

Williams Landir

# Norman Disney& Young

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# Intro**duction**

# With the continuing upgrade and development of transport infrastructure is paramount.

Norman Disney & Young (NDY) has extensive experience in urban, regional and intercity passenger and freight rail infrastructure. Our approach is built on meeting clients' immediate needs, as well as considering future expansion plans.

We cover the full life cycle from planning, to design, manufacture/ construction, testing, implementation, maintenance, restoration and, ultimately, replacement.

Our experienced and dedicated staff bring the knowledge of real-world challenges to provide cost-effective, practical and implementable solutions. We are keenly aware of the latest technologies, assurance, risk, reliability and sustainability practices, and integrate them into our approach.

We understand the importance of integrating rail, engineering services and operational readiness for each and every project.

NDY has experience on both sides of a project, including working client side on concepts reference design and safety assurance and delivery teams.

We have an inherent understanding of the constraints and implications of the various delivery methods and the commercial implications they impose.



Rail infrastructure offers an efficient and economically viable method to enhance infrastructure capabilities at a city, state and national level.

# Our values

### Excellence

Do it once, do it well

# Leadership

Lead in our profession, industry and the community

# Integrity

Treat others as we wish to be treated

# Collaboration

Listen, share and contribute

# Accountability & Ownership

Understand the impact of our actions and own the outcomes

# Innovation

Inspired creativity to challenge the norm

Our purpose is making spaces work

# Our **vision**

To enhance the lives of others, by engineering outstanding projects, mindful that every project matters.

To sustain deep and trusting relationships with our clients, through solving their problems and serving them with utmost reliability,

and

To engage our people with meaningful, rewarding and inspiring opportunities.

#### **Our ethical statement**

NDY has a proud tradition of upholding the highest ethical standards in the manner by which we conduct ourselves as a company. Read our ethical statement at **www.ndy.com/about-us/our-ethical-statement** 



Designing systems and services for railway infrastructure requires a comprehensive understanding of both rail operations and building services. We have the expertise to provide quality services solutions while accounting for the specific requirements of rail owners, operators, employees and passengers.

# What **we do**

As consulting engineers, our purpose is making spaces work. We listen to the unique requirements of each client, and tailor our services accordingly to every project.

Our collaborative approach to excellence and innovation are core values at NDY. We consistently deliver best practice sustainable solutions to achieve our clients' objectives.

Clients come to NDY because they want quality. We take ownership and provide clear recommendations while consulting with the utmost integrity.

Most of all, clients come to us because we listen. We look forward to better understanding your business and collaborating with you to achieve successful outcomes.

# Our markets

- , Civic
- Education
- Health
- Industrial
- Mission Critical
- > Offices
- > Residential & Hotels
- Retail
- Transport

### Our services

- Acoustics
- Asset Performance
- Audio Visual
- > BIM (Building Information Modelling)
- Communications
- Controls & Integration
- Electrical
- Fire Engineering
- Fire Protection
- Hydraulics

- ICT Consultancy
- Interiors
- Mechanical
- > NDYLIGHT (Lighting Design)
- Property Consultancy
- Security (including SCEC) services)
- Sustainability
- Vertical Transportation



# **Railway infrastructure**

Transport infrastructure requires an integrated approach across four key engineering aspects, where we can offer specific rail expertise:



# Fire Protection, Fire & Life Safety Engineering and Ventilation

#### **Fire Protection & Hydraulics**

Fire protection services an integral feature of public infrastructure to protect people and property in the event of a fire. NDY provides a coordinated fire protection system to isolate and control a fire.

The fire protection systems provide input to other systems in the event of a fire. Effectively integrating with the ventilation systems, electrical systems and the PMCS Systems and services is paramount to the safety of users.

NDY's experience in drainage includes building rainwater waste, hot & cold water and sewer.

#### Fire & Life Safety Engineering

NDY has the fire and life safety engineering expertise to provide robust yet cost effective fire safety strategies. Design fire sizes are either nominated by the project brief, or require project-specific risk reviews and stakeholder facilitation to arrive at the agreed design criteria.

NDY has vast experience with human behaviour and its influence on evacuation within tunnels and stations. The use of suitable evacuation models enables us to model detailed population flows and egress routes. We utilise CFD to model fire and smoke in above and below ground infrastructure.

Our solutions consider local and international standards. We determine optimum solutions to be defined for the safe egress of passengers by control of smoke whilst minimising the impact on the construction requirements and planning impacts.

#### Ventilation System Design

NDY offers international expertise in our review and safety assurance ventilation design with consideration to the latest international standards and analysis methods.

Detailed engineering evaluation of tunnel ventilation and external emissions has an increasing significance as internal air quality and visibility goals and external environmental consideration become more onerous. Application of this tunnel ventilation design methodology and our holistic approach to traffic management has resulted in designs which meet the full requirements of the project brief, yet allow a much reduced tunnel excavation and ventilation plant capacity.

We can review and advise the impacts of various tunnel cross sections and shaft ventilation and arrangements have upon operating costs such that an optimal solution can be offered to suit the project constraints.





### Acoustic Services

NDY is experienced in assessment and noise modelling of environmental noise impacts from civil infrastructure projects and collaborates with the design team to develop appropriate noise and vibration control strategies and measures through early stage involvement on the project.

Our design capabilities involve assessment and recommendation of noise control measures such as attenuation for ventilation stacks, tunnel and building fans, equipment, public address, emergency integration systems and noise barriers through baseline site noise surveying and modelling. For construction noise and vibration impacts, NDY are able to review and advise on potential impacts to the nearest noise sensitive receivers during the early stages of the project and carry out field surveys and monitoring of construction noise and vibration impacts during construction to monitor these impacts and advise on alternative mitigation strategies.

The planning stage of any infrastructure project is where acoustics has the biggest impact on cost planning. NDY will assess background noise/vibration levels of the surrounding environment with modelling of the trackway and buildings during the feasibility phase.

The detailed design stage provides the opportunity to undertake cost benefit analysis of noise mitigation measures such as noise barriers. This detailed design is generally completed through detailed noise/vibration modelling including calibration of the noise/vibration model with on-site noise and vibration monitoring.

# Electrical Services and Lighting Design

#### High & Low Voltage (HV & LV) Power

As an accredited service provider (ASP3) for high voltage infrastructure, NDY are well equipped to offer truly integrated HV and LV solutions. Our detailed knowledge of the processes, technical requirements and personnel involved in negotiations with electricity supply authorities allows us to expedite such approvals.

NDY has a vast range of knowledge inhouse, with specialists in the design of tunnel electrical infrastructure systems. NDY have developed innovative equipment configurations, providing high levels of reliability with minimum infrastructure.

#### **Tunnel Feature & Motorway Lighting**

As specialist lighting designers, NDYLIGHT is able to undertake detailed daylight simulation studies, tunnel lighting design and security lighting design. This allows effective and efficient lighting schemes to be developed, allowing safe and secure use of the tunnel and roadway system.

Our lighting designers consider local and international standards and the impact of visual boredom to develop an effective lighting solution. The use of new technologies and whole of life use influence the choice of lighting solutions.

Our experience in precinct lighting allows NDYLIGHT to develop statement lighting schemes for artistic expression of tunnel features and urban design elements, adding architectural flare to these assets.

# Security Services

With a national team of Licensed Security consultants NDY is well resourced to provide all Physical and Electronic Security consulting services including audits, compliance checks, new design, and commissioning services for all systems including CCTV, Intruder Detection, Access Control, Physical security, Public Address, and Emergency Help Points including Duress.

NDY also provides Security Risk Assessments and Crime Prevention Through Environmental Design (CPTED) advice, reviews, workshops and designs.

# On the road to **sustainability**

We're committed to delivering infrastructure that contributes to a sustainable future – because we know that sustainability is not only better for our cities and communities, but also for our clients.

At NDY, we practice what we preach. We have attained global ISO14001 accreditation, we report annually on our own corporate sustainability initiatives through the Global Reporting Initiative (GRI) framework, and our Australian offices are either certified or registered for Green Star and NABERS ratings.

We are conscious that investing in new infrastructure can be complex and multi-faceted, but above all it needs to be sustainable. We are experienced with benchmarking and rating tools including 'Green Star' and 'IS' developed by the Infrastructure Sustainability Council of Australia.

Our team has extensive experience delivering rail infrastructure projects. We work with our clients to develop efficient, cost-effective solutions that deliver on the 'triple bottom line' of economic, environmental and social sustainability.

We design and deliver infrastructure projects that maximise patronage revenue and optimise maintenance costs, reduce carbon emissions, consider visual impact, lighting and noise, and conserve the natural surrounds.

Sustainable infrastructure underpins the delivery of essential services, drives economic growth supports social needs. We understand the vital role that road infrastructure plays in connecting our society and enhancing our economy, and we're committed to working with our clients to deliver infrastructure that leaves a sustainable legacy.



At NDY, sustainability is in our DNA. It's not an 'add-on' but an intrinsic part of everything we do.

# For over 60 years, we have been at the forefront of innovation. We recognise that both clients and projects are unique, and we are adept at tailoring our services and designs to suit project requirements.



CEO Norman Disney & Young

Stuart Fowler



# NDY rail experience

For more than sixty years NDY has provided consulting engineering services on strategic projects throughout Asia, Australia, Canada, Europe, New Zealand and the UK.

These award-winning projects are testament to the quality of our innovation, expertise and personnel. The following examples of our experience are a snapshot of our ability to deliver world's best practice for master planning projects of all sizes.

To view a comprehensive outline of our project experience visit our website **www.ndy.com** 



### Flinders Street Station Administration Building, Melbourne, Victoria

Melbourne's Flinders St Station is noted as

the busiest railway station in the Southern

commuters passing through each day and

Administration Building was in urgent need

of restoration works to ensure its structural

Hemisphere, with over 1,500 trains and 110,000

growing. At over 100 years of age, the station's

stability, in addition to waterproofing and repair

of the ageing façade. Conservation of heritage

and restoring the clock tower and the revered

buildings for generations to come was a 'once-

in-a-lifetime' opportunity, with NDY contributing

to future proofing the station via upgrades to

building services and acting as a technical

resource to assist with problem solving.

Restoring one of Melbourne's most iconic

elements was a prime focus, including stabilising

#### mages by Martin Leitch Photography

#### Services:

#### About the project:

ballroom.

- Electrical
- Fire Engineering
- › Fire Protection
- Hydraulics
- Mechanical
- Vertical Transportation

### Completion

> 2018

Our work included upgrading non-conformances in the heritage listed building to improve fire safety (in collaboration with the Metropolitan Fire Brigade).

Considering the stations position next to two of Melbourne's busiest intersections, maintaining continued operations within and around the building was a challenge. With contamination a key issue, NDY delivered temporary services whilst rectification works were underway to ensure limited impact on Metro Trains Melbourne operations.

NDY are proud to have worked on this iconic building, a hub for the Melbourne community through cultural events such as White Night or simply using the station's front steps as a meeting point. NDY contributing to future proofing the station via upgrades to building services and acting as a technical resource to assist with problem solving.



### Melbourne Underground Rail Link, Melbourne, Victoria

#### Services:

#### About the project:

- Mechanical
- Electrical
- Fire Protection
- Acoustics

NDY was recently engaged by MTM and our design partner GHD to develop a detailed design for a smoke hazard management and sprinkler upgrade to the three existing underground railway stations in Melbourne's underground rail loop (the MURL). As part of a staged process, NDY delivered:

A Preliminary Design, mechanical, electrical and fire protection services designs based on previous fire engineering work done by others using generic inputs and references. The generic nature of the inputs raised questions around the design basis, such as the design fire size (i.e. a 15 MW train fire) suitability for Melbourne's metropolitan rolling stock. An additional early works programme. For this work, we teamed up with the CSIRO testing laboratories, who tested and developed a specific design fire for the rolling stock used in the MURL. This resulted in a stepchange in the basis of design, with the design fire site increasing to 31 MW, double that previously assumed. Our specialist fire and life safety team then assessed the impact of this scenario on the existing stations. Through a comprehensive process of modeling fire events and occupant evacuation simulations, an optimal solution was developed to increase the level life safety so far as is reasonably practicable (SFAIRP) to satisfy Australian National Rail Safety Law.

- This resulted in modifications to the preliminary design to achieve the higher smoke exhaust rate requirements.
- The preliminary design was developed to a detailed design level, to achieve an optimum level of confidence in the solution. Our work included mechanical, electrical, fire protection services (wet and dry), acoustics (environmental and mechanical) and performance based fire and life safety. The detailed design was then used as the basis of a D&C tender.

The above work complements the successful completion of other rail, transport and tunnel projects such as Wynyard Walk, Westconnex Stage 2, Flinders Street Station and a bid design for the new Melbourne Metro rail project.



# Sydney Metro Northwest Rolling Stock Technical Advisors, Sydney, New South Wales

#### Services:

#### About the project:

- 3D Modelling
- Acoustics
- > Electrical (HV & LV)
- > Fire Engineering
- Fire Protection
  & Detection
- > ITS (OMCS/PMCS)
- Sump Pump
  System Design
- Tunnel Ventilation
- Tunnel Lighting

NDY were part of the rolling stock design review team, advising TfNSW and providing input for the independent certifier on design compliance.

We were also tasked with reviewing train aspects of network systems engineering including interface management, RAMS, fire and life safety, traction power distribution, EMC and acoustics. The team has also reviewed the new maintenance depot design submissions for rolling stock interface aspects, particularly train wash plant, lifting and bogie exchange equipment, underfloor wheel lathe and track maintenance vehicles. With expertise in rolling stock design, systems integration, infrastructure interfaces, manufacturing, testing, and commissioning, as well as knowledge of operations and maintenance, our staff are well-equipped for the challenges of this assignment.

Stage 2 of Sydney Metro extends metro rail from the end of Sydney Metro Northwest at Chatswood, under Sydney Harbour, through new CBD stations and beyond to the south west. Services are expected to start in 2024.

Sydney Metro will deliver 31 metro stations and more than 65km of new metro rail.

The \$8.3 billion Sydney Metro Northwest, formerly known as the North West Rail Link, is the first stage of Sydney Metro - Australia's biggest

first stage of Sydney Metro - Australia's biggest public transport project. It includes eight new metro stations, five existing stations upgraded to metro standards and 4,000 commuter car parking spaces.

Services start in the first half of 2019 with a train every four minutes in the peak - 15 trains an hour delivered by a fleet of 22 fully-automated, singlelevel, six-car trains based on Alstom's Metropolis platform. All stations will be equipped with fully automated platform screen doors. Platforms will accommodate train lengths up to eight cars.



# Newcastle Light Rail Conceptual Design, Newcastle, NSW

#### Services:

#### About the project:

- Automation
- Communications
- Electrical
- Fire Engineering
- Fire Protection
- Hydraulics
- Mechanical
- Security

out the project:

The Newcastle Light Rail Project is part of the NSW Government's plan to re-vitalise the city centre. It consists of the truncation of the existing railway at Wickham Junction and construction of an urban light rail line on a part of the vacated right of way and local streets, terminating in the CBD at Pacific Park. This will be a two-track installation with six stations, operated by a fleet of five light rail vehicles. A depot and stabling area is planned along this right of way just east of Stewart Avenue.

NDY was a member of the technical advisor team and contributed to the pre-concept design in the areas of vehicle definition, depot industrial design, stabling area circulation, and operations analyses and simulation. A fleet of short (20m) 100% low floor light rail vehicles is envisioned for initiation of this service, with provisions for vehicles up to 33m long in the future.

The depot is configured for inspections and light running repairs, with major work assumed to be performed off-site. The depot building will house administrative, operations and maintenance staff, as well as operations control, training, staff accommodations, specialised shop equipment and parts storage.

# 

We served as part of the technical advisor team and contributed to the preconcept design of the project in the areas of vehicle definition, depot industrial design, stabling area circulation, and operations analyses and simulations.



# Nebo Rail Maintenance Facility, Nebo, QLD

#### Services:

- Automation
- Communications
- Electrical
- Fire Engineering
- › Fire Protection
- Hydraulics
- Mechanical
- > Security

#### About the project:

Our team was engaged as part of the Pacific National Infrastructure Alliance to provide design services for their new rail provisioning and maintenance facility approximately 10kms south of Nebo, Queensland.

The facility includes a maintenance building, two

provisioning buildings, washdown building, under

floor wheel lathe, two warehouses, fuel farms,

turntable, water treatment area and sticky coal

hydraulic design team have worked closely with

the alliance partners to deliver a facility that will

reuse approximately 85% of all treated water.

pit. With no main water supply available, the

Yard and Road Lighting

> HV and LV Power

Authority Liaison

> Site Cable Reticulation System

Lighting & Emergency Lighting

> Equipotential Bonding

#### **Communications and Security**

- Data and Communications
- > Security

**Electrical** 

#### HVAC

 Design of HVAC System for Maintenance Shed and Associated Buildings

#### **Combined Services**

- > 3D Coordination of Underground Services
- Trench sections

#### Mechanical

- Sanding Reticulation
- > Lube Oil Reticulation
- > Engine Coolant Reticulation
- Fuel Reticulation
- > Compressed Air Reticulation

#### Hydraulics

- Rainwater Harvesting
- Water Recycling
- Water Treatment Plant
- Sewer Drainage
- > Stormwater Drainage
- Water Reticulation

#### Fire

> Wet and Dry and Portable Fire Protection

ections



### Level Crossing Removal Program, Melbourne, VIC

#### Services:

Fire Engineering

Norman Disney & Young (NDY) Fire Engineering is seconded to Metro Trains Melbourne (MTM) as its Fire & Life Safety (FLS) Subject Matter Expert (SME) to fulfil it legislative responsibilities as part of the Level Crossing Removals (LXR) program of works.

The engineering assessments conducted prior to the works beginning is an essential part of moving forward to ensure the local community and all that frequent at the station are kept safe during the process and well after the removal is completed.

This major transport projects will see at least 20 level crossings removals completed by 2018 and a total of 50 removed by the end of the project, creating thousands of jobs in Melbourne.

The benefits will affect the driver, pedestrian and train user; more trains will be able to run, commuters get home faster. The removals will see safety improvements, greater reliability in all weather conditions, and easier navigation for all road users.

NDY is seconded to MTM to assist the Projects team with specific fire safety expertise and advice. The secondment ensures MTM has the resources available to turn reviews and comments around quickly, ensuring that the project timeline is maintained.

NDY has extensive experience with FLS across many government and private contracts. With hundreds of thousands of members of the public using rail facilities daily, ensuring a high level of FLS services and compliance was a key goal of the project. This improved the robustness, and lowered the physical and legal risks associated with the project.

A specialist review of FLS design aspects informs the design team of MTM's Standards and design requirements, supporting consistency across the works packages. This helped the client by bringing specialist knowledge to MTM's LXR team, resulting in quality design input and allowing others to focus on their areas of expertise



### Williams Landing Station, Melbourne, VIC

#### Services:

#### About the project:

community.

Our team was engaged by Lendlease to provide

The new state of the art station is situated within

building services and ICT design for this new

the town centre and provides a focus for the

development of Melbourne's Western regions

and is a key piece of infrastructure for the local

As part of the successful bid team for this project,

our team provided schematic design for pricing

purposes, cost saving initiatives and technical

support to the tender submission.

metro station for Public Transport Victoria.

- 3D Modelling
- Acoustics
- > Electrical (HV & LV)
- > Fire Engineering
- Fire Protection
  & Detection
- ITS (OMCS/PMCS)
- Sump Pump
  System Design
- Tunnel Ventilation
- Tunnel Lighting

The detailed design phase for the project commenced in July 2011. We provided detailed design and construction administration for power distribution, ICT including CCTV, Public Information Displays, Ticketing and communications systems, lighting, fire and hydraulics, mechanical systems and vertical transportation.

The project was completed in April 2013 and provides key public transport access points for the developing suburb of Williams Landing.

# 

As part of the successful bid team for this project, Our team provided schematic design for pricing purposes, cost saving initiatives and technical support to the tender submission.

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# Rail Maintenance Facility, Esperance, WA

#### Services:

#### About the project:

the line.

- Automation
- Communications
- Electrical
- > Fire Engineering
- > Fire Protection
- Hydraulics
- Mechanical
- Security

Having been awarded the freight contract for the transport of iron ore from Koolyanobbing open cut mine operated by Cliffs iron Ore to Esperance port, Aurizon (previously QR National; Australia's largest rail freight operator) embarked on a

programme to upgrade facilities. Included in this

maintenance and operation of the rolling stock on

programme is a series of new buildings for the

With a total building area of 3,000 m<sup>2</sup>, the new

the remote region, with full access below the

vehicles and heavy lifting facilities to facilitate

major overhaul operations if required.

buildings are designed to be self sufficient within

Our team was engaged to provide building engineering services including communications, electrical, hydraulics and mechanical engineering.

The project makes use of an innovative waste water recycling system. This is a separate collection system connected to a cyclone spinning oil/water separator, with recycled water reticulated for re-use and waste product shipped from the site for disposal.

Other innovations include rainwater harvesting and LED lighting, with the resultant extremely long lamp life, white colour of light and energy consumption reduction.

# 

With a total building area of 3,000 m<sup>2</sup>, the new buildings are designed to be self sufficient within the remote region, with full access below the vehicles and heavy lifting facilities to facilitate major overhaul operations if required.

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Sydney Metro - Crows Nest Station, Crows Nest, Sydney, NSW

#### Services:

- Acoustics
- Communications
- Cyber Security
- > Fire Engineering
- > Fire Protection
- Hydraulics
- Mechanical
- Security
- Security Risk
  Management
- Sustainability

#### About the project:

Having been awarded the freight contract for the As part of the Crows Nest Design Consortium (CNDC), NDY are responsible for the design stage deliver of the MEP services for this project. Together with SMEC (Design Lead, Civil, Environmental), Woods Bagot (architecture) and Robert Bird Group (Structures), NDY are developing the Stage 2 (70%) and Stage 3 (100%) design packages for this project.

Crows Nest Station is an underground station located on the Pacific Highway between Oxley Street and Hume Street. This area is a growing commercial and residential precinct in close proximity to the village centre of Willoughby Road and proximate to the CBD centre of St Leonards.

#### Features:

Underground station connecting the Sydney Metro North West to the new Sydney CBD Metro

- New pedestrian crossing with traffic lights at the Pacific Highway/Oxley Street intersection
- New pedestrian crossings on Clarke and Hume Streets
- > New bike parking on Hume Street
- New kiss-and-ride and taxi bays on Clarke Street
- Existing bus stops close to the station retained and relocated on the Pacific Highway.

In addition to the station design, the CNDC team are collaborating with Sydney Metro on the planning of the proposed over site developments and planning the infrastructure and connections for the implementation of these future buildings.



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