

STAGE TWO SUBMISSION
TECHNICAL PAPER

Australian Construction Achievement Award

Macquarie Rapid Build Prison

FOR
2024



hansen yuncken

1. Macquarie Rapid Build Prison project overview

1.1 INTRODUCTION

For 100 years, Hansen Yuncken has been a pioneer in Australian construction. The justice sector is a major part of our business, and an area of significant specialisation within our teams. We aim to deliver quality facilities which focus on the Government's objectives of progressive social outcomes, while delivering on-time and with value for money.

Following the announcement of the largest ever expansion of NSW prison infrastructure, Hansen Yuncken participated in a competitive tender process for the Managing Contractor contract for the new Macquarie Rapid Build Prison.

The project involved the design and construction of the first dormitory style, rapid build prison in Australia. The Department of Justice required the 400-bed facility to be completed within 12 months,

approximately one quarter of the time usually taken to blueprint and build a conventional prison. Covering 27 acres (108,000sqm), the proposed facility featured 14 buildings with state-of-the-art electronic security systems, surrounded by 5.4km of multi-layered security fencing.

Through sound understanding of the client's requirements and extensive stakeholder collaboration, Hansen Yuncken formulated an innovative design and construction solution, and delivered a facility that exceeded the Department of Justice's expectations within an exceptionally tight timeframe.



Image 1: Macquarie Rapid Build Prison reaches practical completion.



Image 2: First open plan, dormitory style pod layout in Australia

1.2 THE CONCEPT

A key focus of the design was ensuring the facility surpassed security and community safety requirements and would facilitate re-education and socialisation for inmates, with the end goal of reducing recidivism.

The facility has been designed to include 16 dormitory pods in an open plan layout, with high ceilings and 25 individual cubicles in each pod. The pods are fitted with state-of-the-art security cameras involving advanced biometrics, which facilitate visual and physical tracking analytics of the inmates, including thermal capabilities for night surveillance linked to monitored central control areas to ensure the safety of all occupants in the pods as well as the security staff and other personnel.

The accommodation blocks house 100 inmates in four quadrants, containing 25 inmates each. Every inmate is assigned a partitioned cubicle which includes a single bed, a small desk, light and interactive television. At the front of the cubicle area are larger, communal metal tables and chairs secured to the floor and individual pods with showers and toilet cubicles.

1.3 PROJECT SCOPE AND APPROACH

The Scope of Works included the design and construction of 14 buildings specifically designed for a maximum security correctional facility. These buildings included four 100-bed, dormitory style accommodation buildings, a segregation unit, support facilities, a

kitchen, programs, sports and industries facilities, a visits centre, a clinic and reception area, a gatehouse and bulk storage facility.

To achieve this, Hansen Yuncken analysed the facilities required by the client and immediately reached out to key subcontractors and suppliers to assess the range of materials and methodologies available in the industry that would allow the team to meet the client's deadline. Through this early involvement with the industry, Hansen Yuncken was able to identify a unique and innovative approach to construction that was presented during the Expression of Interest phase based on the industry's capacity to deliver.

Hansen Yuncken returned to the client with various proposed changes to the facility's design and the materials to be used during construction. Due to the level of innovation Hansen Yuncken was proposing, the NSW Department of Justice offered us the opportunity to identify and engage a team of architects and engineers that were highly experienced in the design and documentation of correctional facilities including Perumal Pedavoli Architects, Grieve Gillett Andresen Architects, Woolacotts Engineering, Northrop Consulting Engineering Services, JHA Consulting Engineers, Taylor Brammer Landscape Architects, WSP and IPP Consulting, to document the proposed changes over the course of the design development period.

1.4 THE CONTRACT

Hansen Yuncken was awarded the project on a NSW Government GC21 Managing Contract with a Gross Maximum Price that was required to be submitted with an 80% design submission six weeks after being awarded the project.

The GC21 embodies principles of co-operative contracting and enhanced communication between the parties. As part of the contract, a GC21 start-up workshop is required to be held for both parties to discuss and review concepts to be applied to the project.

Both Hansen Yuncken and the client agreed to use a facilitator for a two-day workshop to establish the culture that would be encouraged on the project and how all parties could become a 'hyper-performing team' to achieve success. During the facilitated workshop a co-operative contracting charter was established to be followed throughout the duration of the project. This charter was foundational to the one team approach that was a cornerstone of the success of the project.

CO-OPERATIVE CONTRACTING CHARTER

We will work together to develop and maintain collaborative relationships built on shared objectives, open and honest communications, commitment, fairness, mutual respect and trust to deliver an innovative and time-critical correctional facility.

By working in this collaborative spirit, we will achieve:

- the highest standards of safety through design, construction and through operational use.
- innovative solutions to achieve the design intent within our time commitments.
- an exciting project to work on.
- positive advocacy about the project by all parties.
- success for each of the parties.
- reputations as great corporate citizens and neighbours.
- full operational readiness on completion.
- a benchmark for future projects to aspire.

1.5 KEY TO SUCCESS

Pivotal to the successful delivery of this facility was:

- the proposal of using multiple construction methodologies and materials based on the industry's capacity to deliver.
- our strategic team structure, which saw multiple teams running the various construction methodologies concurrently on-site while external works were co-ordinated to suit.
- our understanding of the client's needs and the drive and commitment to the successful delivery shown by all parties involved in the project.
- the involvement of a highly-experienced and dedicated team at all levels including the client, the project team, consultants, subcontractors and suppliers.
- co-locating with the client, consultants, subcontractors through the design process.
- the flexibility shown by all parties involved to work long hours, rostered shifts, weekends and through holiday periods.
- the full commitment of all parties to actively participate in a one-team approach to the project.
- open communication between all parties to ensure problems were dealt with early and efficiently.

2. Outcomes achieved against planned targets for key project parameters

2.1 WORKPLACE HEALTH & SAFETY

Workplace health and safety was a key focus on this project from all levels of the organisation. During construction, the project team completed approximately 500,000 man hours on-site with no LTI's.

Hansen Yuncken achieved this through implementing and communicating a site specific WHS Management Plan that was backed by high-level involvement and encouragement from the senior management team.

The safety culture on-site was also promoted by:

- various senior management audits undertaken over the course of the project, including a site inspection by the Chairman of Hansen Yuncken, David Beslich.
- the implementation of regular pre-start meetings that were undertaken each afternoon to discuss safety requirements for the following day's work.
- the inclusion of peer reviews from other safety officers.
- a total of three safety officers present on-site throughout the course of the project.

The Hansen Yuncken enterprise information system, HYway, also facilitated the improvement and monitoring of safety on-site. Through this platform, all staff could complete comprehensive safety tasks on-site using

iPads, to maintain the standard of safety required and make the induction process more efficient. The leadership and management team could also monitor all safety alerts through live project dashboards, enabling them to follow up on any potential workplace health and safety risks.

Our focus on innovative construction engineering also drove a large portion of manufacturing off-site, which heavily reduced on-site hours. This approach negated the need for a significant on-site workforce and in turn, reduced the risk of incidents on-site and during travel.

The program included provisions to minimise health and safety risks. Some examples of this include the fabrication of elements such as security fencing and custom steel to be carried out on the ground to reduce working at height, and concrete pours taking place at 1am to reduce workers exposure to extreme heat during the summer period.

2.2 TIME

A correctional facility of this size would typically take between four to five years to complete from concept stage. Hansen Yuncken successfully completed the facility within 54 weeks of commencement on-site and 57 weeks from contract award.

Upon completion, the client noted the successful delivery of this project set a new benchmark for the speed of delivery for Government projects. An overview of key milestones demonstrating the speed of delivery is depicted in image three.

To meet the timeframe, Hansen Yuncken approached the project using the various strategies outlined below.

2.2.1 Early subcontractor involvement

Through meeting with consultants, subcontractors and suppliers early, the team incorporated materials and methodologies within the industry that were readily available to meet the timeframes available.

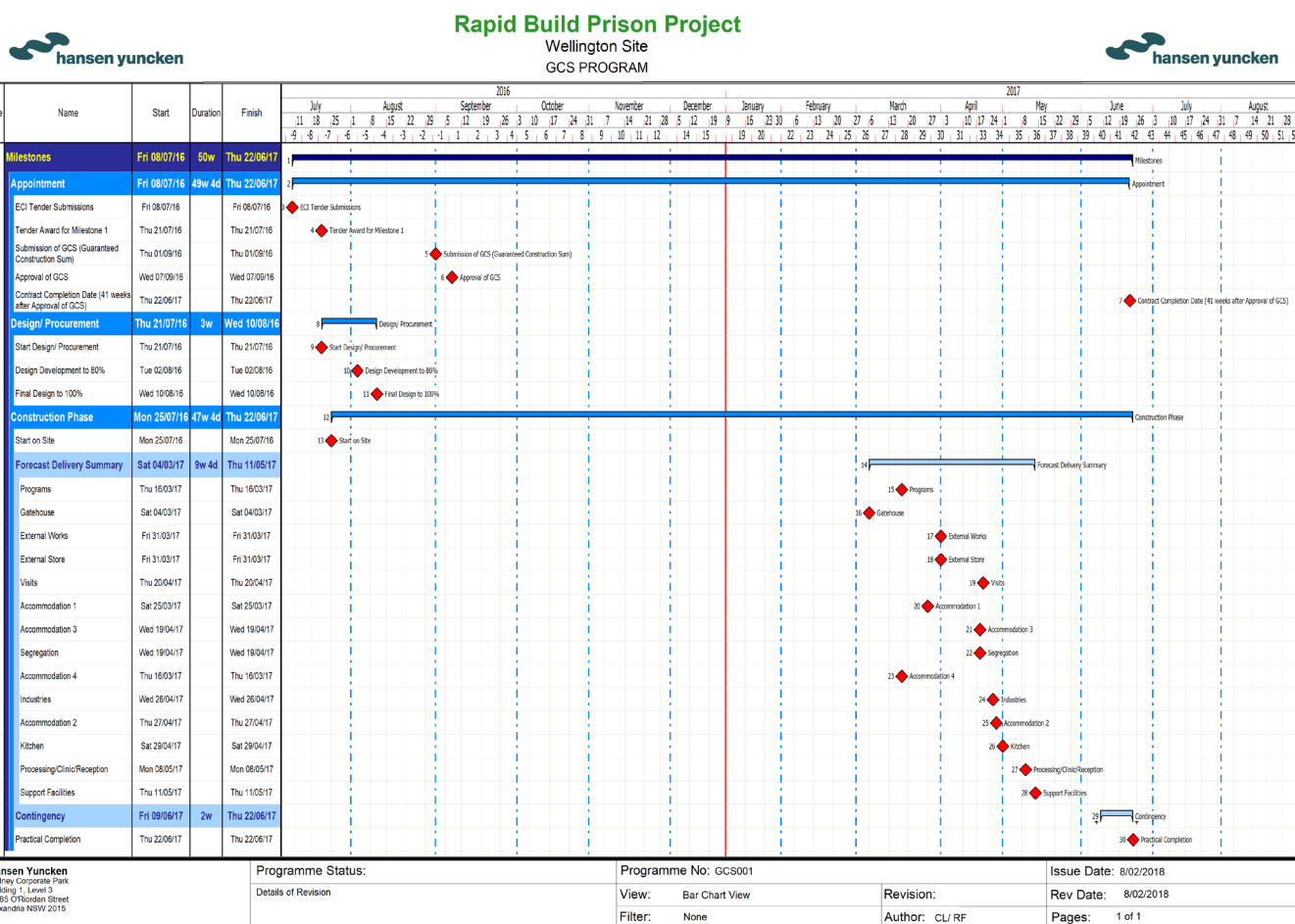


Image 3: Macquarie Rapid Build Prison program milestones.

2.2.2 Design resolution

To quickly resolve the design from 50% to 80% design within six weeks, a section of the Hansen Yuncken NSW office was transformed into a Design Hub incorporating the Hansen Yuncken management team, the client, key consultants and subcontractors to efficiently develop design options and resolve any design issues quickly.

During the tender phase, the Hansen Yuncken team identified it was possible to redesign building structures to simplify components within structures, such as precast panels to enable mass production in shorter timeframes. The team worked closely with subcontractors to resolve the detailed design of all elements using the subcontractor's shop drawings rather than a consultant led solution which may have required further refinement with the subcontractors. This process was undertaken in the Design Hub with the client's ongoing review to minimise the approval process.

Given this was the first facility of its kind, detailed design resolution continued efficiently through the construction period including resolution of client scope changes to ensure the program was met.

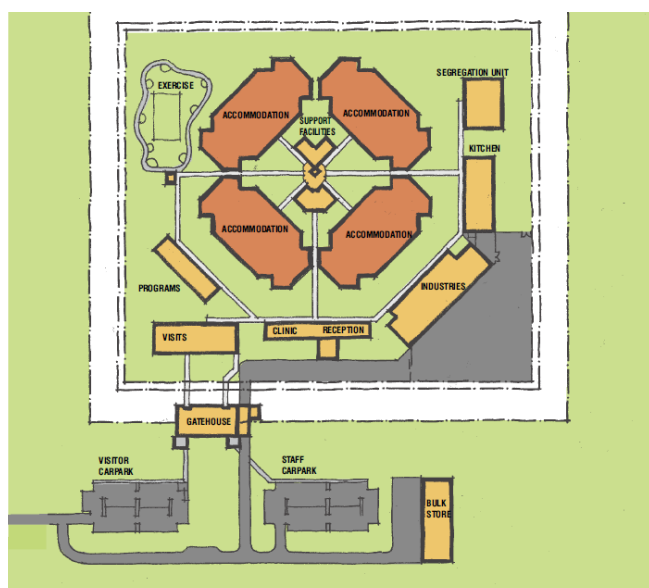


Image 4: Design at 50% completion

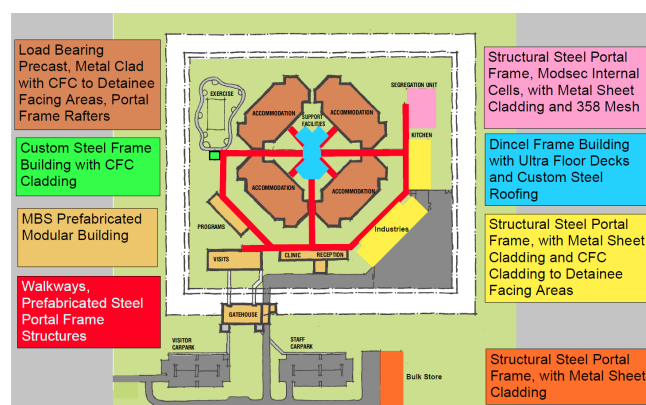


Image 5: Hansen Yuncken resolved the design to 80% completion within six weeks.

2.2.3 Monitoring off-site fabrication

As off-site fabrication was crucial to the timely delivery of the project, Hansen Yuncken resourced the regular monitoring of subcontractor factories with a combination of engineers and foreman. This approach provided accurate information about the status of production and reduced decision-making times to ensure all elements were ready for delivery and installation by the deadline outlined in the program.

2.2.4 Reducing program risks

Hansen Yuncken removed the reticulation of services off the critical path to reduce the risk of impacts to the program. The team removed the criticality of services in precast concrete panels by implementing an alternative reticulation solution.

Another example of innovative solutions to reduce program risks was to reticulate services in-ground as opposed to suspending services within walkway structures as per the original design intent.

2.3 COST

As a NSW Government project, value for money and cost certainty were key considerations for the client.

On completion, the project's actual cost was within the Guaranteed Construction Sum that was developed within six weeks from award of contract.

During construction, the project team managed expenditure of more than \$20 million per month for five months at peak, on a remote, maximum security project. Hansen Yuncken carefully managed this expenditure through close collaboration with subcontractors and consultants as well as through the effective use of multiple prefabrication methods.

2.3.1 Managing cost through the procurement process

Traditional Managing Contractor projects require the Managing Contractor to procure all trade packages in an open tender environment on design completion. Our solution was to identify critical early works trades that we could engage, based on benchmarking value from recently completed projects. This approach ensured work could commence on-site early to meet the required completion date, saving approximately three months of traditional Managing Contractor work while providing cost certainty to the client.

Hansen Yuncken implemented a procurement strategy which complied with the *NSW Government's Implementation Guidelines* and *Code of Practice for*

Procurement. The strategy involved direct negotiation with the supply chain in accordance with the *ICAC Guidelines for Managing Risks in Direct Negotiations*. All trades that were tendered on a direct negotiation method were either benchmarked with comparable prices or assessed by an independent professional.

This approach allowed us to engage with our supply chain with an Early Subcontractor Involvement (ESI), as opposed to an Early Contractor Involvement (ECI), which meant the design was influenced by the supply chain and shop drawings were completed concurrently to minimise time while ensuring value for money for the client.

Live data from procurement activities and variations was imported from our financial control system, Cheops, to HYway dashboards to ensure the project team could monitor cost and make informed decisions based on live data. Through this management system, the procurement process and the measures put in place to manage the supply chain's cash flow, Hansen Yuncken ensured all subcontractors and suppliers were contractually resolved within 13 weeks of practical completion, with no formal disputes.



Image 6: Client inspections were undertaken throughout construction to monitor the progress of the project.

2.4 QUALITY

Using our digital smarts and the project team's dedication to delivering a quality facility, Hansen Yuncken successfully handed over the project on time, achieving a defect-free result.

We achieved this with the use of Hansen Yuncken's accredited, enterprise information system, HYway, integrated with BIM 360 Field. This allowed the project team to complete traditionally paper-based quality, safety and environmental management processes on-site, in real time, using a transparent digital platform.

30 iPads programmed with Hansen Yuncken's suite of applications to monitor quality management were utilised on-site. These resources enabled the project team to effectively track the progress and quality of all elements of the facility. In conjunction with RFID tags, staff employed quality management procedures to collect data and manage issues in real-time.

As there were several new resources within the project team engaged by Hansen Yuncken for this project, intensive training on quality assurance was carried out by our NSW Quality Assurance and Systems Manager. This was supported by regular peer review resources that assisted in identifying quality issues.

In addition to this, the multiple construction methodology approach assisted in improving the quality outcome on the project due to prefabricated elements being produced in a controlled and supervised off-site environment.

The facilities are of an outstanding quality, and we were impressed by the way in which they were delivered through collaboration, with the client, the builders and the designers working very closely together.
Sean Sweeney - Chief Executive, Justice Infrastructure

2.5 ENVIRONMENT AND HERITAGE

Hansen Yuncken targets zero environmental incidents on all projects. Despite the speed of the Macquarie Rapid Build Prison project, we achieved no environmental breaches or non-conformances.

The project suffered from the wettest winter in NSW on record with rainfall at 400% above average. Structural designs needed redesigning to account for the effect of shrink and swell in super saturated, highly reactive clay. Hansen Yuncken managed the turnaround of these redesigns within two days, mitigating any long-term risk to the facility, with no loss of time in construction.

We established early in the project all weather access paths and hardstands for material delivery to prevent loss of production due to the time criticality of this project.



Image 7: The project team laying lime stabiliser to reduce the impact of wet weather



Image 8: Exercise yard outside the sports building.

2.6 SUSTAINABILITY

Hansen Yuncken has a continual focus on the design and construction of sustainable projects.

While sustainable development initiatives were not a key driver for the client, given the nature of the project and the speed in which the facility was needed, Hansen Yuncken initiated the following solutions in consultation with the Department of Justice:

- extensive use of off-site prefabrication, which reduced material wastage through refined processes used in a factory environment.
- passive infrared sensor technology for lighting control in non-inmate areas for energy efficiency.
- sizing the mechanical plant to the accommodation areas to provide tempered air only, reducing operational energy consumption.
- bathroom showers with timed operation allowances, minimising water consumption, with a WELS 3 Star water efficiency rating.
- installation of sanitary fixtures and fittings site-wide to meet a minimum WELS 3 Star rating.
- 3.5km of sewer main rectification and upgrade works to ensure sufficient capacity for future expansion of the prison and adjoining properties.
- the initial design was based on isolated diesel generated power and sewer pump outs using trucks. During the development stage, Hansen Yuncken identified an opportunity to connect the facility to the grid with the installation of substations and a sewer pump facility within the tight timeframe, increasing the energy efficiency of the ongoing operations of the facility.

2.7 INNOVATION

A key part of Hansen Yuncken's role on the project was to take an innovative approach to correctional centre operations and develop an engineered solution that exceeded the Department of Justice's operational brief within an exceptionally short timeframe.

We instigated several innovative initiatives to achieve this, including:

2.7.1 Collaborative approach to design development

Project team members (client, consultants and subcontractors) were invited to co-locate at Hansen Yuncken's Sydney head office in the Design Hub during design development. This immersive approach meant all issues could be tested and engineered quickly, to provide the optimal solution prior to submission of the Guaranteed Construction Sum.

2.7.2 On-site resourcing

The 14 buildings to be constructed were divided amongst six teams based on common fabrication processes. These six teams could then concurrently concentrate on their own critical path to ensure the program was met effectively. The six teams were:

1. central support and sports building (Dintel and custom steel).
2. four accommodation buildings (precast).
3. four prefabricated buildings (Modular Building Systems).
4. external works and fencing (civil and Wheeler).
5. industries buildings (steel frame and metal cladding).
6. completion and commissioning.

2.7.3 Site preparation

The project team arranged for accurate surveys, geotechnical investigations, and services searches of the proposed site immediately on Contract award. Hansen Yuncken proposed a slight relocation of

the original site to reduce the amount of cut and fill required and reduce the time of this process. Working closely with architects, engineers and the client within the Design Hub, the team settled on the most appropriate location for the facility.

During this process, the project team commenced benching out the site from the inside out whilst the design was being finalised and the final reduced levels were established, as opposed to traditionally benching the entire site upon design finalisation. This allowed us to open the central area of the site for inground drainage activities early and safely, with four scrapers operating concurrently.

Approximately 130,000m³ of cut and fill was excavated during the wettest recorded winter in NSW. This was achieved through the knowledge, skills and experience of the team on the project. The team established stormwater management for the site from commencement of works which minimised time lost due to weather events.



Image 9: Site excavation was carried out through the wettest recorded winter in NSW.

2.7.4 The use of “non-traditional” correctional facility construction methods

Traditional correctional centre construction methods would not have allowed us to meet the 54-week program. The following innovative strategies were implemented to create concurrency to achieve completion on time:

a) Dincel

The central support building was the critical path of the project and the only two-storey building on-site. This building was originally designed using precast. To enable the central support building and the accommodation blocks to be constructed concurrently, we utilised Dincel which could be prefabricated off-site while meeting the durability requirements of a maximum-security facility. Not only did this method reduce labour on-site, it also eliminated scaffolding from the project.



Image 10: Dincel was used for the central support building.

b) Custom steel

The sports building and roof trusses of the central support building were prefabricated using custom steel in Dubbo, transported to site and then crane lifted into place. This reduced on-site labour and the risks associated with working from heights. The roofs were also redesigned to allow for simplified fabrication, reducing construction time.



Image 11: Custom steel was used for the sports and central support building.

c) Modular building systems

Four entire traditional stick build buildings were changed to prefabricated buildings, manufactured in a factory environment. These buildings were up to 70m long and built in approximately 3m wide modules. This reduced on-site labour and the risk of wet weather impacts on construction, and allowed Hansen Yuncken to closely monitor the level of quality which could not have been achieved on-site.



Image 12: Modular building systems were used for four entire buildings on-site.

d) Modsec

The segregation cells were originally designed using speed panel. Due to the number of caulked joints required in the segregation cells to prevent inmates from hiding contraband, Hansen Yuncken redesigned the building utilising a prefabricated product called Modsec. Once fabricated, these panels were installed into a bottom channel to ensure an anti-ligature, safe, secure and robust wall and ceiling system. These panels were designed to allow the reticulation of services within the panels.



Image 13: Modsec was used for the segregation cells.

e) Structural precast

The four main accommodation buildings were redesigned based on our experience in the industrial sector. We utilised a structural precast solution to eliminate internal structural columns that were climbing risks within the facility. This approach also removed the structural steel off the critical path and allowed the team to facilitate the fabrication of other concurrent elements.



Image 14: Structural precast was used for the accommodation buildings.

f) Prefabricated security fencing

5.4km of fencing panels were prefabricated off-site. Four panels were connected together on the ground and then lifted into place within a trench and braced for a concrete pour into the footing structure to embed the posts concurrently. Once set, the braces were removed in a similar process to precast panels. This reduced time, on-site labour and the risks of working from height in boom lifts.



Image 15: Prefabricated security fencing was used for the 5.4km fenced perimeter.

g) Prefabricated doors and windows

The heavy-duty steel doors and windows were also 100% prefabricated off site in Melbourne by Steelfinne, again reducing the amount of on-site labour. This work was supervised by Hansen Yuncken engineers within the subcontractor's facilities as if the construction was carried out on-site.



Image 16: Prefabricated steel windows and doors were used throughout the facility.

h) Corrective Services Industries equipment

The inmate cubicles, tables, chairs and stools were manufactured by Corrective Services Industries using labour from inmates at the Cessnock Correctional Facility. This not only reduced on-site labour but also incorporated inmate labour and helped facilitate the teaching of trades to inmates which is designed to reduce recidivism within the facilities.



Image 17: Corrective Services industries equipment was used throughout the facility.

i) Bathroom pods

The 128 bathrooms within the four accommodation buildings were originally designed as a stick built solution using fibre cement. Hansen Yuncken changed the design of 120 of these facilities so they could be pre-fabricated off-site using our subcontractor, Hickory Building Systems. This again reduced on-site labour and allowed us to achieve a greater level of quality than could be achieved on-site.



Image 18: Bathroom pods were used within the four accommodation buildings.

j) Precast walls

The precast walls for the accommodation buildings were critical to the success of opening-up work fronts on site. We elected to omit the use of conduits within the precast panels to minimise extensive design and delays during the shop drawing phase. Instead we reticulated services via a cavity between the precast and wall cladding which could be completed off the critical path.

We also calculated that installation of precast walls could happen quicker than supply and transport. We removed the fabrication of all precast panels from the critical path by creating an area on-site to house fabricated 'toaster racks'. This allowed us to stockpile the panels and keep up with the calculated speed of installation.



Image 19: Reticulated services were installed via a cavity between the precast wall and cladding.



Image 20: Toaster racks were utilised on-site to stockpile precast walls to speed up construction.

2.7.5 Services solutions

Services were initially reticulated through a series of covered walkways. Hansen Yuncken eliminated this high-risk strategy and designed a traditional inground reticulation concept which would allow cabling to be installed much earlier in the process.

Siemens arranged for the integration of various client specific electronic security systems along with systems that they recommended to the client. Siemens arranged for the main security control room to be fabricated and specifically programmed to the client's operating procedures for this new centre in their NSW head office, for review and approval prior to be moving to site. The components were then shipped to site and installed, enabling a "plug and play" solution that reduced the on-site commissioning timeframes.

2.7.6 A procurement approach that opened-up the program

We involved subcontractors in the design process, allowing them to commence works prior to designs being completed and fast-track construction. This allowed engineered solutions to be completed in line with the construction program, not a procurement program.

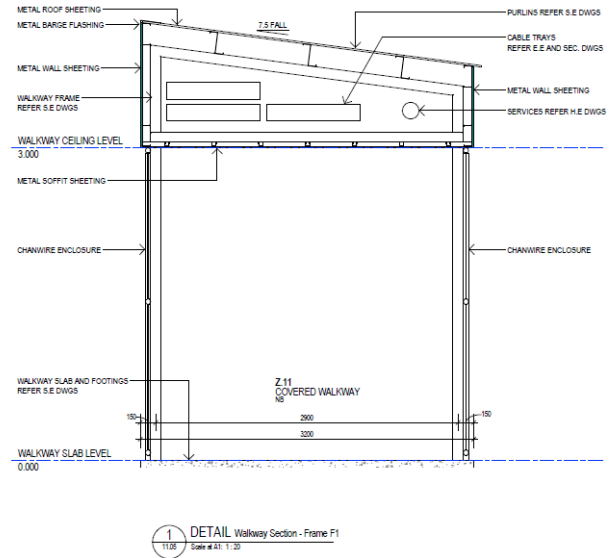


Image 21: Traditional inground reticulation was utilised to eliminate the use of reticulation through covered walkways.

2.8 NEW TECHNOLOGIES

The application of Autodesk BIM 360 Field building models, and engagement of subcontractors with innovative products and similar technologies, enabled the project team to accelerate the resolution of engineering issues and challenges.

The design was simplified to ensure considerable repetition throughout, reducing the number of shop drawings needed. Technology enabled shop drawings to be reviewed and returned within 24 hours.

We utilised HYway to connect different forms and sources of data into a single platform which allowed analysis and evidence based decision making.

The Hansen Yuncken team elected to monitor the project using ASTA Powerproject with reviews being undertaken through a combination of on-site resources, the project management team, experienced programmers and weekly Hansen Yuncken NSW Executive reviews undertaken with the project management team and on-site inspections.

2.9 STAKEHOLDER SATISFACTION

Hansen Yuncken's approach to the project was to continually reinforce the project charter with all parties involved in the project which encouraged a one-team approach to the challenge.

The client and key consultants and subcontractors spent over two months in our Sydney head office throughout the course of the design development phase to ensure the team worked collaboratively to incorporate all stakeholder needs.

Ultimately the project was delivered on time and under budget, with substantial user based design changes being addressed and engineered right up to

completion. This could not have been done without the collaboration of the entire supply chain, from the client down.

The client praised the successful delivery of the project with the Project Director stating it was the best demonstration of teamwork and collaboration he has experienced during his 30+ year career.

Rapid Build Prison, rapid indeed! Today we have achieved something that is unprecedented. We have set new benchmarks for the speed with which Government can act and deliver. This is only possible with a common understanding of, and commitment to the endeavour. Today the team has succeeded.

Matthew Dalmau - Program Director Rapid Build Prisons, Justice Infrastructure



Image 22: One of the four accommodation buildings.

3. Complexity, difficulty and optimisation of the construction task

3.1 LOGISTICS

Key issues the project team faced throughout the course of the project included:

3.1.1 Weather

The weather in the Central West reaches extreme temperatures in both winter and summer, impacting productivity on the project. The multiple-methodology approach reduced the risk of weather impacting delivery by enabling a large amount of construction to be completed off-site and out of the elements.

To add complexity to the project, the team experienced the wettest recorded winter in NSW resulting in major flooding to the Central West region. This was addressed by fast tracking all-weather access on-site early in the program to reduce the risk of weather delays. Roadbase was installed early, lime stabilisation under final roads was expedited, grading of the land and early installation of stormwater systems were all carried out to manage rainwater events.

The weather also impacted work during the day. In summer, due to the heat, the project team would need to commence concrete pours from 1am. Restructuring the day ensured the team could meet engineering requirements for the placement of concrete without exposing workers to prolonged periods of extreme heat. The winter called for the use of turbo blow gas heaters to raise the temperature while the team laid epoxy flooring and painted.

3.1.2 Industry capacity to deliver

Some supplies required for the project such as security cameras, corrections toilet pans, locks, high security windows, doors and Modsec panels were in limited supply. Hansen Yuncken worked with suppliers across Australia to source industry assistance in delivering

supplies. This added to the complexity of the project as there was a large portfolio of subcontractors to manage.

As each stage of the program depended on the timely delivery of supplies, Hansen Yuncken had a member of the project team based at the subcontractor facilities over the course of the project to continually provide updates on the status of fabrication and anticipated delivery dates to site. This meant real time progress was being tracked and any issues could be resolved quickly to ensure there were no delays on the delivery of supplies. Through this approach, the project team managed to coordinate the production and delivery of 360 precast panels over the Blue Mountains to site within nine weeks of the commencement of the project.

3.1.3 Remote location

The site is approximately 350km from Sydney over the Blue Mountains. With the large amount of prefabricated products, Hansen Yuncken had to manage truck movements throughout the program. This was especially difficult over the Christmas holidays, due to the embargo of truck movements over the Blue Mountains.

Prefabricated buildings and bathrooms were sized for standard truck widths and the design and room layouts were altered to allow this to work. There were approximately 200 loads of precast panels with only two panels per truck. We catered for this through fabricating storage solutions on-site to minimise the impact of prefabrication on the program.

3.1.4 FF&E

As part of the contract, Hansen Yuncken was required to design, select, procure, deliver, install and commission 6,857 individual items of FF&E, from dust masks, pillows all the way through to CNC routers and tractors.

This equated to over \$5 million worth of group one, two and three equipment to allow the correctional centre to be operational on day one of handover.

3.1.5 Specialist components

There were several specialist components which required importation from overseas. This included security locks, cameras, IT equipment and special correctional metallurgy. Hansen Yuncken was required to closely monitor and track these specialist components with logistics companies.

3.2 INTERFACES

3.2.1 Design process

Due to the rapid build nature of the project, the design team did not have the typical Design Development stage prior to commencement on-site. At the award of the contract, the design team took the concept through to 80% design in only six weeks. This was achieved through an innovative approach of transforming the Hansen Yuncken Sydney head office into a Design Hub. The Design Hub housed key decision makers including Hansen Yuncken's Design and Services managers, the client Project Manager, the client – NSW Corrections design consultants and the main sub-contractors to streamline the design process and facilitate quick decision making to ensure the design was developed rapidly.

3.2.2 Authority and Client interfaces

There were numerous interfaces with Corrective Services Industries which will run the rehabilitation program in the facility, Corrections NSW, Department of Justice, the existing Wellington correctional facility, Consultants, Subcontractors, Suppliers, RMS, Essential Energy, Corrections Digital & Technology Services (DTS), Corrections Health and Corrections Education. All their requirements needed to be incorporated within the detailed design.

3.2.3 Existing facility

There were also numerous security and sewer connections which required very careful interfaces to prevent any downtime of services or operations of the existing facility.

3.3 CONSTRAINTS

3.3.1 Tender process

Hansen Yuncken received its first enquiry about the Rapid Build Prisons on 10 June 2016. A request was then made for potential contractors to attend a briefing on 20 June 2016. 12 construction companies attended the initial briefing. Disbelief on the part of the builders was evident, particularly with respect to the undertaking that the client would not hinder the progress of the build projects.

Expressions of interest were sought by 24 June 2016. The final location of the Rapid Build Prisons was not yet determined. Contractors were shortlisted over the weekend of 25-26 June 2016 and advised on 27 June. On 29 June the Wellington site location was confirmed.

Hansen Yuncken was appointed the Managing Contractor for delivery of the Macquarie Rapid Build Prison at Wellington on 21 July 2016. The speed in which the tender process progressed added to the complexity of the project.

3.3.2 Alterations to standard prefabricated structures

To meet maximum-security correctional facility requirements, Hansen Yuncken was required to undertake the following non-standard modular building techniques:

- Increase the metal gauge and spacings of sections within the chassis.
- Apply 5mm metal sheets to isolation rooms.
- Re-engineering for the reticulation of services.

3.3.3 Industry capacity to deliver required components

Hansen Yuncken needed to investigate the industry's capacity to provide the following elements for the maximum-security facility:

- Specialised window and door manufacturers.
- Locks.
- Cameras.
- Specialised metallurgy for security bars.
- Security fencing.
- Specialised sanitary wear.
- Requirement for compact laminate.

In undertaking this analysis, Hansen Yuncken also needed to be mindful of other Justice projects occurring concurrently in NSW and across Australia.

3.3.4 Commencement of works

Due to the time constraints on the program, the project team needed to commence work on the site as soon as possible. Any delays to the commencement of works would put increased pressure on project delivery. From tender award, the leadership team worked around the clock to complete site investigations and reports and resolve management plans and designs, so that works could commence on-site. In less than three weeks from being awarded the project, the team had started on-site.

To enable earthworks to commence on-site as early as possible, the First Crown Certificate focused on the site levels, building pads and inground services. This required civil, landscape and architectural coordination and documentation for the finished ground levels to be finalised early, in parallel with developing the rest of the project. This strategy ensured subcontractors could enter site early and was instrumental in achieving program dates.

3.3.5 Site location

Shortly after commencing work on the project, Hansen Yuncken identified the site location provided during the tender phase was not the most suitable location for the 400-bed prison. The project team worked closely with the civil engineer, architect and landscape architect to re-position the site and a neutral cut to fill balance was achieved whilst improving the serviceability and access to the site. There was considerable design development required to finalise the levels of the various buildings and relationships between buildings in a short time frame. This process was effectively managed and did not cause any delays to the program.

3.4 COMMUNITY

Due to the project's isolated location the adjoining community was minimal. On one occasion during construction, a neighbour requested the project team to reduce light spill from lighting towers during night works. Not only was this actioned immediately, the Hansen Yuncken team also resolved a long-term solution for light spill potentially impacting adjoining properties. The team quickly ordered and installed mature trees on the neighbour's boundary.

A sewer pumping station and amplification assisted the township's existing issues with sewer infrastructure.

Hansen Yuncken was conscious of the effect a 450-worker influx could have on the community. We met with local authorities including the council and emergency services to discuss the works, emergency response plans and resolve any community concerns. During construction the local community benefited from a 30% increase in turnover while the project was in construction and there were no major incidences of concern initiated by the project resources.

Hansen Yuncken directly contracted 20 local businesses from the Central West including; Crampton's Carpet (Dubbo), Central West Waterproofing (Dubbo), Pave & Scape (Orange), Saren (Orange), Custom Steel (Dubbo), Satts Plant Hire (Wellington), Orange Precision Metalcraft (Orange), Quicksew (Bathurst), Glen Healey Construction (Dubbo), Forefront (Orange), Hamcon Civil (Orange), KB Concrete (Wellington), Benson Fencing (Dubbo), Barrier Premium Waterproofing, Wellington Plant Hire, Sunset Fencing (Bathurst), Apollo Fabrications (Young), Matt Redfern Construction (Wellington), Nolans Earthmoving (Wellington) and Usher & Associates (Orange).

3.5 RISK MANAGEMENT

3.5.1 Accommodation

Hansen Yuncken was required to accommodate 450 people in the surrounding region to reduce travelling times on rural roads before and after working.

We created a database of all accommodation options for subcontractors to access to assist with finding suitable accommodation close to site. Buses were also utilised to reduce the number of people driving to and from the site.

3.5.2 Fatigue management

Being a remote site location, Hansen Yuncken identified fatigue as a key risk on the project. To manage this, we appointed three safety officers on-site and implemented strict maximum working hours, including a rolling 10-day fortnight so employees could return home and have quality time with their family.

3.5.3 End user acceptance

Hansen Yuncken included various managers and staff from NSW Corrections in a series of completion and commissioning meetings. These meetings started 24 weeks from completion to mitigate the risk of an unforeseen circumstance at the end of the project. In conjunction with this, there were ongoing audits, both internal and external, to pick up short falls on the project.

3.5.4 Supply chain issues

The project team was in contact with subcontractors and suppliers as to critical stock levels within the supply chain on a regular basis. These stock levels were constantly communicated with the Department of Justice to cater for any impacts on the program if any supplies were low across the country.

3.5.5 Identical facility being built concurrently

There was an additional rapid build prison being built concurrently by another contractor, which was required to be as identical to the Macquarie facility as possible. Hansen Yuncken facilitated this through constant communication through the Department of Justice to make sure any resolution of design issues was conveyed to the other team.

3.5.6 Construction methodology

The major component of the project was to deliver a complex facility within a timeframe that had never been achieved before. This posed a major time constraint on the project.

Before and during the Expression of Interest phase, Hansen Yuncken met with major suppliers to discuss the industry's capacity to deliver within the tight time frame. Through meetings with suppliers and subcontractors, the project team identified early in the tender phase that an innovative approach to construction methodology was key to the success of the project. Throughout the design process, the team focused on practical assembly and supply solutions including off-site manufacturing and prefabrication to expedite the program.

To meet the tight program and address the labour and industry capacity to deliver, pre-emptive works

commenced early in the process with the project team and subcontractors coming up with design and engineering solutions. Hansen Yuncken incorporated various methodologies into the design which enabled construction to be completed within 54-weeks of commencement. Methodologies included the use of:

- prefabricated buildings for the gatehouse, visits, programs, clinic and reception buildings and prefabricated bathroom pods for the accommodation buildings which reduced the resources required on-site and wet weather impacts.
- different construction methods including precast, Dintel and structural steel to mitigate risks of the availability of materials and subcontractors.
- precast concrete for the external walls of the accommodation buildings to remove columns from within accommodation pods to reduce inmate climbing and hiding points.
- light weight structural steel, Dintel and Modsec for the construction of the support services and segregation building to speed up construction.

The variety of construction methodologies is not typical for a project of this size however was at the core of the strategy to ensure the project could be delivered within the compressed timeframe.

3.5.7 Development of new technologies

The electronic security brief was developed over the course of the project as this was a new form of facility for the client. Hansen Yuncken worked with Siemens to implement a site specific, bespoke electronic security system to accommodate the unique layout of the facility. The project team worked closely with specialist consultants and the client to facilitate 'Factory Acceptance Tests' where the system was built at the subcontractor's office to test effectiveness and then sent to site for installation and further testing.

4. Leadership and management of the project delivery

Strong leadership of the project was a compelling factor in achieving success. Managing six teams and 120 sub-contractors working concurrently on 14 buildings with multiple forms of building methodology within an extremely tight timeframe increased the complexity of the project. Hansen Yuncken took a solution focused approach to the project and implemented innovative and collaborative processes to the methodology and management of the program.

4.1 LEADERSHIP TEAM

Matt O'Grady
Program Director



Matt was the primary point of contact for NSW Justice Infrastructure during this project. Matt worked with our core project management team to identify our strategy to secure the project and deliver the rapid build prison within the timeframe required by NSW Department of Justice. Matt's involvement extended through securing both new and internal resources to join our construction team, briefing all people involved with the project about our strategy and construction methodologies, working with our client, the project stakeholders, design, procurement and delivery teams to resolve any issues that arose.

Nader Zreik
NSW/ACT Design Manager



Nader was responsible for leading the design and buildability strategy for the Early Contractor Involvement phase of this project, bringing innovative solutions on how to add value for money and expedite the delivery of the facility. In addition to this, Nader also led the design team to produce the 80% design documentation within a six-week period, redesigning several buildings to produce the Guaranteed Construction Sum whilst obtaining the planning approvals required to commence on-site concurrently. Nader played a key role in leading the design team to finalise the documentation, ensuring full coordination as well as the incorporation of changes required by the client resulting from stakeholder consultation.

Max Baroni
Project Director



Max joined Hansen Yuncken in 2016 to act as Project Director on this project, drawing on his experience delivering projects at the Kariong, Cobham, and Mt Penang Juvenile Correctional Centres. Max was introduced to the project to drive the completion and acceleration of the project. As Project Director, he was responsible for leading and delivering a design and construction process on a collaborative basis with the client. Max directed project quality to a fit-for-purpose test, for the design and the completed works, and directed project completion through detailed programming, progress tracking against target dates, co-ordination and administration of subcontract programs.

Jeremy Ell
Commercial Manager



Jeremy has worked in senior commercial roles within Hansen Yuncken for nearly a decade and has been working in the construction industry for over 23 years. Jeremy's role on the project encompassed the commercial management of the project including the initial rapid procurement methodology which incorporated multiple off-site manufacturing solutions and different structural solutions to allow concurrent fabrication and installation.

Christine Devane
Site Manager



With over 20 years' demonstrated success in the construction industry, Christine has managed complex projects and clients within the civil, mining, prison and health sectors. As Site Manager on this project, Christine was responsible for managing all the construction activities on-site. Christine's focus was to optimise buildability and develop mitigation strategies to address risks, develop procurement strategies, manage staging, and perform whole of life assessments on-site.

Kent McInney
NSW/ACT Services Manager



Kent is the Senior Services Manager for the Hansen Yuncken NSW business. Throughout this project, Kent was responsible for successfully managing and co-ordinating the services trades and commissioning activities. During the project, Kent applied his considerable knowledge, skills and experience utilising his affable and well-developed communications skills to ensure alignment of all necessary parties to achieve extraordinary outcomes on the project.

Pivotal to the success of the project was the collaboration achieved between The NSW Department of Justice and Hansen Yuncken as outlined in the co-operative contracting charter. Key client members of the project team included:

- Kevin Corcoran
Assistant Commissioner, Custodial Corrections, Corrective Services NSW, NSW Department of Justice
- Sean Sweeney
Chief Executive, Justice Infrastructure, NSW Department of Justice
- Matthew Dalmau
Program Director Rapid Build Prisons, Justice Infrastructure, NSW Department of Justice
- Dan Jourdan
Project Manager Macquarie Rapid Build Prison, Justice Infrastructure, NSW Department of Justice
- Andrew Sneddon
General Manager Rapid Build Prisons, Corrective Services NSW, NSW Department of Justice



Image 23: Client site inspections were carried out during construction

4.2 PROJECT TEAM RELATIONSHIPS

At the earliest stage of project discussion, Hansen Yuncken focused on creating a team that could meet the needs of this extremely difficult project. That meant not only looking inside the organisation for the best people, but also looking to the broader construction industry for the people and organisations that had the skills and culture to help us deliver. Each of the consultants and key subcontractors were chosen and met with prior to the tender being issued by the client to ensure that we had the most effective project solution.

Once our project team was developed, Hansen Yuncken then set out to ensure that our relationship with the client representatives began to form, ensuring that the client was an integral member of the Design Hub and ensuring that open communication was enabled at all levels of the Hansen Yuncken organisation with the Department of Justice.

Initiatives included a two-day project start-up with all key parties involved, regular project meetings where relevant parties were involved, and all members being held to account for decision making.

At a site level, the on-site leadership team championed a similar collaborative culture, through ensuring toolbox talks were undertaken each day, on-site at 4pm, where time was allocated to address any issues with the following day's work. Following the meetings, the specific engineering challenges for the coming day could then be allocated to staff and either addressed on-site, sent back to Sydney, Brisbane or Melbourne where the relevant engineering support could resolve the matter and have the technical solution back with the site team for the following morning.

Site BBQs, team dinners and leadership visits were implemented for team bonding and to celebrate milestones and success.

4.3 GENERATING A LEGACY FOR THE CONSTRUCTION INDUSTRY

The collaborative approach to the project has set new benchmarks for the industry. This is evidenced by not only having completed the project on time and within the agreed budget but also that the project team has managed an additional 4.6% over the original cost projection due to scope changes. The Department of Justice is so taken by the approach of the project team that they have engaged University of Technology Sydney to complete a study of the project and the process that was undertaken so that it can be used as a study tool in the future for an exemplar project.

Throughout each phase of the project, the management team has been instrumental in providing lessons learnt feedback to the client and its stakeholders to support the development of other facilities in the Prison Bed Capacity program.

An innovative tender process was applied and a high level of trust and transparency prevailed amongst the stakeholders. A speedy turnaround time by the client in response to requests for information by the builders was critical. The client's retention of risk for purposes of the build and the application of even more risk sharing between the client and building companies facilitated mutual engagement with problem solving. As a project with the highest-level risk profile in terms of the demand for speed plus quality, the Rapid Build Prisons are an exemplar model for innovation in project delivery.



Image 24: Toolbox talks were undertaken daily to address any potential issues for the following day.

4.4 CONTRIBUTION TO THE DESIGN PROCESS

The client approached the market with a concept that had never been constructed or operated in Australia. We approached the challenge by working closely with stakeholders to develop the design within a rapid timeframe. The design development and cost plan finalisation stage was completed in just six weeks.

As this concept was the first of its kind in Australia, Hansen Yuncken identified and resolved several key maximum-security facility design risks that were yet to be identified.

When the initial concept was presented, the design team identified changes to simplify the design. An example of this was reducing the bespoke precast design and replicating moulds to expedite the program. We then managed redesigning and documenting the facility to cater to this change in design. All plans were drawn up over a six-week period to take the design concept to design finalisation.

The net result of these actions on the precast design meant that all panels were on-site within 13 weeks of the Guaranteed Construction Sum agreement.

4.5 WORKPLACE HEALTH & SAFETY

The delivery of the project was fast-paced however, workplace health and safety remained a high priority. The team achieved an exceptional workplace health and safety record on this project through:

- implementing and communicating a site specific WHS Management Plan that was endorsed by senior management.
- ensuring ongoing compliance with the WHS Management Plan by the leadership team completing regular site inspections as well as a total of 123 task observations and seven internal and external audits over the course of the project. They also continually monitored work practices and educated the workforce.
- clarifying expected acceptable behaviours to the workforce.
- drug and alcohol awareness training for the entire workforce.

- implementation of a site-specific fatigue management plan – an exceptionally high-risk issue given the project location.
- effective site-specific induction process.

The Site Manager was also instrumental in promoting safety on-site. Coming from a mining background, she implemented strict processes and ensured there were increased avenues of communication for workplace health and safety including:

- the implementation of a WHS committee.
- daily prestart talks.
- subcontractor coordination meetings.
- daily toolbox talks.

Due to the number of new employees engaged on this project, the State Safety Manager and State Quality Assurance and Systems Manager regularly attended site to conduct in-depth training sessions and internal safety audits.

4.6 PLANNING AND CONTROL OF DESIGN AND CONSTRUCTION OPERATIONS

Resolution of the design was more complex than most projects as the dormitory style institutional model was a first for a Correctional Centre within Australia. Critical to the project's success was a rigid approach to design submission and sign-off, something that could not have been achieved without the collaboration of the consultant team and our client.

The team closely managed consultants and subcontractors to resolve all design related issues in a tight timeframe and achieved compliance with the approved Review of Environmental Factors. This included all mitigation measures in relation to design and construction activities, and preparation and implementation of the Construction Environmental Management Plan. The team was mindful of all temporary works required to carry out the construction including barriers and fencing required to separate operational areas from construction work.

Concurrent with site team program reviews with all subcontractors, Hansen Yuncken also utilised several peer review resources (including Hansen Yuncken consultants and the client's consultants, Hansen Yuncken resources from other sites, NSW Justice and

NSW Corrections stakeholders) that provided reports for consideration of our Management and Executive team.

The Hansen Yuncken executive team also arranged an internal corporate review to be undertaken of the project which included an audit of planning, construction methodology and financial management of the project. This level of oversight was very useful to the project management team to ensure all appropriate measures were being undertaken.

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The Hansen Yuncken executive also arranged an internal corporate review to be undertaken of the project which included an audit of planning, construction methodology and financial management of the project. This level of oversight was very useful to the project management team to ensure all appropriate measures were being undertaken.

4.7 INDUSTRIAL RELATIONS

Hansen Yuncken has an outstanding track record of industrial harmony. Given the complexity of the program, the team focused on ensuring critical issues of site amenity and support, safety culture and fatigue management were addressed, ensuring a smooth

project industrially.

Our strategy to move as much intensive labour off-site also assisted this approach. This meant the project did not overload the local demands for accommodation or travel resources and moved high-risk activities into the factory environment where they can be effectively managed.

Our approach was to minimise work health and safety risks with contribution from everyone to help reduce risks to the project and the participants. The project did not have any industrial disputation throughout its lifecycle.

4.8 TRAINING AND DEVELOPMENT INITIATIVES

The remote location of the project combined with the rapid mobilisation required a large influx of new staff to Hansen Yuncken, some in senior project roles. To address this issue, the project was heavily supported by the State Management team and support staff. All new staff were not only inducted into the Hansen Yuncken culture, but also trained on how to operate our paperless systems and processes.

Ensuring this training was effective became a two-pronged approach, with select personal in engineering and supervisory fields moved on-site and senior support staff (Safety, Quality, Environment and Human Resources) regularly visiting site.

Informal training was also provided on the job with staff being given the opportunity to take on further responsibility in their roles and learn on the job.

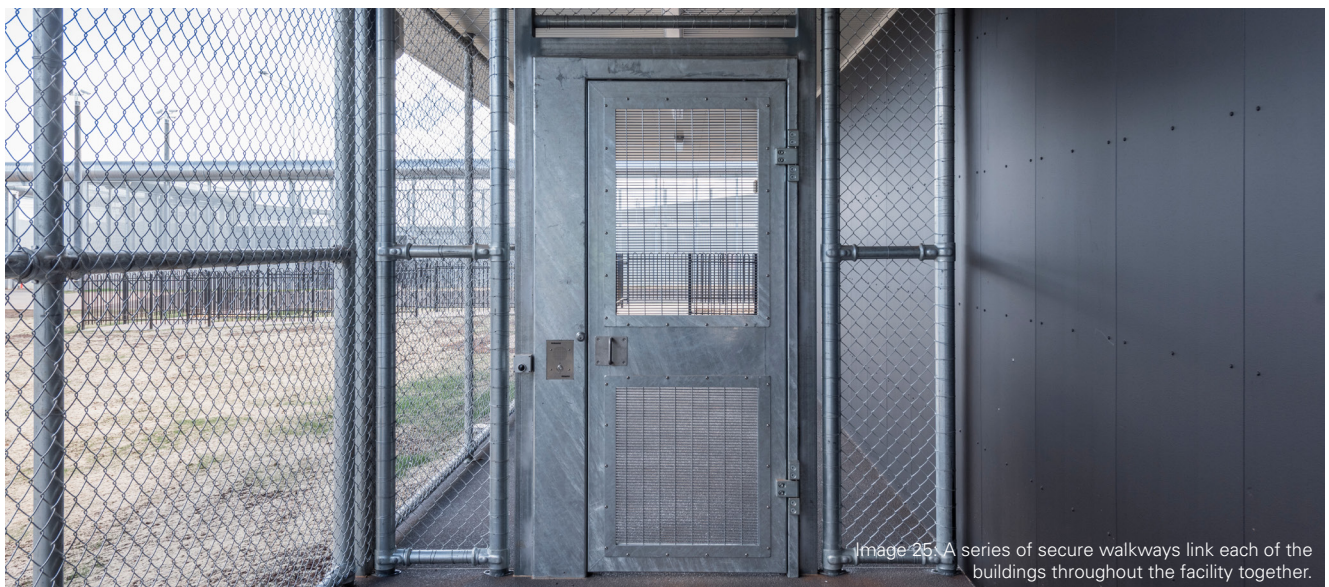


Image 25: A series of secure walkways link each of the buildings throughout the facility together.

