



**Norman
Disney &
Young**
A TETRA TECH COMPANY

Our Canada & **Global** Capabilities



Cover photo: Vancouver cityscape featuring the Shangri-La hotel, Canada.



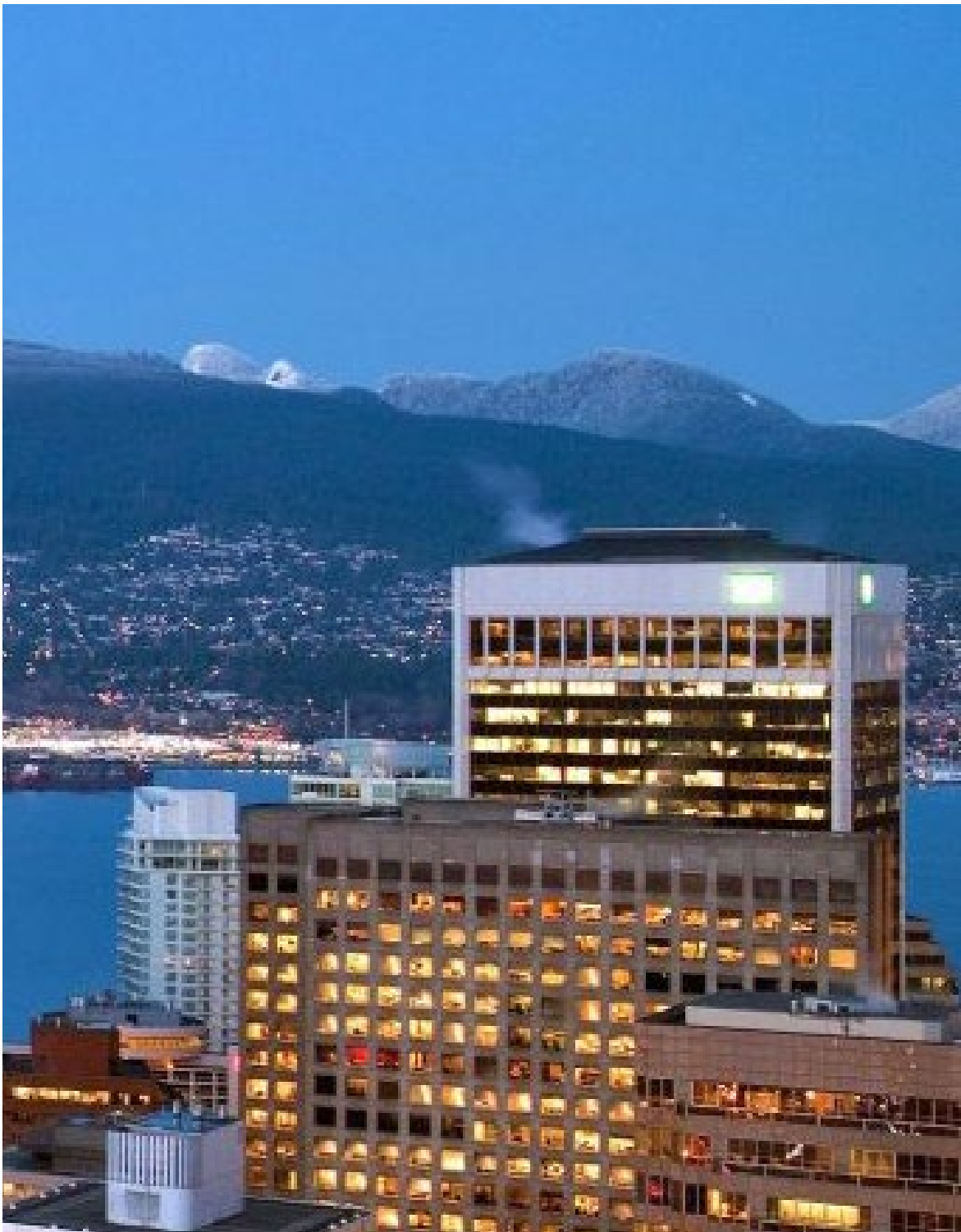


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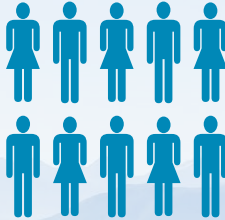
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NDY BY NUMBERS



established

1959



600+

people



9 key markets

12

offices



5

countries

Introduction

“ A key element of our company’s vision is “sustaining deep and trusting relationships with our clients” . ”

Norman Disney & Young (NDY) is an innovative and diverse engineering consultancy, with a commitment to building a better future through excellence in sustainable design.

Established in 1959, we have a long and proud history of offering an extensive range of engineering services, and delivering award-winning landmark projects.

For over 60 years, we have been at the forefront of innovation and we actively embrace the key role that engineering can play in minimising environmental impact. We recognise that our clients and their projects are unique, and we tailor our services and designs to suit individual client requirements.

With over 600 people in offices across Australia, New Zealand, Canada, the United Kingdom and Asia, we offer clients access to the highest quality expertise supported by a depth of knowledge and experience that few firms can rival. In the engineering services industry, this makes us a provider of choice.

We offer engineering consulting services across a wide range of market sectors including buildings, defence, health, industrial, mission critical, transport and utilities.

The success we have achieved is due to our people: highly skilled, passionate and engaged individuals, with a highly developed sense of teamwork.

We are proud of our achievements including contribution to a range of iconic award-winning projects. On all projects large and small our commitment is to working with our clients and project stakeholders to deliver high quality, sustainable outcomes.

In January 2018, NDY greatly expanded this engineering and design expertise by joining Tetra Tech, Inc., a global alliance offering consulting, engineering, and technical services.

With a purpose of ‘Leading with Science’, and more than 16,000 associates in 400 offices around the globe, Tetra Tech enhances NDYs delivery of smart and sustainable solutions to clients through a much larger global network of experts.

I hope you enjoy this insight into our company.



Stuart Fowler

Chief Executive Officer
Norman Disney & Young

NDY Across the Globe



Australia

Adelaide
Brisbane & Gold Coast
Canberra
Melbourne
Perth
Sydney



New Zealand

Auckland
Wellington



Canada

Vancouver



United Kingdom

London



Hong Kong SAR

Hong Kong

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



Swells Landing B.C, Canada

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 Global services

- › Acoustics
- › Asset Performance
- › Audio Visual
- › BIM (Building Information Modelling)
- › Communications
- › Controls & Integration
- › Electrical
- › Fire Engineering
- › Fire Protection
- › Plumbing
- › ICT Consultancy
- › Interiors
- › Mechanical
- › NDYLIGHT (Lighting Design)
- › Property Consultancy
- › Security
- › Sustainability
- › Vertical Transportation



HEAR FROM OUR PEOPLE ABOUT HOW THEY ARE MAKING SPACES WORK

www.ndy.com/ourpeople

Our people

Our most valuable assets are our capable and enthusiastic staff. Every member of our team actively contributes to our success, and the success of our clients' projects.

NDY people have an enviable level of specialist skill and a focus on providing high-level customer service, understanding the needs of our clients and producing quality engineering deliverables on time and within budget.

Across all projects NDY people exhibit a commitment to:

- › Having a clear understanding of market conditions in each operating location to provide clients with accurate advice on costs and programming imperatives
- › Teamwork and collaboration throughout all phases of the project from concept design to commissioning and handover
- › Applying practical Ecologically Sustainable Design (ESD) principles
- › Innovative engineering design
- › In-depth understanding of design standards and proven approaches
- › Practical understanding of installation practices
- › Universal adoption of 3D modelling techniques
- › A responsive approach to collaborative working.

Our people embody the NDY brand and are key to the success of your project.



Brentwood B.C., Canada

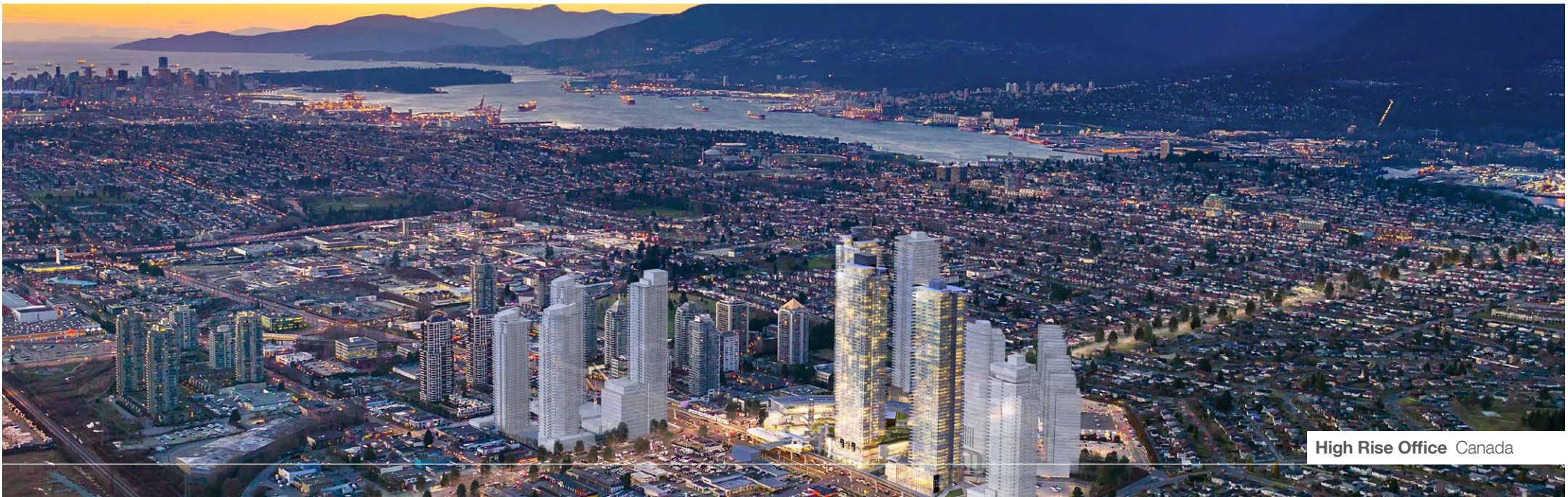
Our **experience**

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





High Rise Office Canada

Brentwood Town Centre Vancouver, CAN

Services:

- › Acoustics
- › Mechanical

About the project:

SHAPE Properties engaged NDY to design the mechanical engineering services of a new 8 acre lifestyle shopping mall (with two residential towers) adjacent to an existing mall in Burnaby, B.C. NDY is also engaged to provide Acoustics engineering services for the Food Court of the mall. The development is adjacent to a SkyTrain station – a strategic location for potential tenants. NDY was brought onboard for its track record on previous successful projects and good relationship with the client.

The transit-orientated project development will have six levels of parking below grade, as well as retail and residential areas above grade. The shopping mall will have a cinema, a gym and several retail tenancies.

Coordinating services to suit the end user before having enough information on the potential tenants had been a key challenge for the team. NDY was able to overcome this through timely planning, proper coordination and appropriate adjustments to suit tenants that would come in.

NDY's specialist acoustical team was tasked with introducing design measures that mitigated mechanical noise and improved acoustical quality within Brentwood Town Centre – Food Court. The acoustical solutions work within the intended designed high height and exposed ceilings that require theatre quality acoustics.

By utilizing the Inhouse developed software to predict perceived noise within the seating area and work closely with the design team, the Food Court design provides exceptional acoustical quality for its patrons.

The NDY acoustics team was able to achieve this result by working closely with our internal Mechanical design team.

We worked closely with SHAPE Properties, IBI Group Architect and GH+A Design Studios to ensure the solutions were focused on the end-user experiences and expectations of the facilities.

NDY's internal collaboration between the Acoustics and Mechanical engineering has ensured all mechanical systems noise was addressed prior to the construction. This contributes to time and cost savings in project delivery and on-site constructability.

The acoustical solutions implemented at Brentwood Town Centre – Food Court will lead to improved occupant satisfaction with their exceptional eating experience.



Aquilini Centre South Vancouver, CAN

Services:

- › Plumbing
- › Mechanical

About the project:

Rogers Arena is an indoor sports and entertainment complex that hosts some of Vancouver's biggest events. It also has facilities for ice hockey, basketball, concerts and a variety of other indoor sports. Recently, the venue has been expanding into a precinct-level development, with two of three new towers built across Rogers Arena in the heart of Vancouver CBD.

As such, the mechanical and plumbing system must cope with high variations in temperature and volume. Aquilini Development engaged NDY to design solutions for the mechanical and plumbing platform of the 32-storey South Tower of Rogers Arena.

Our team has developed a work plan for the plumbing and mechanical upgrades of the 32-storey residential tower with multi-purpose

rooms, fitness area, meeting room, amenity lounge and lobbies (excluding the podium-level car park).

Sustainability was identified as a key performance indicator, and the project satisfies as a LEED Gold Equivalent Building. Several LEED Credits included in our scope includes stormwater design: quality control, water use reduction of 37% and enhanced refrigerant management.

NDY partnered with Aquilini Development, BMZ, Francl Architecture, Nemetz and Pitt Meadows Plumbing towards completing the successful project.

NDY was not only involved in the mechanical and plumbing design of the South Tower. Our team also worked on tenant improvements for the West Tower, excluding the base building design.

The plumbing solution selected is a Sovent plumbing system that utilizes an alternate way of waste and venting by slowing the velocity of the liquids and solids through a series of aerator fittings and double offsets. This removes the need for a secondary vent line, saving cost on materials, labor and maintenance, a considerable benefit to a high-rise building.

The building also utilizes a Vancouver-based Neighborhood Energy Utility company called Creative Energy to create a flexible, low carbon neighborhood energy across the city.



Bridgeport Complex Vancouver, CAN

Services:

- › Energy Modelling
- › Mechanical
- › Plumbing

About the project:

Chunghwa Investment (Canada) Co. Ltd. contracted NDY to work on the base building design of the iconic Bridgeport Complex taking up a massive area in Richmond, BC. NDY has been referred by the architect IBI Group whom we have a great relationship with, particularly via our contributions on many successful projects prior. The client has a particular interest in hotel investments, and NDY is eyeing for repeat business after this project.

A unique design consideration for this project is the district energy plant for Richmond. The plant did not serve the entire city, but only certain areas. The City of Richmond mandates that in the future, all projects are required to have the district energy rate, which means that all the plans of the system must be designed for a future DEU connection accordingly.

The complex consists of four buildings in total: two hotels, one eleven-story office building and a four-story office building. An exciting component of the project were the hotels as the operator will be Marriott Hotel, where NDY will gain a greater understanding of the company's design requirements. The project team has worked on designing the office building, currently working on the design of the two hotels, with the low-rise building being the last.

Our team's innovative work on the Bridgeport Complex consists of future-proofing the facility. As the energy plant of Richmond was a unique aspect, NDY allowed for pipework in the design. This accommodates future linkage where the existing system may operate at the same time, which in effect, will have a seamless transition.

Although the project team has encountered limitations due to the architectural design, NDY was able to provide effective solutions that meets both the needs of the client and the architect.

NDY helped Chunghwa Investment (Canada) Co. Ltd in the design in the most cost-effective manner possible. From the energy equipment to the window designs, all solutions provided were efficient.



Residential Canada

Sewell's Landing Residential Project Vancouver, CAN

Services:

- › Plumbing
- › Mechanical

About the project:

West Bank engaged NDY to deliver the base building design of the Sewell's Landing Residential Project for their Creative Energy plan to provide space heating by utilizing an ocean loop. NDY has successfully provided efficient design for numerous projects with West Bank, thus the repeat business.

Located at Horseshoe Bay in North Vancouver, adjacent to a marina and a nearby terminal ferry, Sewell's Landing is a waterfront building consisting of four levels of underground car park, six residential buildings and one glass amenity and boat dock – similar to a resort area. Some of the residential buildings will have its own retail spaces on the ground floor, and each building's height varies (from four to thirteen levels). The location has the biggest influence in the project design.

The key challenges towards designing the project was the ongoing changes of the design to suit the environment. The local authorities each had comments and new suggestions, which led to several redesigning stages

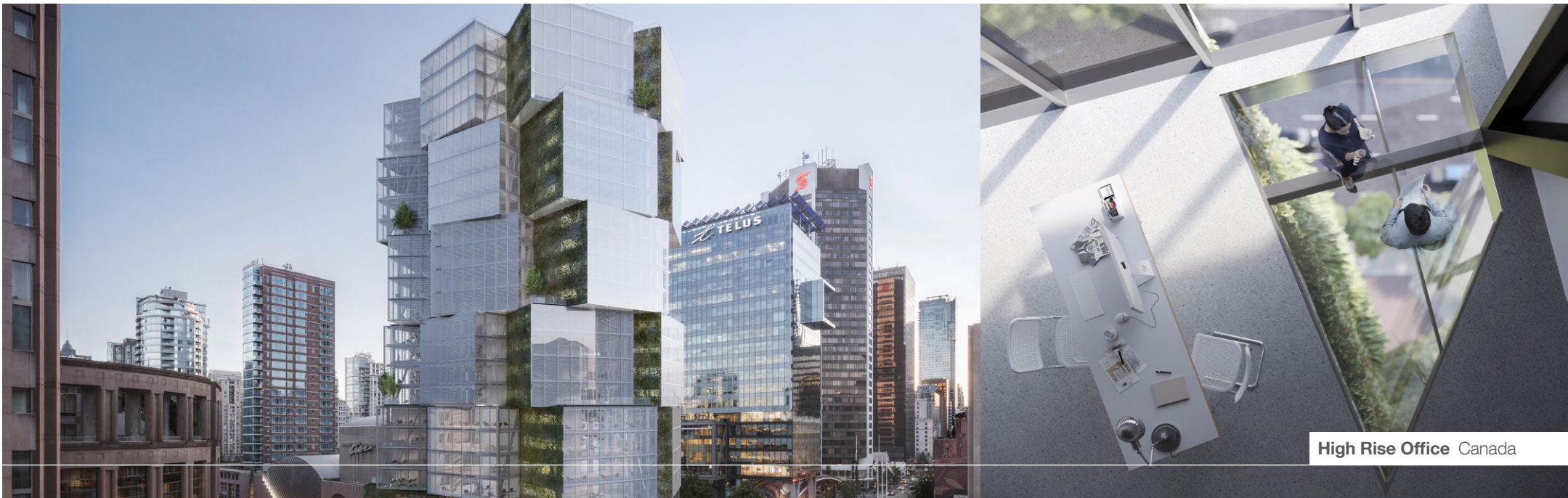
The inputs of our key partners, Merrick Architecture and Sewell's Marina's, the primary consultant and the authority respectively, were significant contributors that affected NDY's robust design.

NDY was involved with a unique innovation to the site – The Creative Energy Plan. This initiative by Westbank promises to use geothermal energy using ocean water for heating and cooling creation, which means only small amount of emission will be produced. Instead of the boilers, a huge percentage will come from the geothermal equipment instead of the boiler – which is a water-saving component.

The work performed by NDY also prevented contamination for the marine environment with innovative ways to maintain the system.

The site has seven buildings next to a cliff and is conveniently located exactly on the water. Sewell's Landing has its own uniqueness, apart from utilizing ocean water, the boathouse (an all-glass and all-glazing green house) had its peculiarity as well. NDY provided the heating to the site, however, there is no way to cool via air conditioning, so the team designed it in a way to let the natural breeze ventilate the area.

In the M3 Lot, located in between the residential development and an existing marina restaurant, there is a huge underground tank to fuel up the boats for the marina. NDY is set to design Sewell's Landing for approximately two more years.



High Rise Office Canada

410 West Georgia Vancouver, CAN

Services:

- › Mechanical
- › Sustainability

About the project:

West Georgia Street is the Central Business District 'high street', home to Vancouver's architectural monuments and landmarks buildings. Westbank contracted Norman Disney & Young (NDY), A Tetra Tech Company, under a design-build agreement for 400 West Georgia, a 25-storey commercial office tower situated at the centre of Georgia Streets emerging business and cultural district.

One of Westbank's main objectives was to develop innovative commercial office space together with a flexible and optimized mechanical system capable of meeting the demands of the next generation office space and achieving LEED Platinum performance. This required optimal collaboration between the design teams, and NDY's diverse in-house offerings was a principal catalyst towards being appointed.

The primary challenge of the project was the building's unique design – inspired by a Japanese lantern and designed by OSO from Tokyo, the building form is a series of stacked boxes cantilevered with steel structure. The project is a direct counter point to the city business as usual expansion era of concrete structures and articulated glass towers, taking inspiration from global cities the building is an architectural sculpture with highly refined details, which remains deeply influenced by Vancouver's natural surroundings.

The result is a complex steel structure allowing the floorplate to rotate every four floors. This structure has led to a decentralized plant arrangement and restricted ceiling voids that are unique from typical large commercial buildings.

Features and Innovations:

- › NDY and Westbank's goal to deliver a uniquely designed building within specific budgetary constraints has been achieved. 400 West Georgia is being built to a LEED Platinum standard which will result to improved standards of energy performance, better air quality, reduced environmental impact and increased daylight for occupant wellbeing.
- › With the dramatic changes happening in the building design industry, NDY retains its position as a global leader in providing innovative solutions. NDY has been a major contributor to the services coordination across all disciplines in a bid to help the project succeed on time and in budget. This was executed through several smart design decisions to the project based on accurate energy modelling and design experience.



Hotel Canada

Shangri-La Hotel Vancouver, CAN

Services:

- › Energy modelling
- › Mechanical
- › Plumbing
- › Sustainability
- › Supporting O&M

About the project:

NDY's previous successful projects and experience in high-rise residential and hotel markets, were key factors in Westbank Group's decision to engage NDY to design the luxury hotel Shangri-La in Vancouver, BC.

The high-rise building's first half is made up of a five-star hotel, whilst the top half is home to luxury residential units. The 62-storey Shangri-La is currently the tallest building in British Columbia and in addition to the hotel and residential spaces, there is also a grocery, two restaurants and a high-end retail rental unit in the building including eight levels of underground car park.

During the design phase of the project, a primary challenge was the height of the building. The vertical column pressure on the plumbing systems tended to increase, which made the team divide the building into two different mechanical sections; this is a unique scenario.

After completion of construction, NDY continued to provide support to the owner/building operators by designing tenant fit outs and support operation and maintenance of the base building.

A unique aspect in the project was the series of installed boreholes called a ground condenser located underneath the building, essentially for thermal storage. The ground-source heat pump loop sends the heat into the ground during summer, which could be reused during winter for space heating and domestic hot water heating. The ground condenser is an innovative alternative to solar panels; solar panels are not too effective in Vancouver due to the weather.

Aside from NDY, the visionaries behind the project is Westbank as the developer as well as James K.M. Cheng Architects who assisted in making this project possible.

There is a significant amount of carbon reduction and greenhouse gas reduction as the building can store thermal energy from cooling to heating seasons, while also saving on energy costs.



Willoughby Town Centre Parcel 3 **Vancouver, CAN**

Services:

- › Acoustics
- › Mechanical

About the project:

Qualico, Chow & Li engaged NDY to design three buildings and a common underground carpark for the Parcel 3 Mixed-Use development in the Willoughby Town Centre, Langley, BC. The Buildings include a 4-storey Mixed-Use Retail / Residential Building, a high-volume Restaurant Building and a 3-storey Retail / Office Commercial Building. The main reason for engaging NDY was the previous successful project delivery to the client, more specifically the Willoughby Town Centre Parcel 2 Commercial Project.

On the Parcel 3 Residential component, there is a communal space – a rooftop garden – where the mechanical services had been placed. During the coordination stage, the team relocated the mechanical systems to a different area to mitigate any unpleasant exhaust.

The coordination stage with other consultants had been the primary challenge for NDY, particularly in terms of electrical and structural landscaping requirements of the Langley municipality. Constant liaison was an important aspect for the project to be successful – and had to be done in a timely manner.

NDY collaborated with the general contractor, as well as the Architect, Kaisan Architectural Interior Design and Planning Limited, to deliver cost-effective solutions. In the initial stage, NDY submitted a proposal with several options on the mechanical system for the client's review. The client wanted to minimize the common space requirement and chose the Variable Refrigeration (VRF) system for the office spaces.

NDY's specialist acoustical team was tasked with introducing design measures that mitigated mechanical noise and improved acoustical quality within WTC Parcel 3. The NDY acoustics team was able to achieve this result by working closely with our internal Mechanical design team.

Willoughby is one of the biggest and booming areas in Langley, where there are ongoing developments that will have many innovative aspects.



Residential Canada

2nd and Main Building Vancouver, CAN

Services:

- › Electrical
- › Mechanical
- › Plumbing

About the project:

Create Urban Development Corporation engaged NDY to design 180 East Second Avenue, also known as “2nd and Main”. Located at the intersection of Second Avenue and Main St. in downtown Vancouver, this 12-storey residential building contains 233 market units, 30 non-market units for social housing purposes, and five levels of parking underground. The project is currently under construction with practical completion scheduled for February 2021. NDY has been retained to design the electrical and mechanical services of the building. 180 East Second Avenue had different types of suites that varied for every floor, which had been the primary challenge for the team. NDY played a key role in overseeing the plumbing, mechanical and electrical aspects during the design and construction phases.

The project is targeted for LEED Gold certification therefore we have been working with the firm Light House on items related with mechanical, plumbing and electrical to meet the intended target. After the first review from the Canada Green Building Council, we are working on addressing items they have questions and concerns about prior to occupancy of the building.

As the City of Vancouver owns a District Energy system, heating is already available for the building. The entire building has air conditioning; however, the non-market suites for social housing purposes only have the water base board for heating and no cooling. NDY ensured the non-market suites had their own equipment to deliver an air handling solution as well as space and domestic heating.

There is also an artist studio area with a spray booth in the building, and NDY ensured that there is enough exhaust and lighting in the space. There was collaboration with City of Vancouver District Energy department to ensure our space and domestic design met all their requirements prior to approval of the building permit. This included review of items such as temperatures, peak loads, flow rates and system control.

NDY collaborated with architects DYS Architecture, general contractor Urban One Builders, landscape architect Durante Kreuk, code consultant McAuley Architectural Consulting, and structural engineers Glotman Simpson. The NDY team designed all electrical, mechanical and plumbing services for the residential tower.

Our services

NDY offer a complete range of consulting engineering services, delivered by a highly qualified team that has experience on projects across the globe. Our people are continually adding to their qualifications and experience, and know when a conservative solution is required, and when a bold design is needed to make a statement.

Our services are delivered with the following key focus points:

Understanding your business

- Creating the right solution requires our people to develop a deep understanding of our client's business. Aligning our contribution with the values and goals of our clients ensures that NDY can design according to current, and future requirements.

Cost effectiveness

- NDY strive to provide solutions that achieve the requirements of the project, while ensuring that the solution is financially viable. This applies to the building phase, and over the operational life cycle of the project.

Reliability

- NDY value reliability across the scope of our services. Beyond providing robust designs and solutions our people are committed to providing our clients with a dependable partner in their projects.

Collaboration

- Communicating with key stakeholders, such as owners, architects and builders, ensures that the design solutions proposed are feasible, cost effective, and fulfil the purpose of the building. NDY values a collaborative approach as a key tool across all stages of the project.

Responsibility

- Taking ownership of a problem is at the very core of NDY's approach to engineering. Our people can be relied upon to address challenges and provide appropriate solutions.

Exceeding client expectations

- Our people consistently strive to deliver outcomes that exceed the project parameters and delight our clients.





NDY's specialist acoustics division offers a range of acoustic consulting services, including architectural and specialised spaces, environmental noise impact assessments and the physical assessment of noise and vibration.

Our Acoustics services include:

Building acoustics

- › Create a design for acoustic isolation, confidentiality and voice security
- › Collate noise report submissions for local authority / development approval.

Environmental acoustics

- › Conduct appropriate noise reports for Industrial, Road, Rail, and Air transportation projects. Creating a permanent noise and vibration monitoring system design.

Industrial acoustics

- › Minimise occupant and plant machinery vibration, as well as providing reports to assess the acoustic impact of the site.

Electro-acoustics

- › Sound system design and technical specification.

Technical investigations

- › Identify sources of noise and vibration, while determining a solution that complements the building's function and architectural design.

We work with clients to review processes and formalise management systems for their assets. We assess asset reliability in the context of managerial requirements and make key recommendations on safety and performance.

Our Asset Performance services include:

Plant upgrades and implementation

- › Ensure appropriate systems are chosen and implemented in a way that is sustainable and maintainable.

Energy efficiency opportunities (EEO)

- › Identify opportunities to improve the energy efficiency of a building.

Maintenance management and solutions

- › Develop comprehensive and adaptable maintenance plans.

Strategic planning

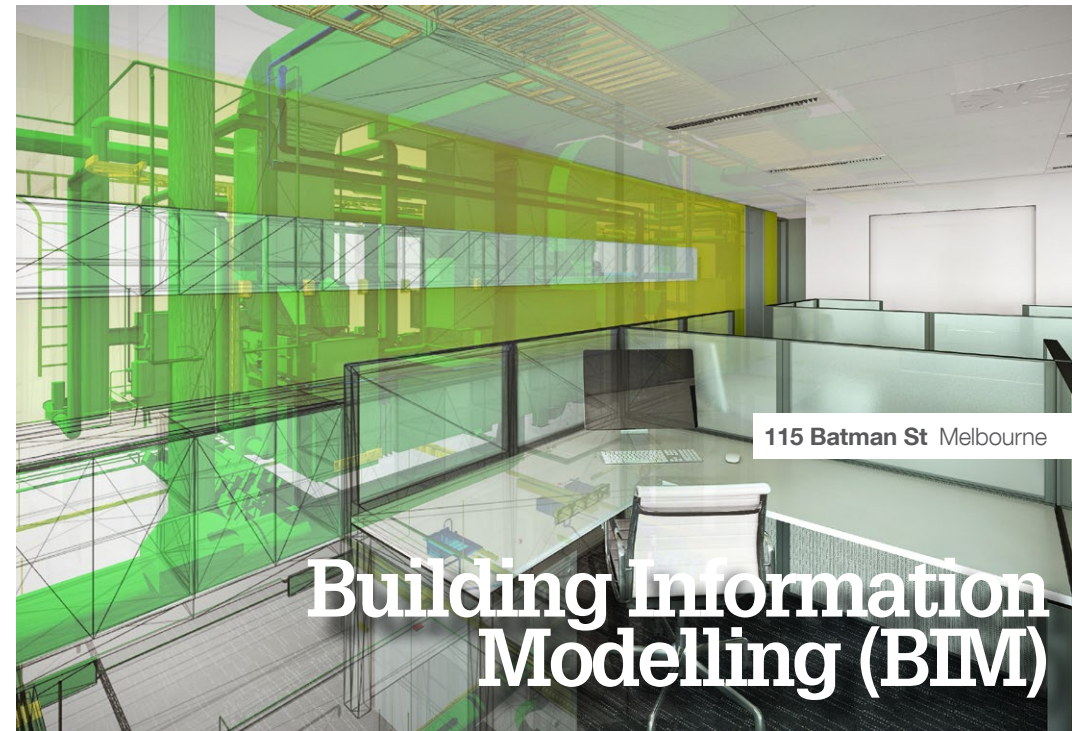
- › Create a resilient strategic plan.

Technical due diligence reporting

- › Understand the technical limitations and their impact on a structure.

System troubleshooting

- › Identify problems, as well as develop a solution that suits the budgetary requirements, the impact on a structure, and the timeline of the client.



NDY's AV team is committed to fully understanding the business objectives and user requirements of each client, to ensure that the optimal solutions can be provided in the most practical, cost effective and efficient manner.

Our Audio Visual services include:

Brief Definition

- › Audit of existing systems and assets, conducting business effect reports and preparation of project briefing requirements.

Planning & Options Analysis

- › Strategic planning, conduct feasibility studies, options analysis and business case development.

Operation & Management

- › Assist in the operation and management of infrastructure and technology systems.

Design and Documentation

- › Design planning and management, preparation of policies, tender and contract documentation.

Procurement

- › Vendor screening and pre-qualification, tendering and negotiation with vendors and preparation of vendor framework agreements.

Implementation and Contract Services

- › Installation supervision, quality inspections and control and project management services.

The true value of BIM is the ability to collect, share and leverage construction related information from project stakeholders. This results in greater speed, accuracy and efficiency at every stage of project delivery and streamlines the progression into the operational phase.

Our BIM services include:

BIM Execution Plan

- › Develop a comprehensive and bespoke plan in consultation with key project stakeholders that aligns with project goals.

Modelling

- › Identify changes made to both geometry and data in a dynamic 3D environment.

Clash Detection

- › Use sophisticated modelling techniques to address coordination in the early stages of design.

Data manipulation

- › Extract data from models, manipulate the data and then inserting it into models for numerous applications.



Commissioning Management



Controls & Integration

Commissioning management is the process of ensuring that all systems and components of a building are designed, installed and maintained according to the design brief, and operational requirements of the owner.

Our Commissioning Management services are delivered through our ECS brand, and they include:

Reviewing contractor method documentation

- › Provide expertise on the feasibility and compliance of the relevant documentation.

Creating commissioning plans and schedules

- › Set up a reliable, realistic plans that provide efficient commissioning timelines.

Facilitating meetings and workshops

- › Keep stakeholders informed across the life cycle of the project.
- › **Functional testing**
- › Ensure outcomes are in line with expectations and requirements.

Reviewing operational performance

- › Evaluate the outcome performance and identifying opportunities for improvement.

Read more about our ECS brand on page 20

Energy efficient buildings rely upon sophisticated technology to maintain their performance and value. This requires hi-tech diagnostics, tuning and maintenance to ensure that the building is operating at peak efficiency.

Our Controls & Integration services include:

Remote diagnostics

- › Remote evaluation offering a convenient and efficient method of diagnostics.

Energy control strategies design

- › Establish technological and operational methods for improving efficient use of energy.

Implementation and verification

- › Ensure that the systems operate as designed, to the required standard.

Retro commissioning

- › Design systems that can operate across multiple generations of technology.

Building tuning

- › Fine-tuning of the parameters of the building's systems to ensure optimal operation.

Energy reporting

- › Identify energy usage across designated areas, and highlighting opportunities for improvement.



ADAT Hangar 6 Abu Dhabi International Airport

Electrical



New Children's Hospital Perth

Fire Engineering

Electrical services are a crucial component of any building and NDY are well equipped to provide safe and reliable electrical solutions to a wide range of projects.

Our Electrical services include:

Building design

- › Creation of a design for electrical service that accounts for the energy needs and architectural design of the building.

Energy management

- › Integrate the necessary control systems to ensure energy supply is kept at optimal levels of operation and efficiency.

Fault discrimination analysis

- › Provide detailed reports on faults, along with action plans to address the problem.

Emergency power generation systems

- › Uninterrupted power solutions to provide emergency backup power as required.

Retail electricity procurement

- › Assist in sourcing the best energy provider for the needs of the client.

Due diligence

- › Thorough investigation of all electrical systems being implemented or modified.

Our specialist Fire Engineering team have extensive experience and understanding of all aspects of fire and life safety associated with new and existing buildings.

Our Fire Engineering services include:

Detailed Fire And Evacuation Modelling

- › Predictive modelling of crowd movements in an emergency situation.

Rationalised Fire Ratings

- › Determine current ratings of zones, and identify opportunities for improvement.

Smoke Hazard Management

- › Design of smoke extraction systems, and safe storage of combustibles.

Fire Safety Audits And Risk Assessments

- › Audit the current emergency strategies and highlight risk factors that can be improved.

Construction Phase Involvement

- › Collaborate with key parties to ensure the design considers key fire engineering principles, such as speed of egress and safe combustible storage.



Fire Protection



Plumbing

Fire protection is a crucial and highly specialised segment of building services engineering. We have the depth of experience to provide clients with effective strategies for the protection of life and assets.

Our Fire Protection services include:

Performance-based design

- › Creates systems that provide the necessary fire suppression and safety features that suit the buildings operation and design.

Fire safety risk assessment

- › Identify physical and procedural fire hazards.

Smoke spread computer modelling

- › Computer simulations of smoke behaviour.

Building services inspection

- › Whole building reports on fire protection elements.

Fire safety management plans

- › Determine optimal strategies for maintaining and improving fire safety.

Water is a crucial consideration in building services. NDY's Plumbing experts work with clients and design teams to develop cost effective strategies for the provision of plumbing and drainage services.

Our Plumbing services include:

Waste water

- › Efficient design of waste water removal with a focus on efficiency and sustainability.

Solar hot water systems

- › Design of hot water systems that use solar power to lower operating costs, and improve environmental ratings.

Potable water systems

- › Provide efficient access to clean water.

System audit and maintenance programs

- › Identify operational vulnerabilities, and maintenance strategies that minimise downtime.

Water treatment

- › Designs for water treatment systems, from Industrial to residential level.

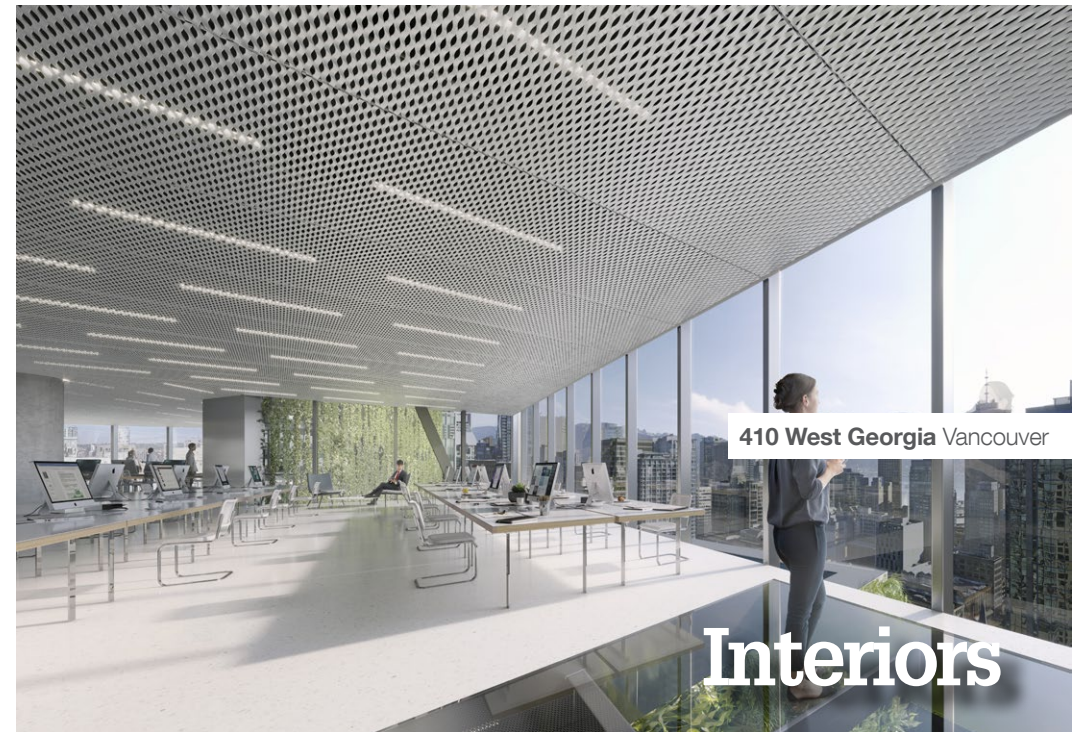
Infrastructure design

- › Large scale planning for water services across a project.



Australian Federal Police Canberra

ICT Consultancy



410 West Georgia Vancouver

Interiors

Our specialist ICT team look for opportunities to incorporate technology solutions that improve information sharing, collaboration and communication, while giving special consideration to preserving data security and integrity.

Our ICT services include:

Specific solutions

- › Reliable communication solutions tailored to the specific needs of each client business.

Comprehensive documentation

- › Knowledge necessary to train and operate the solutions being implemented.

Risk Assessment

- › Identify vulnerabilities in the system.
- › Provide convenient access to authorised parties, while effectively hindering unauthorised access.

Technology Audits

- › Identify opportunities for greater technological efficiency, automation or precision.

NDY are office fitout specialists. We have proven experience in advising and guiding clients as they prepare to move into a new premises or modify a pre-existing location.

Our Interiors services include:

Benchmarking

- › Assist prospective tenants to determine a building's suitability for their needs.

Offices

- › Acoustic design for performance spaces including auditoria, theatres and cinemas.

Server Rooms

- › Noise control for compliance with environmental protection policies.

Large Function Rooms

- › Whole building vibration isolation to reduce structure-borne noise and vibration intrusion.

Mission Critical Data Centres

- › Sound and impact insulation testing for compliance with building code.



NDY is committed to providing our clients with master planning approaches that deliver outstanding results. Efficiency and sustainability are key considerations, while effective maintenance and monitoring of the built environment is also imperative.

Our Master Planning services include:

Sustainable strategy

- › Work with the design and development teams to understand their project drivers, and communicate how the sustainability strategies we develop respond to these drivers.

Decentralised and off-grid services

- › Future proof developments by providing mechanisms to integrate low carbon technologies.

HV and LV power

- › Develop innovative equipment configurations, that provide high levels of reliability with minimum infrastructure.

Life cycle management

- › Minimise cost and environmental impact, whilst providing maximum value for both our clients and the communities in which they operate.

The NDY mechanical engineering team provides efficient designs for projects in all market sectors. Thorough research and documentation are evident in all projects, and all solutions are delivered reliably and cost effectively.

Our Mechanical services include:

Heating

- › Provide comprehensive heating solutions that consider the operational costs, environmental requirements, and sustainability impact.

Ventilation

- › Provide system designs that create the desired air flow in accordance with the requirements and purpose of the space.

Air conditioning

- › Design efficient systems that create a comfortable space.

Energy efficiency

- › Optimise energy-demanding plant machinery to operate more efficiently.



Property Consultancy



Security

Our chartered Royal Institution of Chartered Surveyors (RICS) professional team have an excellent record of working with local and overseas property owners and occupiers. They provide a range of building consultancy services over the complete property life cycle, including acquisition and divestment.

Our Property Consultancy services include:

Acquisition

- › Assist clients with procuring property assets that meet their stated criteria and investment objectives.

Asset management

- › Implement systems that provide in-depth analytics on the performance of buildings, with strategies that improve efficiency and operational stability.

Development

- › Whole-of-life consultation services, ensuring that development goals are achievable and feasible.

Divestment

- › Determine the most efficient strategy to divest a property in line with timing and investment objectives.

Security is crucial for all businesses. Our expertise in developing detailed engineering plans for security controls and systems allows us to assist clients in ensuring that people, assets and information are kept safe at all times.

Our Security services include:

Cover planning and options analysis

- › Provide security solutions that incorporate complete sensor coverage at points of vulnerability.

Security risk assessment

- › Identify vulnerabilities and provide recommendations for resolution.

Engineering design and documentation

- › Design a robust system, along with the documentation necessary to train operators in its use.

Procurement, implementation and contract services

- › Incorporate the latest technology from reputable suppliers into the design, and source all appropriate materials.

Commissioning operation and management

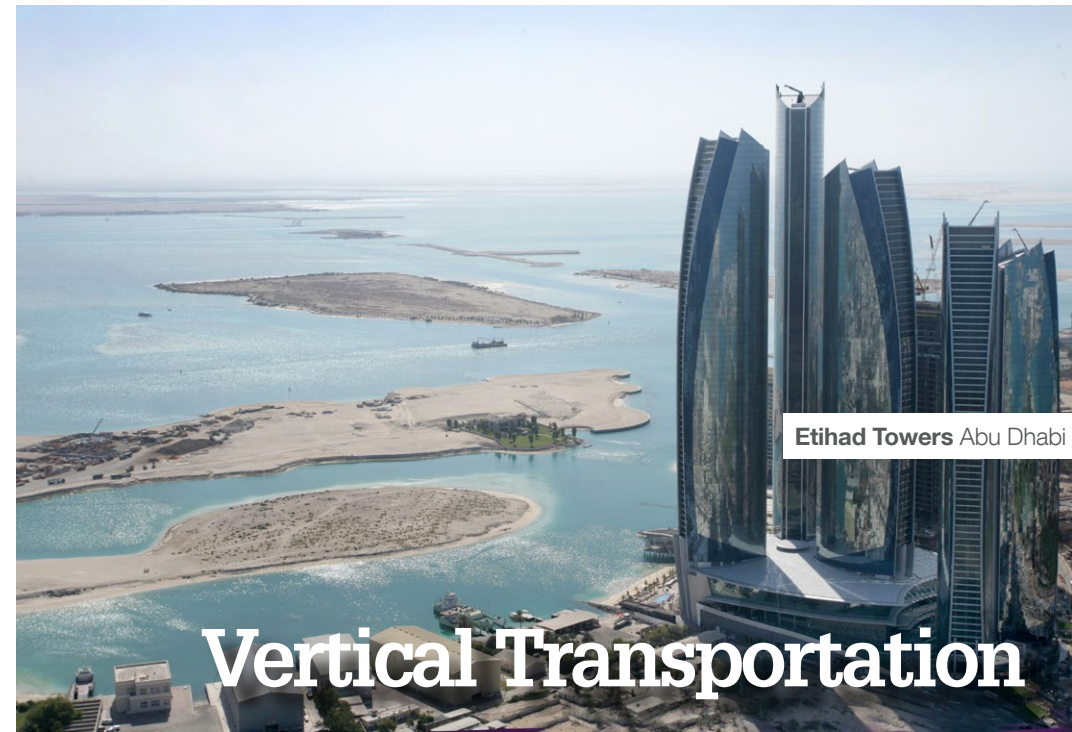
- › Evaluate the system across the life cycle of the property.

Integrated security solutions

- › Comprehensive assessment of physical and digital security solutions.



Sustainability



Vertical Transportation

At NDY, we carefully and skilfully consider ways in which our communities and cities can become more sustainable through the appropriate management of our built environment.

Our Sustainability services include:

Strategic advisory

- › Corporate strategy, governance and reporting
- › Pre-development advice
- › Design briefing, verification and due diligence
- › The NDY specialist sustainability group works across all major markets.

Project masterplanning

- › New sites development planning advice
- › Urban re-development.

Sustainable design and Construction

- › Construction review and contractor assistance
- › Ecologically sustainable design strategies
- › Sustainability benchmarking and certifications
- › Simulation and compliance modelling

Sustainable operations

- › Operational performance enhancement
- › Regulatory compliance and certifications
- › Wellness management

For tall buildings to function effectively, a safe and fast vertical transportation system (more commonly known as elevators) is critical. Our service also extends to ensuring the provision of quality control services through the commissioning and installation of a project.

Our Vertical Transportation services include:

Systems Design and Selection

- › Create a design that fits the operational and aesthetic requirements.

Documentation and Tendering

- › Provide all necessary documentation to acquire, operate and maintain the specified system.

Construction Supervision

- › Ensure the implementation is as designed, and on schedule.

Performance Based Maintenance Audits

- › Keep the maintenance plan relevant through the life cycle of the system.

Modernisation of existing equipment

- › Implement modern solutions within an existing building.

Condition and Pre-Purchase Audits and Reporting

- › Identify the needs and vulnerabilities of the system.

Our Markets



Latrobe Institute of Molecular Science (LIMS) Melbourne

Civic

Our creation of a dedicated Civic market sector is recognition of the specific requirements for these type of built environment projects.

From arts precincts, theatre facilities and film studio projects, through to sport and entertainment venues, NDY takes a considered view of the client and end-user experience. Through this lens, we design services that ensure the highest level of operational efficiency, user experience, and return on investment over the entire asset life cycle.

Education

NDY has had many years experience with schools, universities and other education facilities. Our award winning ability to provide world class teaching facilities is widely recognised.

NDY has been actively involved in the Australian Federal Government's A\$14.7 billion Building Education Revolution.

Our experience in all building services disciplines (such as mechanical, electrical, communications, security and fire) are supplemented by our specialist expertise in ecologically sustainable design. Acoustics present specific challenges in education and our experts in this area have the necessary experience to meet all demands.

Health

Few market sectors require as much specialist knowledge as healthcare. NDY has an enviable record of providing services to major tertiary hospitals, healthcare & research facilities. We understand the connection between intuitive design, improved patient outcomes, sustainability and wellness.

With our strength in health ICT, we focus on solutions which help reduce infection rates, support chronic disease management and contribute to operational efficiencies in healthcare delivery.

Our focus is always on client-specific solutions which minimise whole-of-life project costs.

WARNING - AUTOMATIC FIRE CURTAIN. DO NOT OBSTRUCT.

Our Markets



Gilbert + Tobin Sydney

Industrial

NDY has extensive experience in the industrial sector, extending across manufacturing and food processing through to materials handling and infrastructure associated with the mining and resource industries.

With expertise involving technologies such as heavy power systems, controls, wide area networking, water treatment, acoustics and vibration advice, NDY can provide specialised solutions across a variety of complex industrial projects.

Our industry leading position on document delivery and 3D building information systems allows us to deliver added value to projects.

Mission Critical

NDY delivers visionary, integrated solutions to our mission critical clients. Secure, dependable facilities are vital for business continuity and our expertise in mission critical facility design is highly sought-after around the globe.

Our work in minimising data centre energy usage is recognised by leading global awards.

Across data centres, hosting or collocation, telecommunications infrastructure builds, call centres, satellite or cable landing stations, NDY's expertise assists our clients in minimising their risk and optimising their return on investment.

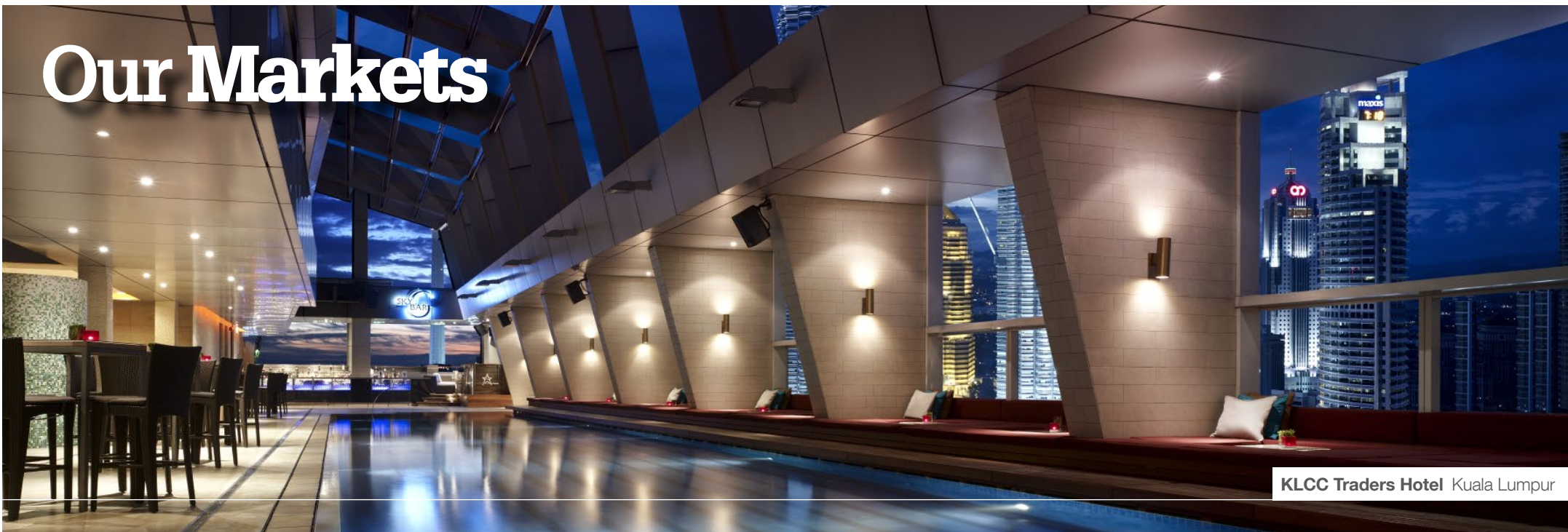
Offices

Commercial offices are the projects that have lined skylines across the globe since NDY commenced operations in 1959.

Commercial offices consume a significant amount of the worlds energy. Sustainable design and construction delivers far more than energy efficiency.

We work with our key clients to get the best out of their office buildings to maximise asset values, minimise operational costs, boost the health and productivity of people, demonstrate leadership in triple bottom line sustainability and reinforce their brand values.

Our Markets



KLCC Traders Hotel Kuala Lumpur

Residential & Hotels

As populations grow and our cities expand, ensuring residential buildings and hotels combine efficiency with luxury is a valuable skill.

Our engineering services expertise for residential projects spans across affordable and social housing, through to high-end luxury apartments for low, medium and high rise developments.

Our Hotels experience is equally diverse with boutique luxury operators and projects including the Belgraves Hotel in London through to some of the world's most iconic hotels such as the Ritz Carlton in Dubai.

Retail

From retail tenancy design to major retail led mixed use complexes, we understand the unique requirements of the retail sector.

At NDY we keep abreast of issues and trends which impact the retail property sector. This understanding allows us to identify opportunities to improve our clients business, and manage key risks.

Digital strategy, customer centricity, diversity of experience, omni-channel sales and changing buyer habits, amongst a highly competitive and high turnover environment are key challenges our clients face. We aim to provide solutions that make the most of the opportunities that these challenges provide.

Transport

The NDY Transport group focuses on the four infrastructure spokes of rail, road, aviation and ports.

NDY capabilities in aviation projects include core engineering services along with specialist services such as acoustics, fire and lighting.

Our ports expertise includes commercial marinas, ship building facilities, mining ports and freight logistic sites. The alliance with US rail firm LTK Rail to form NDYLTK Rail has enabled us to meet all rail engineering requirements.

NDY has proven expertise in the implementation of smart road networks through the planning intelligent traffic signalling, closed circuit camera monitoring and road lighting.

Our Brands



Engineering Commissioning Services (ECS) is an independent enterprise established by NDY Holdings, in recognition of the need for specialist commissioning management expertise.

Through our highly experienced and practical staff, ECS offers clients a unique depth of knowledge on global commissioning management projects, delivering buildings that perform as intended, that are maintainable, and operate in a sustainable manner.

As an independent commissioning consultant, ECS offers a holistic and unbiased assessment of services systems and their engineering components, to provide robust and reliable testing and commissioning outcomes. Improving a building's performance saves energy and reduces water consumption which significantly reduces operational costs.

www.engcommservices.com

NDYLIGHT

L I G H T I N G D E S I G N

Architectural lighting is the bringing together of equal parts art and science; it is the blending of the two that sets it apart from the engineering disciplines, or from pure design.

The NDYLIGHT measure of success on any project is the attainment of visual delight and the complete fulfilment of all technical requirements.

We are independent lighting design consultants that build close professional relationships with our clients, design and construction teams so that we can work together ensuring that client's aspirations and requirements are met.

A Principal, allocated for each project, actively leads it from inception to completion. Extensively experienced teams of lighting designers with up-to-date technology and product knowledge are able to offer complex 3D computer modelling and analysis to suit the particular project needs.

www.ndylight.com

Our Charitable Trust

Throughout its history, NDY has been committed to giving back to the community.

This commitment to charitable causes inspired the establishment of the NDY Charitable Trust which provides financial and on-the-ground support to charities that align with our aim to assist communities in need.

For further information about the NDY Charitable Trust, visit:

www.ndycharitabletrust.org



NDY Charitable Trust

Support for communities in need

Volunteering and charitable work by NDY staff is an intrinsic part of NDY's values.

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