A MICSA CASE STUDY ON DESIGNING AND BUILDING A MEDICAL CENTRE WITHIN AN EXISTING HOSPITAL BUILDING ENVELOPE

Vermont Private Hospital
General Practice
VPH General Practice
Case Study

Challenges of building and fitting out a general practice within a larger hospital setting
This case study was written based on the design and construction work completed in 2016 by MICSA.

It is written as a general source of project guidelines and information that is partially general in nature and partially project specific.

It is designed for readers who are not construction professionals as most of the information is common industry knowledge.

This icon indicated general information and helpful tips and considerations.

This icon indicated case study specific solutions employed by MICSA.

This icon indicates relevant regulations, codes and performance requirements.

For more information on solutions and other case studies, visit micsa.com.au
A medical practice design and build should take into account several factors. In this case study we outline some of them.

1. Regulation, standards, minimum requirements
Any building once completed needs to comply with the latest edition of the Building Code of Australia, Australian Standards and other statutory authorities specific to the medical industry. All electrical, mechanical and hydraulic services also need to comply with relevant standard and requirements. These are known as the minimum requirements. Your contractor should be aware of these.

2. Design and construction documentation
All works by the building contractor you hire should be completed in line with drawings, designs and documentation and approved by the relevant authority, such as a Registered Building Surveyor and other relevant bodies. Documentation addresses issues such as safety, disability access, structural integrity and adequacy, sustainability and cost.
In a multi-floor, multi-tenancy building a builder takes into account services and pipe-work in floors above and below.

All walls should comply not only with the style of the building, but also requirements for fire protection, sound insulation and other relevant factors.

Penetrations for future drainage should be considered and incorporated into the base build.
3. Relevant permits and accreditation
As part of the turnkey project, the contractor guides the client through required permit process. These include town planning, building permits, energy efficiency and fire safety as well as specific accreditation requirements for a medical practice.

A builder or project manager who specialises in healthcare projects will understand that baseline commercial building requirements are often insufficient. However, additional considerations made for a medical establishment do not necessarily need to equate to additional costs, as long as they are factored in early stages and in a clever fashion.

In this case, disability access requirements as per AS1428.1 were met by early planning and consultation with the relevant specialist and the need for dedicated washing facilities required for general practice accreditation were met by incorporating necessary services early in the rough stages.

5. Site Location
Location of the building in relation to other buildings, infrastructure and services can have a great impact on the viability of the business. They need to be considered.
Future patients will require easy access to public transport or conveniently located parking facilities. The design of the building should maximise easy access and visibility of the new establishment.

In this case, MICSA redesigned a single entry tenancy into a dual entry one (the main entrance being relocated to directly face a large parking area). This was only possible after a local council approval which we facilitated. Disability access requirements for any entrance and exit had to be met as well.

6. Fitout specifications, fixtures and fittings
Incorporating the correct room sizes, lighting, plumbing and electrical services early in the design saves time and significantly reduces cost. A contractor with suitable experience in the industry will be able to foresee many of those requirements and plan accordingly.

In this case, MICSA incorporated consulting rooms accessible from hallways and procedure area located in a central position with a dedicated nurse’s room as well as accessibly from multiple consulting rooms.
7. **Construction timeline**

In order to deliver a project on time and on budget, all building and fit-out components need to be planned ahead. This helps to avoid delays and any potential for on-site hazards and damages to existing or new fixtures and fittings.

*In this case we used our own tested “smart-lapping” project management method in which sections of the building can be fully or partially finished and closed off in order to deliver the project without delays but at the same time protect finished areas. for damage.*
An example of project components that frequently need to be factored in:

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>EXAMPLE</th>
<th>CONSIDERATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire Protection Services</td>
<td>Fire hydrant, sprinklers, fire hose reel</td>
<td>Is the total building area over 500 m²? Can each hose reel reach all of required areas?</td>
</tr>
<tr>
<td>Plumbing</td>
<td>Toilets, hand basins in consulting rooms</td>
<td>Is the hot water system suitable in size and durability for the requirements of a practice?</td>
</tr>
<tr>
<td>Mechanical Installation</td>
<td>Air-conditioning, heat extraction</td>
<td>Is the system’s size suitable to the proposed use?</td>
</tr>
<tr>
<td>Electrical Installation</td>
<td>Power and data</td>
<td>Do the electrical outlets need to be body-protected?</td>
</tr>
<tr>
<td>Roofing</td>
<td>Sloped or flat roof</td>
<td>Will the roof protect against natural elements?</td>
</tr>
<tr>
<td>Waterproofing &amp; Sealant</td>
<td>Caulking</td>
<td>Are all wet areas properly sealed and protected?</td>
</tr>
<tr>
<td>Mechanical Doors</td>
<td>Automatic sliding doors</td>
<td>Are the doors wide enough?</td>
</tr>
<tr>
<td>Framing</td>
<td>Partition walls</td>
<td>Does the partitioning system support sound insulation?</td>
</tr>
<tr>
<td>Glazing</td>
<td>Windows</td>
<td>Does the site allow natural daylight?</td>
</tr>
<tr>
<td>Ceiling Grid</td>
<td>Suspended ceiling or ceiling tiles</td>
<td>Does the ceiling installation support easy maintenance?</td>
</tr>
<tr>
<td>Paint</td>
<td>Walls and other fixtures</td>
<td>Is the paint type safe?</td>
</tr>
<tr>
<td>Flooring</td>
<td>Vinyl or carpet</td>
<td>Is the floor hard-wearing?</td>
</tr>
<tr>
<td>Other</td>
<td>many other components should considered</td>
<td>Have you prepared a scope of design and construction?</td>
</tr>
</tbody>
</table>
8. Health and Safety

It is important that every participant of the project considers their actions or lack of action and how it impacts on the health and safety of themselves and others.

All contractor and subcontractors in Australia comply with applicable Health and Safety Codes of Practice, Australian Standards and other relevant legislation. Information on WHS (Workplace Health and Safety) should always be shared with involved parties, including the client and this information should be filed and made available by a nominated Health and Safety Officer for the project.

An experienced contractor will be able to identify risks and hazards to the health and safety of construction workers and other parties. Some common high risk works include working at heights, excavations for trenches and installing electrical wiring. A Health and Safety plan is normally prepared by the contractor and kept on file.

For example, electrical equipment used on site must be inspected and tagged on a regular basis by a person certified competent to undertake the testing.
The most critical and too often bypassed stage of a project is its design phase.
A medical practice requires a carefully designed floor plan taking into access to services, patient comfort, practitioner efficiency and safety, regulatory compliance (both NCC and other other regulatory bodies such as Department of Health and Human services and RACGP guidelines for space and amenities)

Some of the items that sometimes get missed:

- Suitable power supply. Is the planned power supply sufficient to the needs of the business?
- Specific requirements relevant to the business or industry, for example specialty medical equipment
- Computer system, specialty IT and Telecom systems
- Signage and other branding and visibility needs
- Maintenance items. Will the design allow for easy maintenance?
- Changes in regulations
Full set of drawings also include detailed construction notes and schedules of finishes, for example doors and windows.

Site plan incorporates surroundings, available services, paths of travel and egress.

Elevation plan indicates appropriate dimensions and finishes of facade details, for example window details.
Site plan incorporate surroundings and services

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Elevation plan indicate appropriate dimensions and finishes of facade details, for example window details.
Initial Stages

Demolition, Site preparation
Protection & Consultation

Fitting into an existing envelope is needs to be carefully planned and executed
Prior to engaging in any development or medical centre within an existing hospital, the client together with a project manager and builder meet to outline in detail the proposed construction timeline and possible impact on existing operation.

The project team will typically identify issues such as noise, access to site, engagement of heavy equipment such as cranes, environmental impact as well as health and safety of existing patients, clients and construction workers.

In this case, MICSA completed the project within a strict noise restriction roster as well as carefully planned equipment access timeline. This created a challenging environment in which the works had to be completed in specific order outside of restricted times. Despite having to complete the project outside of roughly 40% of standard working hours (MBAV calendar) MICSA delivered on-time and without any cost penalties.
Any base building conditions need to be assessed to identify additional preparation.

Any penetrations allowing sewer discharge need to be completed in early stages.
Site Preparation

Provisions for the supply and maintenance of temporary site accommodation amenities, power other services are almost always required and need to be planned ahead of time. Careful consideration of existing site conditions allows for proper stage planning of construction.

Internal demolition, plumbing and sewer preparation, retro-fitting of electrical, lighting and data services often requires preparation and consultation with contractors responsible for any prior works. Any health and safety hazards and risks need to be assessed and documented.
Construction Stages

Hydraulic, Mechanical, Electrical Installation + General Fi-out

A comprehensive project plan will identify the order of installation of different construction components.
1. **Electrical Works**

An electrical contractor needs to ensure compliance with Australian Standards. In some cases the standards take precedence presented electrical plans. For example, body protected areas even if not marked on the plan should comply with the requirements of AS3003 (GPOs within procedure areas or clinical rooms need to be protected by a 10mA RCD TYPE I device). Other regulations which may cause regulations superseding the plans can include dedicated circuit and cleaners outlets requirements.

As part of electrical works stage, the contractor provides compliance certificates as required by AS3003. Inspections are carried out by an appropriate electrical inspector.

In a multi-faceted commercial project, the electrical installation also serves the needs of mechanical works, data connectivity needs and sometimes hydraulic installations (for example powered hot water units etc).
Prior to commencing works, contractors need to visit the site and examine all existing services as well as sizes and locations of existing systems. It is important to verify any information collected with the information contained in construction plans. Discrepancies or missing information are not uncommon and when found need to be passed on to the head contractor, superintendent and client. Frequently, contractors collect information from a variety of available sources. Drawings are read in conjunction with all relevant architectural and other consultants reports, specifications and any written instructions.

If the electrical system requires penetrations, it is important for the electrical contractor to identify those early and co-ordinate and confirm with the Builder, structural engineer and all other trades the location of all penetrations.

Three phase and single phase power to main switchboard needs to be designed and installed to suit the specified requirements of the medical centre. Typically an electrical engineer will calculate the power demand based on the total sum of individual loads of each device to be installed (including all services such as air conditioning). It is important that all power and light circuits need to suit base lighting and requirements of a medical centre. All other electrical systems required need to be completed to suit authority requirements and minimum BCA requirements.
2. Mechanical Works

Air-conditioning system design needs to suit the performance requirements of the site location and use. In some cases retrofitting and reconditioning of the existing system is required to support the climate and air quality requirements. As part of the mechanical installation, the mechanical contractor typically installs automatic controls for different building zones, temperature sensors and control panels suitable for the use as a medical facility.

Air conditioning system as well as mechanical ventilation needs to be designed in accordance with floor plan design and relevant regulatory requirements. In case of discrepancy between the two often regulatory requirements supersede the plans, but this always needs to be brought up to the attention of the project superintendent or client.
HVAC (Heating Ventilation Air Conditioning) design is often based on a specific commercial vendor’s equipment (for example Mitsubishi Heavy Industries). In some cases an alternative solution based on a different brand is acceptable, but always should match the design and performance criteria.

Evaluating different systems and vendors and taking into account all characteristics and specifications is not always easy, therefore several conditions need to be satisfied before such substitutions can be considered. First of all, an experienced mechanical design engineer is required to engage in the necessary computations on each separate substituted item of plant and equipment. Secondly, the head contractor and mechanical subcontractor need to determine with accuracy whether the alternative mechanical ventilation equipment would cause any building works to be altered - especially ones that are structural in nature. Finally guarantees and warranties for substituted equipment need to be revised and specified (ideally matched with the originally specified system)

Medical centres require comfortable and safe environments
There are several regulatory requirements for all mechanical works in Australia. For example all pipework, fittings, valves, components, concealed space and below ceiling heads need to achieve compliance with AS 2118.1

3. Fire & Smoke Protection

Requirements for fire and smoke detection and protection are critical in any building, especially one that is public in nature (medical centres, gymnasiums, public halls etc). There are active and passive protection methods. An example of a passive protection would be fire-rated plasterboard, whereas an example of an active system would include portable fire extinguishers, sprinklers, fire hose reels and hydrants.

A specialised and experienced contractor designs and installs this equipment and often the head contractor will engage such them.

Often the contractor will need to produce shop drawings prior to installation, which need to be approved by the superintendent.
Coordination with other trades and finding the location of all pipework and fittings with other services and structures is an important factor that cannot be missed.

Penetrations to fire-rated walls must be sealed with non-combustible material to prevent the passage of smoke. Any penetrations to the fire wall must be fire sealed so as not to reduce the FRL (Fire Rating Level) of the fire wall.

The Fire Sprinkler System design & installation has to meet the requirements of multiple bodies such as fire engineering report, the fire services drawings, hydraulic services drawings, architectural, structural and other services drawings.

If the total area of the building exceeds 500 square metres, a dedicated fire hydrant will most likely be required.
4. Hydraulic Works

Hydraulic works commonly consist of water Services (potable cold and hot water as well as fire services water supply), sanitary Plumbing and Drainage Systems and sometimes storm-water Drainage Systems.

All plumbing works in Australia comply with Australian Standard AS3500, BCA (Building Code of Australia) and the Plumbing Code of Australia. Similar to mechanical and electrical works, if a situation arises that one of the statutory requirements conflicts with the proposed plan, they supersede it.

Water services require agreements in place with authorities that have jurisdiction over the supply (for example Yarra Valley Water). It is a good idea to enquire about this process early in the construction process. The hydraulic subcontractor engaged by the head contractor is required to co-ordinate with other Services Contractors before commencing to determine the correct construction sequence. Plumbing works need to be installed as per recommendations of the equipment manufacturer or otherwise as per governing regulations. It is also important to create an adequate support system suitable for
Hot water to all fixtures typically requires at least 70 Degrees Celsius delivery but hot water installations to all Personal hygiene fixtures need to be set at max. 42 Degrees Celsius.

the weight of pipework and capable of withstanding changing weather conditions.

All pipework should be concealed in walls. This is common sense, but does require planning and foresight by both the designer and contractor. Finally, all installations must be pressure tested to ensure no leaks.

In commercial buildings, especially clinical centres, proper water temperature delivery is key. For example, it is normally a requirement that hot water to all fixtures requires at least 70 Deg Celsius delivery but hot water installations to all Personal hygiene fixtures need to be set at max. 42 Deg Celsius. This outcome is commonly achieved by using thermostatic mixing valves. This system is also capable of reticulating tempered temperature water.
Finishing Stages
Flooring, Painting, Fixtures & Fittings

Medical centres require modern, high quality commercial grade finishes designed to last.
Suitable materials, types of finishes and colour scheme can increase patient and staff comfort.

Considerations should be made to increase visibility and safety of access and paths of exit.
Each space has to suit its purpose and enhance productivity and safety.

Consulting rooms should be designed for ease of access and the versatile nature and functionality of the room.
Sanitary facilities and bathrooms should be designed to suit the style of the practice.

Toilets should comply with AS 1428.1 disability access requirements.
All functional areas need to be carefully designed and finished using high grade durable, commercial materials.

Consideration should be made to enhance staff comfort and workflow.
MICSA (Medical, Industrial & Commercial Specialists Australia) is a full-service, Australian owned medical infrastructure company. The group provides consulting, planning, fit-out and development services. We have been serving both private and public entities and have an unmatched level of expertise and experience in the healthcare sector.

MICSA was formed by experts in the field of healthcare operations, industrial design and commercial development. We serve the unique needs of healthcare practitioners, investors and developers.
WHY US

Whether you are a medical professional thinking about opening your first practice or a large group of clinicians planning a national expansion, you should talk to us.

Our experience and industry specific focus allows us to save you time and money on any project, regardless of size and scope. We deliver accurate budgets, realistic schedules and an commitment to quality. Because the work is performed by our in-house specialist team of engineers, builders and project managers you can be assured of a well managed and controlled project.

We are fully licensed and insured commercial builder and offer a level of healthcare specific expertise that is hard to match by any provider in Australia.

Experience for yourself why more and more hospitals, independent clinicians, land and property developers as well as equipment vendors are partnering with us.

Get in touch with us today for a no obligation consultation.
We look forward to speaking with you about your next project.

We take away the headache of finding new premise locations, designing and deploying the entire project by offering a turnkey solution.

Working with clients prior to committing to a lease property or land acquisition we ensure our clients are well informed and avoid non feasible options.

We offer a complete service including initial appraisals, town planning, building permits, design, construction, FF&E (furniture, fixtures and equipment) and signage.

Our extensive network of professionals are also at your disposal and can assist with property searches and financial advice.

**Full Service Range:**

- Appraisals & feasibility Studies
- Town planning & permits
- Design, construction, FF&E
- Signage & OHS compliance
Our Core Competencies and Unique Offer

Our level of knowledge goes beyond building design and construction. We have hands on experience in infrastructure management and planning for growth (from a real estate, operational and financial perspective).

Our design and planning technology and tools measure impact of design on patient outcomes, staff performance and overall efficiency.

We are open to assist clients at any stage of development as needed, in conjunction with existing builders, vendors or other involved parties.
We work with clients on small fit-out projects, or large and complex developments. Many of our clients have limited budgets and restricted infrastructure environments which we gladly accommodate.

Our Competencies include
- Feasibility studies, demographic research, business analytics
- Lease & asset management, consultancy and negotiation
- Turnkey project management, assistance with project planning
- Medicare compliance, quality assurance programs
- Operational support and consulting
- Healthcare Information Technology

What makes us better?
- Expertise in healthcare infrastructure
- Pricing transparency and simplicity
- Clear focus on delivering results
- Collaborative approach & ongoing support
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