INNOVATION KEEPS SYDENHAM ON TRACK

The Sydenham Railway Station Upgrade required Arenco to design and construct a new concourse with disabled access to each platform.

MAIN CONSTRUCTION COMPANY : Arenco
CLIENT : Transport for NSW
ARCHITECTS : HBO + EMTB
STRUCTURAL ENGINEERS : GW Engineers
COMPLETION : August 2013
PROJECT VALUE : $25 Million

Every project has its challenges, however with the Sydenham Railway Station Upgrade, Arenco had more than the usual quota of complications to resolve. Nonetheless, through great effort, teamwork, innovation and the company's solid infrastructure experience, the project was completed on time, within budget and safely.

The brief was to design and construct a new concourse with DDA Compliant access to each platform; also designing, constructing and removing a temporary footbridge, booking office and station platforms; resurfacing six platforms; and all associated wiring, security, fire, mechanical and electrical works.

From the low flight path overhead and the adjacent high voltage power, through to extremely narrow windows for major works and an incredibly constricted work area, there were an enormous number of logistical issues that had to be addressed. Add in the fact the station and its six commuter rail lines remained operational almost entirely throughout, and you have the perfect situation to showcase an extraordinary level of comprehensive management skill.

The project commenced in late January 2011, with the demolition of the existing steel concourse bridge, booking office and platform stairs. A temporary footbridge was constructed using cranes to lift in prefabricated towers, stairs and spans over two Possession Weekends in January and February. A temporary booking office was also constructed, and CCTV and reconfigured ticketing systems installed.

During the demolition works, a 250 tonne crane was used to lift out the bridge and stair sections, during two Possession Weekends. These pre-scheduled track closures were few and far between, so each one involved the mobilisation of a number of trades, extra workforce, extensive coordination of plant and hi-rail equipment, prior reviews of safety documentation, and meticulous coordination to achieve the works programmed in for the two day, two night window of opportunity. Works were carried out around the clock, requiring extremely vigilant safety supervision and high levels of surveillance.

Excavation in shale for the lift shaft and bridge footings took place between September 2011 and December 2011. Pad footings were constructed, as the platform did not offer sufficient safe working space for piling rigs.

Suspended over six rail lines with an overall length of 70m and over 20m wide, the station's new concourse bridge structure was constructed with precast planks, with headstocks, lift shafts, columns, pad footings and stairs constructed of concrete cast in-situ. The concourse building itself was constructed with a 100 tonne hot dip galvanised and painted structural steel frame, which had to be delivered via crane from the road bridge out of hours. Six sets of stairs and four lifts are connecting the concourse paid area with the station platforms.

Formwork reinforced pour concrete and precast concrete planks comprise the structure, with feature curved walls incorporating glazing, and a unique ceiling design with Eter (timber effect) and Compressed Fibre Cement sheeting contrasts. Other elements include resilient finish Vitrapanels cladding, anodised aluminium louvers (for natural ventilation of the concourse) and metal deck roof sheeting throughout. As the new building is located in surrounds with significant heritage elements, sensitivity to the context in the design and materials choice was required.

"In order to construct the new station concourse structure we were faced with a number of difficult situations. The dimensions of the existing platforms limited the access and imposed construction restrictions for the new concourse structure resulting in the need to erect hoarding approximately 1.5m from the edge of the platforms with passing bays. This hoarding extended to a height of 5.7m from the platform surface to the top of the new concourse slab," said Arenco Construction Manager, Zani Buzevski.

"This was not an easy task when the falsework and formwork required was going to encroach on RailCorp's 4.0m exclusion zone (safe approach distance) to the 1500V overhead wires for metal components. Available Track Possessions were limited and, due to the complexity of the structure and the inclusion of lift shafts to each platform, it was going to take several months to complete. The writing was on the wall – it was going to be impossible to construct the station during Track Possessions alone.

"In order to overcome these obstacles the concept of creating an insulated barrier between the scaffold / metal formwork frames and the 1500V overhead wires was explored.

"The decision was then made to proceed with the design, prototyping and implementation of this concept which would allow safe scaffold erection within 4m of the 'Live' 1500V overhead wires. Approval from RailCorp's electrical engineers needed to be obtained. An initial preparatory works plan followed by a full Work Method Statement was drawn up to capture all safety, quality and technical requirements necessary to make this happen and gain approval.

"The concept was approved and successfully implemented with the non conductive hoarding of 7.7m high being constructed on the platforms. This innovation enabled us to meet our essential possession milestones and was a huge achievement from a programming point of view. It was a massive effort from all involved (RailCorp, Arenco, Synergy Scaffolding – the system supplier) and has proven to be our most ground-breaking construction method to date on the project."

The innovation also won Arenco and their team two Master Builders Australia Awards – one for Innovative Safety Systems and one for Site Safety - Commercial Projects, $10M-$50M category.

On site, the innovation and overall meticulous safety planning also paid dividends, in the form of zero Lost Time Injuries, despite all the risks and the pressured timeframes and confined spaces.

Arenco's team included a Construction Manager, Design Manager, and an onsite team of Project Manager, General Foreman, Foreman, Contracts Administrator, two Project Engineers, two Site Engineers and a Rail Safety Manager. The average manpower on site was 37 per day, increasing to over 100 during Possession Weekends.

A team of specialist consultants contributed to the project, including Structural Engineers GW Hyder and Cardno, Building Code Australia (BCA Logic), High Voltage Electrical (Aecom), Heritage (Scobie), Geotechnical (Jeffery and Katauskas), Earthing and Bonding and Rail Infrastructure (GHD) and Architectural (HBO+EMTB). RailCorp also maintained close involvement with the project's planning, monitoring, certification and commissioning.

The new concourse opened to commuters in late February 2013, with Full Practical completion achieved in August 13.

Over the last 15 years Arenco have built over 30 rail projects, including more than 20 Rail Station upgrades. These projects include South Sydney Freight Line – 3ARail Alliance; Glenfield Station – GJA; Central Station Upgrade; Liverpool Hospital Bridge; Sefton Triangle Bridge; Tourle St Replacement; Wagga Wagga Rail Bridge; Hunter River Third Crossing; and the Northwest Boulevard interchange.

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REVOLUTION IN SCAFFOLDING SAFETY AT SYDENHAM

There was a massive safety challenge the construction team on the Sydenham Railway Station project needed to resolve – live high voltage powerlines and a restricted space in which to work while avoiding them. Synergy Scaffolding not only developed a solution which allowed work to proceed safely, and within a practical timeframe, the invention they developed will provide benefits for countless projects in the future.

In January 2011 when the project commenced, Synergy Scaffolding was one of the first trades on site, literally walking in the first stage of scaffolding for the demolition works. Their involvement remains continuous until project completion in 2013, with up to Eight of their staff on-site at any one time for moving, erecting and modifying the scaffolding. Due to the need to work on key parts of the project only during pre-scheduled possession weekends, when the trains would not operate through the six tracks that pass through the station, full weekends have been part of the Synergy Scaffolding roster on those dates.

What makes this project truly special as an example of their ability to apply their talents to unique situations, is the world-first, award-winning safety system developed by Synergy Scaffolding senior management, General Manager Sam Soukie and Project Manager Mo Soukie and managing Director Mo Eljarrar. Their Fibreglass Screen Hoarding System is now Patent-Pending worldwide, and is a stroke of practical genius which was invented out of program-driven necessity.

"We were called into a meeting with the Arenco project management team. There was a problem with the construction program due to the restrictions of the platform. As the standards specify a 4m exclusion zone for live power, the width of the platform simply did not allow room for the construction of the scaffold," explained Sam.

"The possession weekends (when the power lines can be de-energized) could not be changed, and work could not wait for those. So we went back to the drawing board and developed a screen which allows us to build a scaffold within the exclusion zone.

"We first made a prototype model out in the yard to show the client, when the client was satisfied the system would work we then carried out four demonstrations for RailCorp. Once Railcorp were satisfied it would work, we sent the product to be manufactured by our facility overseas.

"When the system arrived in Australia, we then carried out another demonstration for RailCorp's Technical Advisor for Electrical Mains."

The system is deceptively simple – a fibreglass frame with Foamex 10mm PVC sheeting locked on to the frame by nylon bolts. None of these parts are conductive, and the system has been independently tested for fail point, exceeding the Australian standard by a massive margin. The fail point for a high voltage situation is required to be 1.5 KvA, and the actual fail point of Synergy's product is 40KvA, with the product resisting the burn-through of live high voltage at that strength for a full 30 seconds.

The Fibreglass Screen Hoarding System has also been certified by independent engineers for impact resistance to AS4687-2007 and for wind loading to AS/NZS 1170.

Once the system was proven to be effective, 800sqm of the modular fibreglass insulated hoarding screen units were put to work at Sydenham, rotated continuously as the focus of work shifted to various construction tasks. These included the suspended scaffold over the train tracks and the platform works.

"This has never been done before, and we are impressed by how durable the system is", commented Sam.

The Master Builders Association were also highly impressed, awarding the innovation two 2012 Excellence In Construction Awards – for Innovative Safety Systems and for Site Safety Commercial projects $10M to $50M.

Benefits the system has are its lightness compared to the traditional plywood hoarding, the obvious aesthetic appeal and most importantly the elimination of risk faced by scaffolders installing traditional plywood hoarding and the time saving on a project which in turn translate to cost savings.

The major challenge of how to manage the risks associated with live power resolved, Synergy Scaffolding still had numerous other complexities to manage. The variety of scaffolding construction required included three bridge spans suspended over six tracks; three internal and external lift shafts; and "class B" hoarding on the footpath for construction personnel.

Three 2.7m wide bridge spans of scaffolding for facade construction were built on-site on the concourse slab and then craned into position and locked to towers constructed by Synergy Scaffolding on either side. These all-steel scaffolds were sheeted with the insulated screens.

"On Platform One, there was no room to build the support tower wide enough to take the load. So we chemset two Universal Columns onto temporary purpose-built pad footings and fixed off to them," explained Sam.

"This was a really challenging job. We had to take a flexible approach to meeting the labour needs, allocating enough staff to dedicate long manhours to the project."

In total, Synergy Scaffolding supplied approximately 300 tonnes of scaffolding to the Sydenham Station upgrade, including access ladders with tie-down hatches. Every scaffold was a separate unit, with no connection possible, and spread over six platforms.

Synergy Scaffolding has been providing innovative, safe and reliable scaffolding systems since 2006. The two founding partners have close to 30 years industry experience between them, allowing them to bring a hands-on understanding of the construction process to resolving their client's access and safety needs.

The company manufacturers its own aluminium scaffold, in addition to providing sales and both contract and short-term hire of mobile aluminium scaffold, steel scaffolding, swing stage scaffolds, tube and fitting, aluminium stairs and ladders, day hire, labour, transport, erection, dismantling and engineering, with CAD technology used to formulate scaffolding plans and specifications. They are also now the sole provider of Fibreglass Insulated Hoarding Screens. The 5200m^2 warehouse facility – all under cover – allows the company to maintain an inventory and material capacity which can meet the needs of multiple major projects simultaneously.

Synergy Scaffolding is also well-resourced with manpower, and the 60-strong workforce is highly skilled, with constant training ensuring they are compliant with all relevant standards. The scaffolders working on projects such as Sydenham hold tickets including the RSW Cards (rail safety workers card); Scaffolding tickets; confined space tickets; and are all trained in harness rescue – and every scaffolding crew is equipped with safe height rescue kits and safe height rescue plans. Their workforce also includes staff with Vehicle Mounted Crane tickets, dog man tickets and Rigging, up to Advanced Riggers.

An LTI-free safety record for recent projects, including Sydenham, is proof of Synergy Scaffolding's diligent approach to safety.

"Every year our staff are re-inducted into the company. If there is any change in standards, policies or codes, such as the new Safe Working at Heights Code of Practice, we are right on top of that," said Sam.

"When we brought the screens in to Sydenham, all our team were trained in how to use them.

"We also give new staff options to take courses once they are past their probationary period, such as EWP tickets, Scaffold tickets, and Forklift tickets, and these are all paid for by the company, because it gives our employees knowledge. It is very important to upskill workers, and when you want someone to work according to your standards and procedures, you need to train them to do that."

Other major projects Synergy Scaffolding have recently undertaken include providing 11,000m^2 of all-steel scaffold for Wollongong University; scaffolding for Watpac's Dunbar Building project at North Sydney TAFE; scaffolding for lift shafts at Martin Place Station; Lindfield Railway Station; Chatswood Chase for Watpac; the Sub-Acute Mental Health Unit at St George's Hospital for LAHEY CONSTRUCTION; scaffolding for a 200-unit residential project on Illawarra Road for Phoenix Builders; and multiple projects for the Department of Defence providing scaffolding for Naval vessel works at Garden Island.

Synergy Scaffolding head office is based in Kingsgrove Sydney, with offices in Melbourne and Brisbane which allows the company to services projects across Sydney, Brisbane, Melbourne Wollongong, Newcastle, regional NSW and the ACT. They have developed a reputation for superior workmanship, strict adherence to project timelines and a proven drive to excel at delivering high quality, safe and innovative scaffolding solutions. With Synergy Scaffolding on-site, project challenges become an opportunity to excel.

SYNERGY
SCAFFOLDING SERVICES

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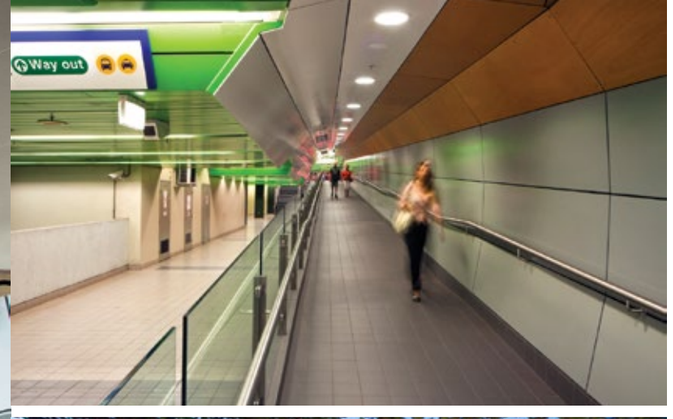

POWER FOR THE PEOPLE'S PLACES

Designing and constructing electrical systems for infrastructure projects like the Sydenham Railway Station takes a trades outfit like PJ O'Connor Electrical, whose thorough understanding of the specific requirements of challenging public asset projects ensured the job was delivered effectively, efficiently and safely. This was not a straightforward electrical works program. The electrical design included upgrading the power supply to a 400 amp fire rated service, the lighting system, backbone cabling and all significant containment runs for communications and data cabling, ticketing, switchboards, CCTV cabling, PA system, and temporary power for the entire station, booking office and temporary concourse during works.

All the plans and specifications had to meet an architect's brief specifying no visible containment; had to satisfy RailCorp standards; and had to allow for future expansion of the station. Works also had to be programmed to fit within the Arenco build program and the site logistics – which included the need to ensure PJ O'Connor's pathways areas were not disturbed or obstructed during Possession Weekends. "All the containment pathways had to be in the slab or in the roof, so everything was predesigned and prebuilt, to allow future access," explained PJ O'Connor Electrical Managing Director, Peter O'Connor.

"I drew upon my 25 years of experience of running my own electrical business, and 30 years in the industry, to resolve the challenges through my experiences on numerous sensitive commercial and government projects.

"Because this is a community asset, it has a design life of 50 years, so we needed to design and build for the long term."

Ease of maintenance was an important consideration for the design, with PJ O'Connor specifying and installing Australian-made and locally available parts. A new product, 300mm fire-rated flexible cables, were used for the feeder cables for the Installation Main Switchboard; the installation comprises numerous lift supplies, essential and nonessential supplies, 120 halide metal light fittings and 120 slim-line fluorescent fittings, all procured from Sydney.

Energy efficiency was another consideration, with multiple controls installed for the lighting system, to enable different degrees of lighting in various areas of the station.

Four PJ O'Connor staff comprising Foreman Rowen Hansell and three trade-qualified electricians worked fulltime on the project for 18 months, with up to 15 staff onsite during peak periods. The project works were completed with no LTIs.

This was PJ O'Connor's 18th Easy Access Upgrade station project for RailCorp, with others including Martin Place, Central and St James. The company have also undertaken numerous D & C projects including multiple power upgrades for RailCorp, numerous substation projects involving cabling and conduit pathways design and construction; the construction of the lighting upgrade for King Street Newtown; a Parklands re development project at Ballast Point Balmain; BER schools projects around Sydney; Defence projects; the upgrade of Trumper Park Paddington; and numerous roads and bridges projects. For every project, ingenuity and innovation are applied to deliver the best solution.

"By understanding our client's requirements and expectations thoroughly, and continually upskilling our staff, we have design and construct capability which is uniquely suited to infrastructure and public asset projects. I set a realistic, high benchmark for our company, and have built a skilled team with a quality focus," said Peter.

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SKILFUL DELIVERY OF FINER DETAILS

Careful project management, excellent products and a high level of expertise are the hallmarks of Intra Design's approach to installing ceilings, walls, and claddings. Careful project management, excellent products and a high level of expertise are the hallmarks of Intra Design's approach to installing ceilings, walls, and claddings. For the Sydenham Railway Station upgrade, their team supplied and installed all the project's cladding including Swisspearl, Vitrapanel, Alucabond, also FC ceilings, walls, linings and stainless steel trimmings.

The works progressed on a staggered program over one year, with the project management needing to factor in the limited number of Track Possessions and power outages available for completing works on the concourse building's external perimeter.

The main challenges were the restricted work area with intricate grades, and the long lead times on some of the products. Careful planning and precision in the framework enabled work to proceed smoothly and ensured installed items aligned accurately. "The main item that required lead time was the Vitrapanel, which was only ordered once the framework was complete and accurate site measurements were complete. This was critical due to the lead time of the item and immense program restrictions. Each panel was measured and wastage was kept to a minimum," said Intra Design Spokesman, Vincent Koh.

Intra Design staff on site fluctuated from 10 to 15 people with a variety of skills, knowledge and experience, depending on the program. The site foreman has 15 years experience in the fitout trade, and extensive project programming and planning expertise. All the crew hold current RSW cards, and had been given regular training in safety aspects including working at heights and boom lift operation and safety.

"Overall we have received great praise and continued work with the client. Our quality of work speaks for itself and subsequent jobs are a result of this," said Vincent.

Other railway station upgrades Intra Design have supplied and installed cladding for include Glenfield and Central. At Glenfield, they undertook a similar scope of works as at Sydenham, also in a Possession dependent works program. The fitout included a significant proportion of Kerlite, a material from Spain which requires extreme care in handling and cutting due to its fragility. Lead times for its procurement also made accurate estimating crucial. At Central Station, Intra Design supplied and installed the walls and ceiling linings for the revamped Devonshire Street entrance, including Prodema, a special timber-look ceiling lining. This project was recognised with a Merit award by the MBA (Master Builders Association) in 2012.

"The complexity of the high level ceiling at the main entry was the toughest challenge. The architect enjoys creating a main feature and the ceiling was it. Once again careful planning and staging allowed this to successfully be completed, including 2.5 months of working on a 10kpa gantry and detailed work," said Vincent. Intra Design has provided skilful, safety-focused cladding services across sectors, including also schools, commercial offices and retail projects. They have an eye for fine detailing, and are able to work with clients to refine designs, clarify specifications and formulate cost-effective alternatives.

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