes. In order to calculate the air-conditioning and heat load requirements, the mechanical engineer will require technical details of all the major items of equipment planned to be located in the area. In addition, operating hours may influence requirements.

Special attention to ventilation will be required in areas generating aerosols, dangerous fumes or noxious odours. The risks associated with asphyxiant gas leaks require a planned management system of ventilation.

Infrastructure systems should include plans for additional capacity. The increasing density of technology in the highly flexible zone is causing more heat emissions, yet the equipment requires constant ambient temperatures. To satisfy codes and to ensure the safety and welfare of lab staff, HVAC systems should be planned in separate zones and planned for additional capacity allowing air quality to improve as testing procedures and methodologies evolve.

Detail of requirements should be ascertained via discussion with the client and by reference to Standards Australia, 2010, AS/NZS 2982:2010 Laboratory design and construction (SAI GLOBAL).

GASES

Natural gas reticulation may be considered but it may be more economical to provide local requirements via a portable unit.

The following gases may be required in the Unit, depending on services provided:

- special gases to fuel or calibrate instruments (e.g. special mixtures of oxygen, nitrogen and carbon dioxide for calibration of blood gas analysers, nitrogen to purge air from certain systems, carbon dioxide or nitrogen used in certain incubators);
- high purity gases such as nitrogen, argon and helium for HPLC and trace metals laboratories;
- special mixtures of nitrogen/ carbon dioxide/ hydrogen used for anaerobic incubators in microbiology; and
- compressed air for some laboratories such as HPLC and trace metals. Compressed air may also be a requirement for the operation of sterilizers and for robotic sample handling systems.

Gases other than town gas may be provided via a reticulated system or by cylinders. A reticulated system affords significant advantages in safety, convenience and often economy. Cylinders can create a laboratory hazard due to difficulty in moving or replacing and are generally discouraged under the Laboratory Safety Codes.

If piped gas systems are considered, especially with high purity systems, a specialised gas consultant should be engaged in the design of the reticulated gas system as special pipework, soldering / braze welding and monitoring systems are required.

Issues to be considered with a reticulated gas system include:

- alarm systems to identify a gas leakage in the laboratory;
- monitoring of supplies;
- emergency cut-off;
- purity of gas required at the outlet; and
- pressures to be delivered at the outlet.

Whether piped or provided from local cylinders, the risk of gas leakage and concentration build-up must be managed by ventilation systems.

ELECTRICAL SERVICES

Electrical wiring and services installations serving all laboratories should comply with relevant Australian/ New Zealand Standards (see below).

Ducts for power cabling should ideally be brought in vertically from the ceiling and not run horizontally above benches as they can clutter; nor from the floor as this restricts future changes. In general, all services should be contained within the floor-to-roof area to facilitate future change with minimal disruption to adjacent areas.

The placement of safety showers and eyewash stations must be situated to comply with required travel distance. Care must be taken to ensure this does not lead to conflict with electrical fixtures. Uniform, low glare lighting is required for staff comfort. UPS to critical items of equipment will be needed.
Electrical wiring and services installations serving all laboratories should comply with the requirements of the relevant authority and with Standards Australia, 2007, AS/NZS 3000:2007 Electrical installations (known as the Australian/New Zealand Wiring Rules (SAI GLOBAL).

FIRE SAFETY
Pathology laboratories present particular concerns in relation to fire. Issues for consideration include:

- storage, decanting and use of highly inflammable liquids and/or gases;
- the presence of open flame equipment and hot surfaces;
- exhaust facilities to disperse flammable vapours;
- disposal of contaminated solvents;
- inadequate separation between hazardous reagents (AS 2243: 2010);
- the need to consider the travel distances in respect of fire egress (refer to the BCA);
- safety standards in respect of installation of electrical equipment;
- the need to grade each room's activities so that the most potentially dangerous are sited furthest from the exits; and
- adequate separation between laboratories and egress passages and other areas. (AS 2982: 2010 and the Australian and New Zealand Building Codes).

Fire safety equipment will include extinguishers, blankets and hoses in accordance with BCA and laboratory safety requirements.
For further information refer to Australian and New Zealand Building Codes, and to:

- Standards Australia, 2010, AS/NZS 2243.3: 2010 Safety in laboratories (SAI GLOBAL); and
- Standards Australia, 2010, AS/NZS 2982:2010 Laboratory design and construction (SAI GLOBAL).

HYDRAULIC SERVICES
The quality of the water required in the area will vary according to use:

- domestic (potable water) to showers, hand basins and beverage bays; and
- purified water for laboratory use. This may be provided through reverse osmosis units, filtered water or deionised water systems. A study of the most appropriate water purification system will need to be undertaken.

Taps with hands-free action are desirable for laboratory sinks. Consideration should be given to locating the water services on the perimeter of the Unit thus leaving the central area free of floor penetrations. This will assist with any future design changes. Check the location of the power outlets with regard to water outlets to ensure that electrical standards are met.
The design of the hydraulic systems should ensure that spillage of hazardous or other waste will not flow through the floor penetrations.
Durable, non-corrosive, chemically inert piping should be selected for all the laboratory areas to avoid distortion, swelling and softening. Safety shower/eye wash will be required (refer to Section 550.21.50).

INFORMATION TECHNOLOGY / COMMUNICATIONS
Information and communication systems may include:

- wireless technology;
- radiofrequency identification (RFID) for access control and equipment management/ tracking;
- voice and data for telephones and computers;
- integrated pathology systems that will include electronic ordering and reporting and bar coding for sample identification and tracking;
- nurse and emergency call in patient areas such as specimen collection;
- security systems such as fixed duress;
- alarm systems where necessary to monitor equipment such as refrigerators and freezers; and
- teleconferencing / telepathology facilities.

As with power, cabling ducts should ideally be brought in vertically from the ceiling and not run horizontally above or along benches.

Telepathology is the process of transmitting digital images (real time video or still) over telephone lines or a local/wide area network (LAN/WAN) and requirements need to be addressed during early planning stages.

LIGHT - GLARE AND HEAT MINIMISATION

Glare and solar heat is a significant issue in laboratories where the outside windows are large and where either direct sunlight or reflected sunlight can enter the laboratory. Planners and designers need to consider effective glare and heat minimisation strategies. The utilisation of large volumes of constant southern light without direct sun exposure is a useful design feature.

Consideration must be given to the changing path of the sun between winter and summer and recognise that in laboratories that operate over extended hours, staff may be operating equipment at sunrise and sunset when direct sunlight entering the building is difficult to eliminate without external louvers. Morning (eastern) sun exposure is preferable to western sun and seasonal controlled of northern light is essential.

Tinting is not always effective and solar-type blinds that still admit light only minimise the problem. In practical terms, the only effective means of controlling glare is to prevent sunlight getting onto the windows. Placing benches at right angles to the window, does not work in practice as monitors and computers may be by necessity orientated to the window.

PNEUMATIC TUBE SYSTEM

Depending on the complexity and number of stations in the pneumatic tube system, delivery of a sample to the laboratory from clinical units can take several minutes. This delay needs to be factored in to the design of the pneumatic tube system especially in relation to the Emergency and Intensive Care Units where short turnaround times are required.

The installation of a pneumatic tube system in a facility that is shared may be considered but is discouraged. During planning and design, it will be necessary to understand the range of samples to be transported using a pneumatic tube system so that tube diameter is adequately sized. A diameter of 110mm is generally considered adequate.

TRADE WASTE

Special attention must be directed to the plumbing and drainage systems and they must be at a minimum, at least designed to be compliant with local government authority requirements.

Information on the quantity of chemicals to be used/ discharged must be provided by the health service to the hydraulics engineer. Pre-treatment facilities may include dilution, pH adjustment and holding tanks.

04 COMPONENTS OF THE UNIT

04.01 Standard Components

Rooms / spaces are defined as:

- *standard components* (SC) which refer to rooms / spaces for which room data sheets, room layout sheets (drawings) and textual description have been developed;
- *standard components – derived rooms* are rooms, based on a SC but they vary in size. In these instances, the standard component will form the broad room 'brief' and room size and contents will be scaled to meet the service requirement; and
- *non-standard components* which are unique rooms that are usually service-specific and not common.

The standard component types are listed in the attached Schedule of Accommodation.

The current Standard Components can be found at: www.healthfacilityguidelines.com.au/standard-components

04.02 Non-Standard Components

SPECIMEN COLLECTION AREA
Description and Function
Required for outpatient specimen collection.
The collection area should be zoned to provide a minimum of two screened bed/chair spaces each with sufficient adjacent space for a specimen collector, an interpreter for non-English speaking patients, a relative and additional collection personnel as required. At least one area should accommodate a full-length examination couch. It may also be appropriate to provide a high chair adjacent to a standing-height work bench for simple phlebotomy.
The area will also include storage for necessary supplies, clerical work space, hand hygiene facilities and space for a patient to undress if required.
The area may be two curtained bays or two separate adjoining rooms but note that one large room may not be considered practical where children will use the service or where auditory privacy is required (e.g. fertility clinics).
Hours of operation are usually 8.00am to 5.30pm, with inpatient services starting as early as 6.00am.
Functions and activities may include:

- patient receipt, instruction and positioning;
- specimen collection;
- disposal of collection equipment;
- labelling and dispatch of specimens to the receiving area; and
- patient recovery/awaiting further collections as required.

Dynamic testing will call for a regular series of samples collected over several hours.

Location and Relationships
Unless located in an Ambulatory Care Unit, the Specimen Collection Area will normally be located in a peripheral zone of the Pathology Unit convenient to the public entrance, waiting, reception and specimen receiving facilities. It should not be located within a laboratory area. Direct access will be required to the specimen toilet.

Considerations
Wheelchair and trolley access (including for emergency purposes). Nurse and emergency call system.
Infectious patients will require separation and this may be achieved in waiting areas or separate rooms for collection.
Space and storage will be required for:

- hand wash basin;
- specimen containers;
- PPE (e.g. gowns, gloves);
- linen;
- stationery;
- sterile equipment and dressing packs;
- waste disposal containers;
- inpatient unit phlebotomy trolleys;
- refrigerated specimens (temporary, as applicable); and
- a pneumatic tube station.

Oxygen and suction (piped or portable) is required as is ready access to resuscitation equipment.
Depending upon data entry/ pre-analytic service roles, this space may need to contain administrative staff, IT and specimen processing capacity.

SPECIMEN RECEPTION / SORTING / STORAGE
Description and Function
This space provides for the reception sorting and temporary storage of specimens arriving for analysis. The space will also be used for the storage of specimens awaiting transfer to other facilities and labs, possibly, for the packaging of such specimens.
The area will be zoned for receipt and related clerical activities, initial storage, transfer storage and for packaging, if applicable. Additionally, facility policy may require the area to act as a collection point for replacement specimen containers for other units. Functions and activities of the area include:

- receipt of specimens from collection area/s, Inpatient Units and departments and outside agents by delivery or pneumatic tube;
- time-clocking upon receipt;
- initial cataloguing/ labelling of specimens;
- main pneumatic tube station and capsule sorting areas;
- specimen sorting, by laboratory, with respect to tests requested;
- photocopying requests;
- appropriate temporary storage of specimens e.g. refrigerated distribution of specimens to relevant test areas;
- scanning requests;
- receipt/holding of specimens for transfer to other facilities under appropriate conditions;
- packaging of specimens for transfer, if applicable;
- odour/fume extraction, as applicable;
- bar coding/computer coding/reading/printing; and
- hand hygiene.

Location and Relationships
This area should be located adjacent to the testing laboratories, at the same time allow for ease of access for internal and external delivery services. The space is functionally related to all laboratories and to the Reception/ Clerical area.

Considerations
The integrity of specimens, the confidentiality of patient information and the physical security of personnel are essential.
The use of automated systems to move samples from this zone through to the laboratory will need to be assessed as this may impact on the arrangement of space.
Space and storage will be provided for:

- reception/clerical requisites (counter, drawers and cupboards);
- workstations to accommodate staff working at computers and utilising scanners;
- shelving / wall fixtures to support specimen baskets, trays, racks;
- insulated boxes;
- hooks for protective clothing;
- refrigerator;
- freezer;
- incubator (small for late specimen delivery for overnight storage);

- waste;
- hand basin; and
- sink.

LABORATORY - GENERAL
Description and Function
The laboratory, for the purpose of the schedule of accommodation in this HPU, is described as an open plan area consisting of modular units of equal size that will adapt to future changes of use and technology.
The Level 4 Pathology Unit would usually include the following areas:

- haematology;
- blood bank;
- clinical chemistry;
- anatomical pathology;
- microbiology; and
- clinical immunology.

HAEMATOLOGY
Description and Function
The haematology service will undertake limited investigation of the blood and its disorders. These specific services include:

- core haematology (FBC and smear products);
- coagulation;
- transfusion; and
- smear interpretation, reading and report.

Number of occupants: 1-2, although this will vary based on size of the laboratory.
Hours of operation: 8.00am – 5.30pm. After hours and on call tests will be undertaken as requested.
Functions and activities include:

- receipt of specimens and request forms that is in most cases separated from the main Specimen Reception;
- despatch of blood products to clinical units etc.;
- centrifuging the specimens;
- testing the specimens by manual, mechanical or automated means;
- microscopic examination of specimens;
- staining of specimens;
- reporting on specimens; and
- bar code identification of donor blood.

This discreet area of the laboratory is concerned with the cross matching and testing of blood for patient transfusion.
The laboratory will maintain a range of testing procedures to provide a safe antenatal, postnatal and general blood transfusion service to the health service.
After-hours access will be required to the blood fridge and the testing area. The functions and activities include:

- grouping of recipients' blood;
- cross matching recipient and donor blood;
- testing patient blood by manual or automated means;
- requesting supplies of blood and blood products;
- receiving blood supplies and blood products;
- storing cross matched blood (separate from un-cross matched);
- storing un-cross matched blood; and
- reporting on results (written or verbal).

CLINICAL CHEMISTRY
Description and Function

- 24-hour laboratory service for acute emergency care and investigative medicine;
- receipt of, and ensure satisfactory collection of specimens;
- supervise complex and dynamic biochemical tests;
- ensure that processing and data registration of tests is completed on all samples;
- use of instruments that ranges from complex platforms to point of care devices;
- centrifuging specimens;
- blood gas analysis;
- chemical analysis of specimens; and
- reporting and dispatching of results from the laboratory computer system.

ANATOMICAL PATHOLOGY
Description and Function
Macroscopic and microscopic examination of tissue specimens (microscopy normally done in the Pathologist's office).
Hours of operation: 8.00am – 5.00pm. It is unlikely that this service will operate out of hours, however frozen sections may be performed in an on-call capacity after hours.
Specimens are received, recorded and prepared and reported on following examination. For hospitals undertaking post mortem examination, tissue will be forwarded to the main Regional / Area laboratory for processing and reporting.

Location and Relationships
Each laboratory zone should be planned so as to allow one person to move freely between each zone or have vision of the complete clinical area. This will ensure that the Unit could be managed by minimal staff. All the zones should be easily accessed from the specimen reception area and be visible from the senior scientific supervisor’s office. The Haematology and Blood Bank area should be located adjacent to each other with direct access to the blood fridge area. The blood bank area may need to be separated by glass in order to reduce the noise transmission to this area. The nature of the work undertaken in this space requires the staff to concentrate as a mistake could cause future clinical problems.

Considerations
Storage will be required for:

- blood and blood products in a fridge or freezer to AS 3864.1: 2012 Medical refrigeration equipment – for the storage of blood and blood products – manufacturing requirements and relevant transfusion service standards;
- test reagents - staff will need to identify the types and volumes of all the reagents to be used in the laboratory in particular flammable liquids. Storage cupboard should be in a central location for ease of access from all laboratory zones. Glass fronted cabinet may be used for this purpose;
- glassware will need to be stored. Some of the containers are 500-600mm tall; Also consider the size of the sink for washing the glass vessels where they need to fit under the tap;
- items of equipment used on a daily basis can be stored on a shelf unit between laboratory benches;
- reference texts should be available for all staff to access within the Laboratory. Shelf units should hold at least A4 ring binders. Many laboratories prefer to store these books in glass fronted shelf units;
- files, stationery and other reference materials will also need to be stored;
- modular filing units can accommodate this function;
- specimen containers are usually delivered in cartons of various sizes - some laboratories keep an open box intact and accessible in the laboratory while others decant the contents into wire baskets or tote boxes and place on shelves or cupboards under the benches; and
- assorted small items need to be stored in drawers. These too can be provided in modular under bench units.

An emergency shower and eyewash should be centrally located and ready access to hand washing facilities in all zones should be provided. All zones require computer access to pathology and hospital information systems.

EMERGENCY SHOWER / EYE WASH

Description and Function

Deluge shower and eyewash facility will be required in case of blood or chemical spillage or contamination. To ensure the best utilisation of space, consideration should be given to placing the deluge shower adjacent to a hand wash basin.

Location and Relationships

Locate in central easily accessible position or if separate laboratories, one in each laboratory. Determination and number of emergency showers and eyewash stations should be in accordance with Standards Australia, 2010, AS/NZS 2982:2010 Laboratory design and construction (SAI GLOBAL).

AFTER-HOURS BLOOD FRIDGE

Description and Function

This space provides for the secure storage of cross-matched blood and other blood products and is intended for after-hours use by authorised staff only. Equipment will include:

- one floor-mounted blood refrigerator; and
- one floor-mounted blood freezer.

Location and Relationships

This area is functionally related to the blood bank.
The space should be located within the Pathology Unit outside the test area. This fridge will need 24 hour access and should not compromise the after-hours security of the laboratory.
Ready access is required to the:

- Unit's after-hours access point;
- corridor/circulation space;
- blood bank; and
- blood delivery point.

Considerations

The selected location should be enclosed and should provide for adequate temperature control and effective ventilation including:

- power failure / temperature control and "unauthorised access" alarms; and
- an effective light source.

Essential power requirements apply to each refrigerated unit.

AX APPENDICES

AX.01 Schedule of Accommodation

A Schedule of Accommodation follows suitable for a Level 4 satellite service supported by a regional Level 5/6 area / regional service. The Schedule is for guidance only and will need to be adjusted to reflect the services provided and the staff establishment. Given their complexity, specifics for higher level laboratories are beyond the scope of these guidelines.

Owing to the range of services provided, not all rooms/ space have a space allocation. The allocation of space will be dependent on the service mix, staff, automation and other equipment requirements. In these cases, a quantity has often been suggested but not a space allocation.

The 'Room/ Space' column describes each room or space within the Unit. Some rooms are identified as 'Standard Components' (SC) or as having a corresponding room which can be derived from a SC. These rooms are described as 'Standard Components –Derived' (SC-D). The 'SD/SD-C' column identifies these rooms and relevant room codes and names are provided.

All other rooms are non-standard and will need to be briefed using relevant functional and operational information provided in this HPU.

In some cases, Room/ Spaces are described as 'Optional' or 'o'. Inclusion of this Room/ Space will be dependent on a range of factors such as operational policies or clinical services planning.

SPECIMEN COLLECTION

AusHFG Room Code	Room / Space	SC / SC-D	Qty x m2	Remarks
WAIT-10	Waiting, 10m2	Yes	1 x 8	6 chairs
RECL-10	Reception / Clerical, 10m2	Yes	1 x 10	2 staff
STPS-8	Store - Photocopy / Stationery, 8m2	Yes	1 x 8	May be shared with adjoining unit
	Specimen Collection Bay / Room		2 x 9	2 collection areas, workspace and storage
STSS-12	Store - Sterile Stock	Yes	1 x 9	
WCPT	Toilet - Patient, 4m2	Yes	1 x 4	Specimen collection. 5m2 if accessible access required. May have pass-through hatch.
BPTS	Bay - Pneumatic Tube	Yes	1 x 1	Optional, depending on location and hospital- wide approach
BMEQ-4	Bay - Mobile Equipment, 4m2	Yes	1 x 4	Phlebotomy trolleys
OFF-S9	Office – Single Person, 9m2	Yes	1 x 9 (o)	Optional (o), depending on size of service. Will accommodate manager and other administrative requirements of the service.
	Discounted Circulation		32%	

Specimen collection may be more effectively located as part of Ambulatory Care / Outpatients Department.

SPECIMEN RECEPTION/ PROCESSING

AusHFG Room Code	Room / Space	SC / SC-D	Qty x m2	Remarks
	Reception/ Sorting /Filing		1	
	Specimen Storage, Packing & Dispatch		1	For transfer to 5/6 Laboratory
	Discounted Circulation		32%	

24 hour on-site service.

LABORATORIES

AusHFG Room Code	Room / Space	SC / SC-D	Qty x m2	Remarks
	Laboratory - General		1	Haematology, Blood Bank, Clinical Chemistry
	Laboratory - Microbiology		1	Optional if the service cannot be provided in a timely manner by a networked Level 5 or 6 Laboratory
	Bay - Emergency Shower/ Eye Wash		*1	*1 in each Lab
	Bay - Freezer		1	
	Discounted Circulation		32%	

24 hour on-site service. Laboratory space will include hand wash bays.

SUPPORT AREAS

AusHFG Room Code	Room / Space	SC / SC-D	Qty x m2	Remarks
	Wash-Up Area		1	Glassware etc.
	Clean-Up / Decontamination		1	
	Store - Flammable Liquids		1	
STEQ-14	Store - Equipment	Yes	1	
STGN-8	Store - General	Yes	1	
	Store – Specimen and Reagent		1	Cool room
CLRM-5	Cleaner's Room, 5m2	Yes	1 x 5	
DISP-8	Disposal Room, 8m2	Yes	1 x 8	
	After-Hours Blood Fridge		1 x 3	May be located in/near the operating unit and operating theatre.
	Discounted Circulation		32%	

The size and overall requirements for support areas will be dependent on the size and complexity of the service.

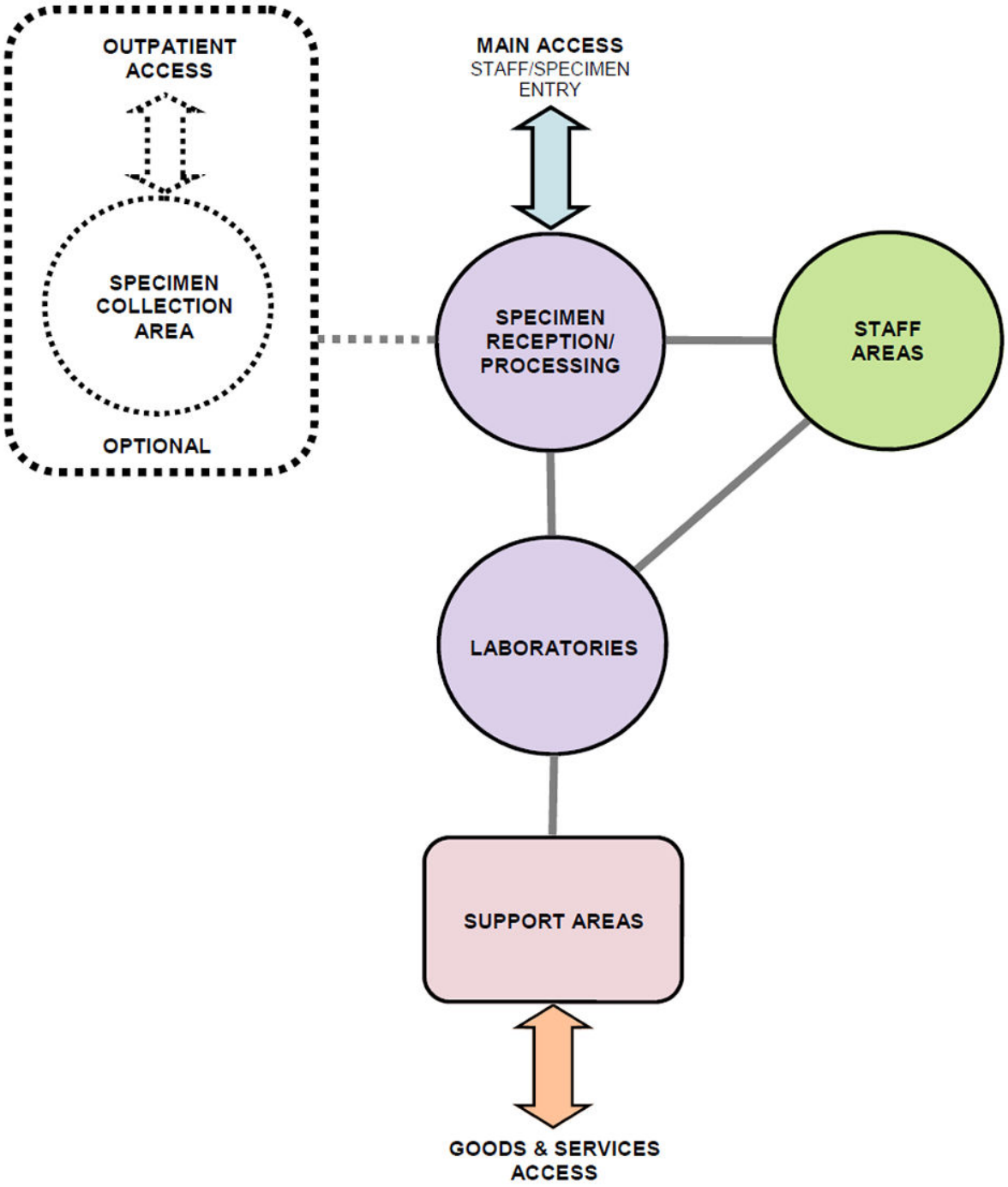
STAFF AREAS

AusHFG Room Code	Room / Space	SC / SC-D	Qty x m2	Remarks
OFF-S9	Office - Single Person, 9m2	Yes	1 x 9	Pathologists (fulltime)
	Office - Workstation, 5.5m2		5.5	Senior scientists, registrars, clerical staff. No. depdnent on staffing numbers.
MEET-12	Meeting Room, 12m2	Yes	1 x 12	
MEET-L-20	Meeting Room, 20m2		1 x 20 (o)	Optional. Room to accommodate multi-head microscope if an Anatomical Pathology Service is included
BBEV-OP	Bay - Beverage, Open Plan, 4m2	Yes	1 x 3	May be in Meeting Room
PROP-2	Property Bay - Staff	Yes	1 x 2	
SHST	Shower - Staff, 3m2	Yes	1 x 3	Optional
WCST	Toilet - Staff, 3m2	Yes	1 x 3	
	Discounted Circulation		25%	

The range of office space and meeting rooms etc. will be dependent on the size and complexity of the service.

AX.02 Functional Relationships / Diagrams

A following diagram sets out the functional relationships between zones in a Pathology Unit.



AX.03 Checklists

For planning checklists, refer to Parts A, B, C and D of these Guidelines.

AX.04 References

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AX.06 Physical Containment Levels

PHYSICAL CONTAINMENT LABORATORIES
Laboratories can be defined according to their level of risk and their subsequent physical containment. These levels are described below and are as defined in the Standard Standards Australia, 2010, AS/NZS 2243.3:2010 Safety in laboratories - Microbiological safety and containment http://infostore.saiglobal.com/store/Details.aspx?ProductID=1430097

PHYSICAL CONTAINMENT LEVEL 1 (PC1)
A Physical Containment Level 1 laboratory is suitable for work with micro-organisms where the hazard levels are low and where laboratory personnel can be adequately protected by standard laboratory practice. The organisms used are not known to cause disease in healthy adults (i.e. organisms in Risk Group 1). Work may be carried out on the open bench. Specimens that have been inactivated or fixed may be handled in a level PC1 laboratory. A PC1 laboratory may be naturally ventilated.

PHYSICAL CONTAINMENT LEVEL 2 (PC2)
A Physical Containment Level 2 laboratory is suitable for work with material likely to contain micro-organisms which may be present in the community, where the micro-organism may be associated with animal, plant or human disease of moderate severity (i.e. organisms in Risk Group 2). With good microbiological techniques, work with these agents may be carried out on the open bench. If there is a significant risk from the production of aerosols, a biological safety cabinet must be used. These laboratories are usually maintained at negative pressure to surrounding areas.

PHYSICAL CONTAINMENT LEVEL 3 (PC3)
A Physical Containment Level 3 laboratory is suitable for work with indigenous or exotic micro-organisms and where there is a risk of serious infection to humans, animals or plants (i.e. organisms in Risk Group 3). A Physical Containment Level 3 laboratory provides safeguards to minimise the risk of infection to individuals, the community and the environment. PC3 laboratories are provided with a controlled airlock entry and are usually contained within a PC2 laboratory area.

PHYSICAL CONTAINMENT LEVEL 4 (PC4)
A Physical Containment Level 4 laboratory is suitable for work with dangerous micro-organisms that pose a high individual risk of life-threatening disease and may be readily spread to the community (i.e. organisms in Risk Group 4). A Physical Containment Level 4 laboratory is a facility situated in a building separate from other laboratories or constructed as a fully isolated area within a building requiring a complete change of clothing, footwear etc. on entry and departure.

AX.07 The Planning Brief

During the stages of planning a laboratory a written brief should be provided by the building owner to the building designer containing the following information:

- type and function of the laboratory;
- detailed description of the work in so far as it may affect building requirements, including its layout and containment levels;
- details of hazards associated with the work;

- any proposed operations which may give rise to air contaminants, including chemical, biological or radioactive operations and operations where flammable liquids, hazardous or infectious materials or objectionable odours can contaminate ventilation air, particularly in the event of accidental spillage;
- the types of gases and flammable vapours likely to be produced by particular laboratory processes or to arise from flammable liquid stores or cabinets and the tendency of those gases or vapours to ascend or descend;
- equipment and apparatus to be installed;
- degree of flexibility required.
- staff complement (present and projected);
- conditions that might necessitate special structural requirements (e.g. heavy loads);
- additional loading, anti-vibration or insulation requirements which may result from the location of the laboratory or from the nature of the work to be carried out in it, or other special hazards such as fire, explosion or radiation;
- types and amount of waste;
- future extension needs; and
- any other relevant matters.

Through the design, planning and implementation process programmed risk assessments should be undertaken.

Extract from Standards Australia, 2010, AS/NZS 2982:2010 Laboratory design and construction (SAI GLOBAL) http://infostore.saiglobal.com/store/Details.aspx?ProductID=1391032&gclid=CO2R9ojUvboCFYPrpAodKEsALQ