Engineering the Future
Arcadis is the leading global Design & Consultancy for natural and built assets. Applying our deep market sector insights and collective design, consultancy, engineering, project and programme management services, we work in partnership with our clients to deliver exceptional and sustainable outcomes throughout the lifecycle of their natural and built assets.

We offer full range design and engineering consultancy services across sectors:

- TUNNELS
- BRIDGES & HIGHWAYS
- RAIL
- MARINE & COASTAL
68% of the world’s population is expected to live in cities by 2050.

As the population grows, liveability becomes increasingly important for cities as they tackle the effects of climate change, rising sea levels, mobility challenges, and need for better infrastructure. Engineering the future of cities will require governments and industry experts to collaborate, innovate, and embrace digital in design and engineering.

Arcadis has over 140 years of experience working with architects, construction companies, and city leaders to plan, design, and build some of the world’s most complex infrastructure projects.

Bringing together technical excellence, a deep understanding of community needs, and a genuine passion for improving quality of life, our experts are helping to build more efficient rail transportation systems and road networks, improve waste and water infrastructure, and offer innovative solutions to protect cities for the impact of urbanization.

Join us as we engineer the future.
WHAT WE DO

Our design and engineering consultancy services are characterized by our sense of responsibility and acute focus on quality. From concept design and pre-feasibility development, through to detailed design and construction support. We strive to use our understanding and expertise to achieve optimum social and economic outcomes that are in line with our clients’ and stakeholders’ biggest priorities.

We have experience in delivering a diverse range of projects using a variety of delivery models, including alliance, public-private partnerships, design and construct, early contractor involvement model, design only, professional project management, design verification and maintenance contracts.

Our capabilities are spread across a range of areas including:

- Infrastructure – rail and railway systems, airports, ports and maritime assets
- Bridges and civil structures
- Caverns and tunnels
- Geotechnics
- Waste and environmental management
- Water management, treatment and conveyance
- Sustainability design
140+ YEARS ON MAJOR INFRASTRUCTURE PROJECTS ACROSS ASIA

MTR Express Rail Link Contract 825 Mai Po to Ngau Tam Mei Tunnels, Hong Kong

West Kowloon Cultural District, Park Development, Hong Kong

MTR Whampoa Station, Hong Kong

DTSS Phase 1 T-03 Paya Lebar Tunnel, Singapore

ChiFeng Bridge Tianjin, China

Route 8, Lai Chi Kok Viaduct, Hong Kong
Arcadis combines strategic advice with multi-disciplinary technical knowledge to design and build tunnels that are safe, functional and sustainable. We have been at the forefront of this expertise for more than 60 years, ensuring reliable and efficient tunnel systems worldwide.

Arcadis’ comprehensive tunneling experience encompasses the planning, design and construction of underground railways, highways and sewerage tunnels as well as utility infrastructure. We provide a full range of coordinated design services and solutions to suit client needs and expectations - this includes the use of a variety of tunneling techniques and the application of best practice procurement methods.

Specialist input is provided at all stages of the project life cycle - feasibility, planning and concept development, detailed design, construction, operational management and maintenance. All disciplines are integrated to create innovative, practical and cost-effective approaches for all tunnel project phases.

- Geotechnical Assessment
- Tunnel and Shaft Construction Method
- Tunnel Alignment & Geometry and Shaft Location
- Tunnel Lining
- Groundwater Inflow & Drawdown
- Ground Movement and Building Impact Assessment
- Value Engineering
- Contract Documentation and Tender Evaluation
- Construction Support, Supervision and Verification
- Risk Management
- Tunnel System
DEEP TUNNEL SEWERAGE SYSTEM
Engineering services for designing one of the deepest tunnels in Singapore

Arcadis was appointed by ED Zublin AG to provide detailed engineering and permitting services for the Deep Tunnel Sewerage System (DTSS) Phase 2 Contract T-07. Contract T07 involves 12.0 km of TBM tunnels with diameter up to 6.0m, 14 shafts, including hydraulic structures.

CHALLENGE
The tunnels run through challenging ground conditions and this requires careful engineering and controlled boring and excavation works to ensure stability of existing buildings and infrastructures above. Multiple levels of approvals are also required to meet permitting requirements in Singapore and contractual requirements.

SOLUTION
Led by the Arcadis Singapore team, we worked with various authorities and Arcadis specialists in tunnels, hydraulics, geology, ground-hydrology and structures from Hong Kong, US and India.

Employing observation method, performance based design and 3D PLAXIS enabled us to analyze complicated and highly variable site conditions for the shafts construction. We adopted an innovative approach in the tunnel design, leveraging on composite behavior, and adopting a full SFRC tunnel lining segment at selected tunnel stretches. Various interfaces were managed using robust design management methodology which enabled Arcadis to produce an economical and innovative design.

KEY OUTCOMES
- First project to launch the TBM ahead of others through proactive management of design schedule
- Cost and schedule savings achieved in hydraulic structures
RAIL
CONNECTING COMMUNITIES

Operators need access to reliable rail engineering and consulting expertise that guarantees sustainable programs where health, safety, security and, above all, stewardship are critical success factors.

With extensive global experience in the design, construction and asset management of railroads across Asia, Australia, Europe, the Middle East and the Americas, Arcadis has the proven ability to deliver successful strategies for a range of rail and Total Mobility programs.

Arcadis technical capabilities in rail engineering and experience spans across:

- Cut & cover, immersed tube, and bored tunnels utilizing New Austrian Tunneling Method (NATM)
- Electrical & mechanical installations, service buildings, illumination and ventilation systems
- Experience in negating a wide variety of physical constraints (railway lines and stations, motorways and other surface roads, as well as waterways)
- Rail Track and Switches
- Signaling
- Power Systems
- Stations and Buildings
- Environmental
- Safety
Arcadis was responsible for the detailed design of a new MTR underground station and over-run tunnel to be constructed as part of the Kwun Tong Line Extension. It was built 25 metres beneath the busy streets of Hong Kong’s second largest private housing estate. The station design has a single platform, two concourse areas and a 100m long connecting platform tunnel.

**CHALLENGE**

The challenge was to minimise street-level construction impact as the station is located within rock and mixed ground conditions located close to residential tower blocks and major utilities. Arcadis’ work also included reconfiguration of an existing footbridge across Hung Hom Road and the design of major utility and traffic diversions.

**SOLUTION**

Our partnering approach enabled rapid design decisions during the extremely tight design program and public consultations and workshops helped garner community support during the design process. The traffic deck system kept everything running smoothly throughout the construction works. The original scheme was streamlined minimizing construction waste, construction work on site and reducing the overall footprint of the station.

**KEY OUTCOMES**

- The HKIE Structural Division Structural Excellence Award 2018 – Project Award - Commendation Merit Award
- Improving mobility for 50,000 Whampoa residents from 10,000 households
BRIDGES & HIGHWAYS
OPTIMIZING ROAD NETWORKS, REDUCING CONGESTION

Arcadis has the proven ability to deliver successful strategies for a range of road infrastructure development programs ensuring lasting value to their owners and operators. Arcadis has handled a wide range of roadwork projects for HKSAR and Private Sectors including widening and improvement works to existing local roads and expressways.

The range of services provided by Arcadis includes project management, concept development, detailed design, value engineering, public consultation from Investigation Stage to Construction Stage.

We combine strategic road advice with multi-disciplinary technical knowledge to help clients and partners plan, build and optimize sustainable road networks, connecting neighborhoods, cities and regions safely and efficiently.

- Mass Transit System Planning & Design
- Highways Design
- Structural Design
- Civil Engineering and Construction Supervision
- Drainage Impact Assessment (DIA)/ Sewage Impact Assessment (SIA)/ Waterworks Impact Assessment (WIA)
- Utilities Design and Diversion
- Road Improvement Works
LAI CHI KOK VIADUCT, HONG KONG
A strategic flyover to reduce congestion

Tsing Sha Highway being part of Route 8, a section between Cheung Sha Wan and Sha Tin provides the fourth road link between Sha Tin and Kowloon, serving the increasing traffic demand between Northeast New Territories and West Kowloon. Arcadis was responsible for the design, contract management and site supervision of the “Lai Chi Kok Viaduct” section forming part of Tsing Sha Highway.

CHALLENGE
The Lai Chi Kok Viaduct is a 1.4-kilometre dual three lane viaduct designed to minimize the new highway’s impact on the existing residents below, and either side of the viaduct. Being constructed in a very congested urban area, it posed severe constraints from underground services, buildings, flyovers, roads and future developments.

SOLUTION
To minimize conflict, the mainline was designed as a high-level viaduct with long spans, and transverse portal frames were also used at several locations. The balanced cantilever method reduced the occupation of ground space, and was used for erecting and assembling the bridge deck segments to minimise disturbance to grade traffic. Structural forms of the bridge deck and piers were also designed with landscaping to provide an aesthetically pleasing appearance.

KEY OUTCOMES
• 1.4 kilometre dual three lane viaduct
• 10th Tien-Yow Jeme Award 2011 for the Tsing Sha Highway project China Civil Engineering Society
• This award is the highest category for civil engineering projects in China
With its origins in the Netherlands and with a strong maritime background, Arcadis has centuries of heritage in land development, ports, waterways, reclamation, water management and flood protection across all continents.

**MARINE & PORT INFRASTRUCTURE DEVELOPMENT**
The growth in freight volumes globally is creating an unprecedented demand for deeper and larger port and waterways infrastructure. Existing ports are often built in densely populated, urban areas, which mean there are limitations on the availability of land for expansion and reclamation, besides upgrading and transforming the existing outdated facilities. With a systems engineering approach and total lifecycle cost philosophy, Arcadis can undertake the design and engineering of navigation locks, ports and terminals that can cope with the highest cargo and transportation demands. We take into consideration nautical safety, natural conditions, structural solutions and value engineering that have a high impact on costs. The end result is robust and cost-effective infrastructure able to deal with the demand, now and in the future.

**ENABLING LAND EXPANSION**
An increased population and rising sea levels inevitably create a demand for land development. At Arcadis, we understand that land reclamation can be an expensive solution and that the work is often intrusive from an ecological and coastal point of view, requiring extensive ecological mitigation measures, coastal engineering, and flood defense expertise and experience. We help manage those costs and risks by providing a full coastal engineering service. We focus on shortening construction time to enable early availability of the land, minimizing life cycle costs, and deliver sustainable solutions to minimize impact on the ecosystems.

**TACKLING CLIMATE CHANGE WITH SUSTAINABLE SOLUTIONS**
An increasing awareness of sustainability and climate change has created more challenges for the development of land, ports and waterways where the negative effects of development, such as air pollution and ecological damage, needs to be minimized.

We ensure there is balance with the natural habitat and we measure success in long-term outcomes. Our approach is to integrate sustainability in every stage of marine and coastal development from pre-feasibility through to operations. Our expertise in environmental impact assessments, energy reduction, renewable energy and coastal zone management helps our clients to optimize their capital and operational expenditure, while mitigating negative impacts on the environment.
Arcadis is delivering Design & Engineering services to Hong Kong’s new Integrated Waste Management Facility as the Lead Design Engineer for Phase 1. It is a US$4 billion project spanned over 6 years until 2024.

Our design includes prefabricated seawalls, breakwaters, reclamation and the associated ground treatment for a 16 Ha offshore site.

The new Integrated Waste Management Facility will have a treatment capacity of 3,000 tonnes each day by adopting advanced incineration as the core treatment technology. It also includes a demonstration scale recycling plant for the recovery of recyclables from waste capable of processing 200 tonnes per day.

Phase 1 of this project will not only reduce the volume of waste by 90% and recover recyclables but it will also recover energy from the waste which can be turned to electricity for more than 100,000 households. It will thereby reduce the use of fossil fuel for electricity generation and contribute positively to the reduction of greenhouse gas emission in Hong Kong.

**KEY OUTCOMES**

- Full BIM service provided including BIM management
- Reduction in volume of waste by 90% and GHG emissions
- Supplying electricity to more than 100,000 households in Hong Kong
HARNESSING DIGITAL

Within Arcadis, Building Information Modelling (BIM) is one of our global key strategic drivers which we adopt in our Design and Engineering capability. BIM leads to better performance by increasing efficiency, providing better quality, reducing production time and lowering costs, bringing full lifecycle benefits.

We have global agreements with the required software and experienced BIM managers within the project delivery team. In Manila, we have 1,500 staff in our Global Excellence Centres who collaborate closely with local teams virtually and are focused on producing drawings directly from the full BIM model.

Our BIM Execution Plan includes:
- Purpose, Scope, Goals, Objectives
- Client Requirements
- Common Data Environment
- Information Delivery Plans
- BIM Roles and Responsibilities
- Responsibility Assignment (RASCI matrix)
- Collaboration and Communication
- Clash Detection Workflow
- BIM Meeting Schedules
- Model Setup
- Quality Control

Some prominent projects that have benefitted from using BIM are the West Kowloon Cultural Development, the Integrated Waste Management Facility, the IT Building in Sha Tin and the Kwun Tong Town Centre Underground Utilities Advanced Works.
WEST KOWLOON CULTURAL DEVELOPMENT, HKSAR

The West Kowloon Cultural District project is one of the largest developments in Hong Kong. The site covers an area greater than 40 hectares and includes 17 arts and cultural venues including theatres, an art park, retail, dining and hospitality developments, and a 17,000 square meters museum.

Arcadis provided concept, schematic, detail designs, tender documentation and construction supervision for all Structural, Civil, Geotechnical, Building Services, Structural Surveying, Façade, Environmental, Sustainable Design, Green Building, BEAM+, Traffic and Marine solutions.

CHALLENGE
The depth of rocks in the area is deep, and cost-effective foundation solutions were required. Advantage was taken of the relatively stiff nature of the ageing reclamation. Stringent plate load tests were carried out to validate the bearing capacity enabling use of shallow foundations in lieu of lengthy pre-bored H-piles, thereby saving millions of dollars. The structural design of the theatre had to accommodate very strict acoustic requirements dictating special double wall construction and box in box techniques.

SOLUTION
Using Revit & Civil3D software, separate models for structure, building services and utilities/civil works were completed. The structural and architectural model were first aligned with each other and then all the engineering models were combined to analyse and remove clashes between them. 2D drawings were obtained through the various discipline aligned BIM models.

KEY OUTCOMES

- Our engineers completed separate virtual models for structure, building services and civil works which were coordinated with the architectural model
- Delivering the government’s wider vision to promote the arts
Arcadis is a leader in built and natural asset design management. From major road and rail infrastructure to innovative wastewater, water, residential, retail and heritage projects, we strive to create smart, sustainable solutions for our valued clients.