URBAN PASSENGER RAIL

STATIONS

wsp



WE ARE WSP

WSP is one of the world's leading engineering professional services consulting firms, bringing together talented people from around the globe. We are technical experts who design and provide strategic advice on sustainable solutions, engineering projects that will help societies grow for lifetimes to come.



DESIGNING WORLD-CLASS RAIL STATIONS

Increasing rail transport demand around the world is prompting infrastructure development to advance urban, commuter and high-speed rail systems. The creation of new stations and the renewal of older ones underpin this multifaceted global undertaking.

As arrival departure points and intermodal passenger transport hubs, stations support mobility throughout cities, regions and countries. Today, digital-technology-enhanced design and engineering know-how are delivering stations that help fulfill passenger expectations for efficient and enjoyable train travel experiences. Innovative people-centric schemes, such as the formation of intuitive circulation paths and daylight-filled, spacious interiors, are creating welcoming station spaces.

Many stations already facilitate social and commercial activities by providing places where people can meet, eat and shop. As cities struggle to accommodate growing populations, transit-oriented development (TOD) plans will utilize stations as centerpieces and magnets for 21st-century residential and commercial development.

For existing and emerging stations to be Future Ready®[1], sustainability considerations must shape decision making. By prioritizing decarbonization and the accessibility of public transportation to advance social equity, stations can enhance the livability of cities for all.

At WSP, we strive to design and shape resilient stations that will endure far into the future. By leveraging our worldwide multidisciplinary expertise to tackle complex projects, we continue to address current needs, push past boundaries and deliver envisioned outcomes.

Here is an in-depth look at diverse projects we have undertaken to advance rail travel throughout the world.

[1] Future Ready® is WSPs global innovation program that seeks to better understand the key trends in climate change, society, technology, and resources and how they are impacting our world, locally and globally. The goal is to work with clients to design for future needs as well as those of today. Future Ready® is a registered trademark of WSP Global Inc. in Canada and New Zealand. WSP Future Ready (logo)® is a registered trademark of WSP Global Inc. in Europe, Australia and in the United Kingdom.



TABLE OF CONTENTS

Anaheim, United States
Regional Transportation Intermodal Center 6

Auckland, New Zealand
AMETI Panmure Interchange 8
City Rail Link (CRL) Stations 10
Newmarket Rail Station 12

Bangkok, Thailand
BTS Sukhumvit Line Extensions 14
SRT Red Line Stations 16

Birmingham, United Kingdom
New Street Station 18

Britain
Britain's High Speed Two Stations 20
Access for All Schemes 22

Cambridgeshire, United Kingdom
Waterbeach Station 23

Chicago, United States
O'Hare Blue Line Stations 24

Clydebank, Scotland
Transport Hub 25

Coventry, United Kingdom
Coventry Station 26

Denver, United States
Union Station 28

Dubai, UAE
Route 2020 7 Stations Expansion 30

Edinburgh, United Kingdom
Edinburgh Gateway Station 32
Edinburgh Waverley Station 34

Espoo, Finland
Finnoo Metro Station & Helsinki Metro Line 36

Fremont, United States
Warm Springs Station 38

Glasgow, Scotland
Anniesland Station 40

Hong Kong, China
Hung Hom Station 42
Kowloon Station 44
Tseung Kwan O Extension Stations 45
South Island Line Stations 46
Tuen Ma Line Stations 48

Inverclyde, United Kingdom
Gourock Station 50

Liverpool, United Kingdom
Hamilton Square Station 51

London, United Kingdom
Abbey Wood Station 52
Brent Cross West Station 54
Tottenham Court Road Station 55
Bond Street Station 56
Farringdon Station 58
London Bridge Station 60
Paddington Station 62

Manchester, United Kingdom
Manchester Golborne Station 64

Melbourne, Australia
Caulfield to Dandenong Stations 66
Footscray to Deer Park Stations 68
Southern Cross Station 70
Southern Program Alliance Stations 72

New York City, United States
34th Street/Hudson Yards Station 74
East Side Access Grand Central 76
Fulton Center 78
Moynihan Train Hall 80
South Ferry Station 82

Newark, United States
New Jersey Performing Arts Center Station 83

Ottawa, Canada
Confederation Line Stations 84

Preston, United Kingdom
Station Roof Renewal 86

San Francisco, United States
Central Subway Stations 88

Scotland
East Kilbride and Hairmyes Stations 90

Seattle, United States
Angle Lake Station 92

Singapore
Circle Line Stations 94
Downtown Line Stations 96
Thomson-East Coast Line Stations 98

Stockholm, Sweden
Stockholm Central Station 100

Sydney, Australia
Glenfield Junction Station 102
Concord West Station 104
Sydney Metro Waterloo 106

Toronto, Canada
Bayview Station 108
Castle Frank Station 109
Guildwood Station Redevelopment 110
Spadina Subway Extension 112
Union Station Enhancement Project 114
UP Express Union Station 116
Union Station Revitalization Program 118
Wellesley Station 120

Uddingston, United Kingdom
Access for All Scheme (GRIP Stage 4) 121

Vancouver, Canada
Canada Line Stations 122

Wellington, New Zealand
Wellington Station 124

Wessex, United Kingdom
Wessex Stations 125

About WSP
Our People 126

Also see our Light Rail, Metros and High-Speed Rail Brochures →

ANAHEIM REGIONAL TRANSPORTATION INTERMODAL CENTER



Location
ANAHEIM, CALIFORNIA, UNITED STATES

Client
CITY OF ANAHEIM/ORANGE COUNTY TRANSPORTATION AUTHORITY

Status
COMPLETED IN 2014

DAILY RIDERS
10,000

ETHYLENE TETRAFLUOROETHYLENE (ETFE) ROOF
>18,580 m^2

LEED CERTIFICATION
Platinum

The Anaheim Regional Transportation Intermodal Center—known as ARTIC—is an iconic gateway for Southern California. It is situated at the juncture of major freeways and between a major stadium and a sports and entertainment center.

The transportation hub accommodates Metrolink commuter rail, Amtrak and Orange County Transportation Authority buses and was designed to accommodate the future needs of California High-Speed Rail.

WSP provided the City of Anaheim and the Orange County Transportation Authority with overall project management, master planning, and civil, site structural and rail engineering services. The scope of the project included site work and preparation, a terminal and supporting facilities, track work and platforms, parking, public art, and access and street improvements.

ARTIC was designed to meet platinum LEED certification by the U.S. Green Building Council. The landmark building, which opened in December 2014, has an open feeling, skyline presence and an impressive recognition factor.





Location
AUCKLAND, NEW ZEALAND

Client
AUCKLAND TRANSPORT

Status
COMPLETED IN 2014

2015 DESIGNERS INSTITUTE OF NZ BEST AWARDS - BUILT ENVIRONMENT

Bronze award

2015 PUBLIC ARCHITECTURE AWARD

NZIA Auckland branch award

2014 AUCKLAND TRANSPORT SURVEY

99% of users rated station “excellent” or “outstanding”

AUCKLAND
AMETI PANMURE INTERCHANGE

The Panmure Interchange Station is part of a wider integrated multimodal transport project; the Auckland Manukau Eastern Transport Initiative (AMETI). The project is located in Auckland’s Eastern Suburbs from Glen Innes through Panmure with future stages extending to Botany.

The station and surroundings are one of the first steps of a ‘macro vision’ that intends to reduce congestion, improve transport options, and unlock the area’s economic and social potential.

The interchange comprises a series of infrastructure elements including new roads, bridges, and a tunnel adjacent to the station. It also includes a new plaza, bus station and the transformed train station.

WSP (formerly Opus International Consultants) were approached by Auckland Transport to deliver the project with sub-consultants Beca, Mott Macdonald and Parsons Brinkerhoff.

Our scope of services included: Engineering – Civil, Structural, MEH, Fire, Architecture, Landscape Architecture.

The location of the project was home to one of the most prosperous Māori settlements in Auckland. To acknowledge and respect this, the design is highly transparent and opens to the view of the maunga (mountain).

The maunga is acknowledged through the building roof form and two translucent green atriums, which symbolizes the underground world. A green wall at platform level and various landscape inserts bring elements of the mountains into the urban space and softens utilitarian elements.

Multiple groups were consulted and participated throughout the design phase. One of the most successful elements from this process is the inclusion of the historical landmark compass in the concourse building. This dramatic feature was developed in conjunction with architects to represent the iwi (tribal) groups.

The compass not only highlights the predominant earth and water geographic references, but also provides a glimpse of the rich history of the area including Māori legend.

Since its opening, the station has contributed wider benefits for the area such as rapid growth in nearby residential developments plus substantial uplift in local land prices. In the first two years, rail boardings were up 174 percent and bus to train transfers increased by 188 percent. The raking of the station also jumped from 15th to fifth place.

In a 2014 survey conducted by 2014, 99 percent of users rated the station as excellent or outstanding.



AUCKLAND
CITY RAIL LINK (CRL) STATIONS

Location
AUCKLAND, NEW ZEALAND

Client
CITY RAIL LINK LIMITED

Status
ONGOING

PASSENGERS AT PEAK TIMES

54,000

CRL UPON COMPLETION

First underground rail line in Auckland

TWIN TUNNEL

3.45 km

WSP has partnered with City Rail Link Ltd, VINCI Construction Grands Projects, Downer, Soletanche Bachy International, AECOM, and Tonkin + Taylor to form the Link Alliance.

The City Rail Link (CRL) will unlock our public transport network and transform how people move around Tāmaki Makaurau Auckland.

The $5.5bn project aims to expand travel options and create more efficient commutes to the CBD via a double-track rail tunnel connecting Waitematā (Britomart) and Maungawhau stations. This will include two new underground stations: Te Waihorotiu and Karanga-a-Hape, facilitating seamless transfers between lines.

WSP has taken a multidisciplinary role in the delivery of CRL. WSP is a member of the Link Alliance contributing to the delivery of a variety of design services across multiple disciplines.

Within our role, WSP provides a comprehensive range of design services for CRL. These include civil and structural engineering, mechanical, electrical, and plumbing engineering, fire engineering, rail systems expertise, digital management and solutions, architecture, landscape architecture, urban design, statutory planning, requirements management, human factors/user interface, and construction phase services.

WSP is collaborating with experts from throughout Aotearoa, along with specialists from Australia, Hong Kong, China, Canada, India, Philippines, and the UK.

One of the notable features of the CRL project is its advanced use of digital technology. WSP is leading the implementation of Geographic Information System (GIS) and Building Information Modelling/3D (BIM/3D) to the Issue for Construction stage of works to integrate CRL designs seamlessly across teams.

Leveraging BIM, we significantly reduced project downtime and seamlessly transitioned to remote work amid the COVID-19 pandemic. This innovative approach earned the Link Alliance the Excellence Award at Autodesk's Architecture, Engineering, and Construction (AEC) Awards.

WSP are part of a dedicated team responsible for integrating sustainability and carbon reduction measures directly into CRL's design processes.

Our combined goal as an alliance is to reduce embodied carbon by 15% and overall construction and operational emissions by 25%.

To help achieve this, we've adopted the Infrastructure Sustainability Council's rating framework to assess, enhance, and validate sustainability performance.

These initiatives have set industry-leading benchmarks, notably earning the CRL the Infrastructure Sustainability Council (ISC)'s Excellence in Design certification in 2020 — a first for any project in New Zealand.



AUCKLAND
NEWMARKET RAIL STATION

Location
AUCKLAND, NEW ZEALAND

Client
AUCKLAND REGIONAL TRANSPORT AUTHORITY (ARTA) AND KIWI RAIL

Status
COMPLETED IN 2010

FOCAL CONCOURSE

1,000 m^2

CONSTRUCTION

Constructed 5 m above track

BUDGET

NZD 35 million (CAD 30 million)

The Newmarket Rail Station upgrade is a high-profile and complex project involving numerous stakeholders, a constrained urban environment, and tight demands on budget and programming.

Auckland Regional Transport Authority (now Auckland Transport) and Kiwi Rail brought on WSP (formerly Opus International Consultants) as lead designers for the station upgrade. Our scope of service included the following:

- Detailed design of platform finishes, furniture, canopies and north and south concourses
- Electrical, mechanical, security design – including high voltage and low voltage services, supply to specialized plant and all lighting
- Concept design for rail alignment designs, risk managements, property assessment and cost estimations.
- Urban design, public consultation, and resource management advice
- Design of the new station concourse
- Geotechnical investigations, assessments, and design
- Stormwater design
- Cost estimating and risk management at all phases

The station's focal point is a 1,000-square-metre concourse constructed five metres above the tracks. Passengers can converge from four entrances to access the escalators, lifts or stairs to the four 180-metre-long platforms below.

A road link bridge connects the entrance to the station concourse. Its dramatic steel portals frame the link bridge, creating a sense of enclosure. Vertical glazed screens on both sides provide security/ weather screening and full-width solid roofing to provide additional shelter.

The concourse is an open, light and airy environment that is the focal point of the station. It contains two sets of escalators, stairs, and accessible lifts to serve each of the two platforms below.

The "floating roof canopy"—with its central skylight —is supported by elegant tree-like columns. It encloses the concourse area and parts of the platform level with high-level louvres and glazed walls to provide protection from sun, rain and wind.

The perforated ceiling panels help to absorb noise and improve the overall acoustic environment.

Awards

- 2010 Winner: NZIA Auckland Branch Award – Public Architecture & New Zealand IES Lighting design awards – Lighting Design
- Winner: Award of Excellence, Award of Commendation and the Trends People's Choice Award for the innovative LED lantern box design on Remuera Road
- 2011 Winner: New Zealand Architecture Awards – Urban Design



Location
BANGKOK, THAILAND

Client
MASS RAPID TRANSIT AUTHORITY OF THAILAND (MRTA) AND BANGKOK METROPOLITAN ADMINISTRATION (BMA)

Status
COMPLETED IN 2021

LENGTH OF EXTENSIONS
31 km

STATIONS
25 Stations

LENGTH OF TRAINS
3 to 6 Cars

BANGKOK
BTS SUKHUMVIT LINE EXTENSIONS

With a population of over 10 million, Bangkok is one of the most traffic-congested cities in Asia. Over the years, the government has invested in building mass transit systems to alleviate traffic congestion and air pollution. As existing lines have limited interconnectivity, the government aimed to change this situation with two extensions of the BTS Sukhumvit Line. The north extension links from downtown to the northeastern district, and the south extension now connects to the southeastern district.

The north extension, under the contract of Mass Rapid Transit Authority of Thailand (MRTA), extended 18.2 km, with 16 stations from Mo Chit to Khu Khot. With four to six car trains, the extension has a 19 ha depot near Khu Khot Station.

The Sukhumvit Line south extension, under the contract of Krungthep Tanakom (KT), an agency under Bangkok Metropolitan Administration (BMA), extended 12.8 km, with 9 stations from Bearing to Kheha Samut Prakan Station. With three to six car trains, the extension is served by a 20 ha depot near Bang Ping, Samut Prakan.

As a member of a consortium, WSP provided project management and construction supervision consultancy services for alignment and trackwork regarding the Sukhumvit Line north extension. WSP provided construction supervision consultancy services for railway mechanical and electrical works regarding the Sukhumvit Line south extension.



BANGKOK
SRT RED LINE STATIONS

Location
BANGKOK, THAILAND

Client
STATE RAILWAY OF THAILAND (SRT)

Status
ONGOING

To reinforce rail interconnectivity in Bangkok's northern and western suburban districts, the SRT planned the construction of the Red Line to link the residents of these areas to the downtown core.

The SRT Red Line is a combination of two lines, namely the 15.3km-long Light Red Line with a six-station western section from Taling Chan to Bang Sue, and the 26.3 km-long Dark Red Line with a seven-station northern section from Bang Sue to Rangsit. Together, the new depots and the redevelopment of the Bang Sue Grand Central Station will serve up to 131,000 passengers per day, providing connections to the airport and the Metropolitan Rapid Transit (MRT) system.

While most of the Red Line stations typically only have side platforms and a concourse level, the 244,600m^2 Bang Sue Grand Central Station will be the new railway hub for the city. As one of the largest railway stations in Southeast Asia, it will have 26 platforms up to 600 metres in length. There are a total of five levels: the two lower levels serve the underground Metropolitan Rapid Transit (MRT) lines; levels 1 and 2 serve commuter and long-distance rail services; level 3 serves the airport link and the future high-speed rail.

As a member of the MAA Consortium, WSP served as the project management consultant. Currently, under a separate contract, WSP is providing independent checking engineer services for the SRT.

LENGTH OF LINES
41.6 km

PASSENGERS PER DAY
>300,000

STATIONS
13

BIRMINGHAM
NEW STREET STATION



Location
BIRMINGHAM, UNITED KINGDOM

Client
NETWORK RAIL

Status
COMPLETED IN 2015

PASSENGER TRIPS PER YEAR
51.1 Million

NEW ESCALATORS
30

ORIGINALLY BUILT
1854

In 2005, WSP was appointed as lead consultant to help Network Rail transform Birmingham New Street into a major transport and shopping hub. As the busiest UK station outside London, the project sought to increase passenger capacity, at platform and concourse level, and enhance the links to the city by improving pedestrian connections.

To provide a 21st-century gateway to Birmingham that fulfilled the brief of being "iconic", "landmark" and "world class", the station's facade was remodelled, and local and transport interchange facilities were significantly improved.

Network Rail also needed to incorporate a flagship retail store into what was an existing major redevelopment project without affecting existing project timescales or the management of the existing project works.

Our study considered detailed options for the proposed redevelopment scheme, from which a preferred solution could be developed and the planning application could be submitted and approved, with conditions. This requirement enabled Network Rail to secure funding for this extensive city centre redevelopment and extension.

The finished scheme provides increased station capacity, modern facilities, improved arrival points, a new roof to the concourse and retail areas, and enhanced pedestrian connectivity to the city. Our team combined in-house structural, civil, mechanical and electrical engineers with alliance architects John McAslan and Partners and Chapman Taylor.

WSP completed its option selection and scheme design work in 2008. Our work also involved supporting specialist subprojects, including the development of train operator and access facilities, the renovation of Ladywood House and the refurbishment of Navigation Street footbridge. We continue in our role as Independent Certifier to peer review works for the new John Lewis Store, where we are addressing the defects, the refurbishment of the NCP oversight carpark, and the Grand Central Shopping Centre.

BRITAIN'S HS2 STATIONS



Location
LONDON & BIRMINGHAM, UNITED KINGDOM

Client
HS2 LTD

Status
ONGOING

CONNECTIVITY

HS2 will connect c.30 million people through 25+ stations

SUSTAINABILITY

HS2 stations, will use zero carbon energy

INCLUSIVITY

Novel combination of technologies improved wayfinding at Old Oak Common

High Speed Two (HS2) will set a new standard for rail travel in the UK, with high-capacity trains dramatically reducing journey times between key cities and boosting capacity for the existing network. Since 2012, WSP has been HS2's consultant for the development of railway systems, operations, maintenance, construction planning and land referencing services, and is currently developing, in partnership with other organisations, the design of the new HS2 Euston, Old Oak Common and Curzon Street stations.

At Euston Station in London, we successfully developed the outline design into a concept and masterplan. In joint venture with Arup, WSP is providing an updated concept, scheme and detailed design to reflect the government-commissioned independent review of HS2 and ensure it is fully integrated with its surroundings. The design reduces the subsurface platforms from 11 to ten and will enable the build to take place in one phase. It will provide a 300m-long station hall that opens onto two new public spaces featuring retail and station facilities at ground- and first-floor level, all under a new top-lit roof.

Mid-way between Heathrow Airport and the centre of London, Old Oak Common's six sub-surface HS2 platforms will connect to the Great Western Mainline and Elizabeth line, creating a major interchange hub. Built on the site of an old maintenance depot, the 20m deep new station box will stretch to almost 1km, making it the UK's largest subsurface station. WSP led the multidisciplinary design development for HS2 and is now contractor's lead designer. Co-located with HS2 and Balfour Beatty VINCI SYSTRA (BBVS), our team is designing a world class, people-centred station that will help regenerate the area, supporting 25,000 new homes and 65,000 new jobs.

In Birmingham, the site of the former Victorian railway station at Curzon Street will be transformed into a landmark destination at the heart of a 140-hectare regeneration project. The 170-strong project team aims to create a transport hub that is "simple, elegant and refined"; the spacious station concourse and arched roof providing a modern interpretation of the great Victorian stations. The stations will be fully integrated with pedestrian, cycle, taxi, bus, conventional rail and tram infrastructure to support growth in the city and the wider economy.



BRITAIN
ACCESS FOR ALL SCHEMES



Location
BRITAIN, UNITED KINGDOM

Client
NETWORK RAIL

Status
COMPLETED IN 2015



WSP delivered seven Access for All (AFA) schemes in Scotland at stations: Perth, Newton, Dyce, Shotts, Rosyth, Gleneagles, and Dunblane. They were delivered as part of Network Rail's major development program to improve accessibility at 160 train stations around the country by installing lifts and ramps. The aim of the development program is to provide step-free access from entrance to platform at each of these stations, benefitting disabled people, those with reduced mobility, or those with children.

Each station brought its own challenges, with our work involving the installation of footbridges, lifts, ramps, CCTV and PA systems, and a range of mechanical, electrical, and telecommunications installations. We also provided architectural input to incorporate and protect listed buildings positioned near or inside the stations. At Gleneagles station, a Category B listed building now houses the new lift system without impeding its original features and footprint. Likewise, work on Dunblane station relied on careful architectural input to protect Category B listed station buildings important to the local area.

We worked closely with our client to develop each station scheme from feasibility to construction, test, and commission. This complicated undertaking involved multiple stakeholders, and our team worked effectively with all parties to develop the best solutions for all involved. We implemented cost saving techniques where possible and reduced costs by changing the paint and waterproofing specifications for bridge decks. Working closely with Balfour Beatty and its steelwork provider, we developed designs with innovative connections to accommodate a reduced number of crane lifts, which meant fewer track possessions, therefore minimizing disruption to the service.

Awards

- Heritage Award won in 2015 for this Scheme

CAMBRIDGESHIRE
WATERBEACH STATION



Location
WATERBEACH, CAMBRIDGESHIRE, UNITED KINGDOM

Client
RLW ESTATES

Status
ONGOING



The introduction of around 11,000 new homes as part of the Waterbeach New Town development, north of Cambridge, meant Waterbeach station would need to meet a substantial increase in passenger demand.

Network Rail was separately considering extending the platforms at the existing Waterbeach Station as part of its train lengthening study between King's Lynn and Cambridge. This measure could, however, only cater for existing demand.

Working for the developer, RLW Estates, and in parallel with Network Rail, we reviewed the feasibility of relocation of the station. Our study has since been accepted by Network Rail as part of the package of infrastructure improvements that can be delivered to support the proposed Waterbeach New Town.

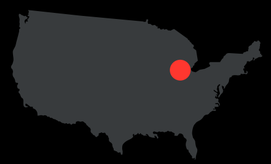
WSP has been retained by RLW Estates to provide the design option to support the planning application for the relocated station, which will integrate seamlessly with a wider vision to develop Waterbeach New Town. This vision is of a highly sustainable new community, which features an accessible, cycle-friendly station and public transport hub that reduces reliance on car trips.

The relocated and enhanced step-free station is due to be operational by 2021. Passive provision is built in to our design so that the station can accommodate 12-carriage trains, turn-back facilities and the space and pedestrian modelling needed for effective fire and emergency strategies to be achieved from day one of operation.

We are providing services across 15 disciplines, including transport planning & highways, track, civils, overhead line electrification, rail infrastructure and station design. WSP was involved in RLW Estates' public consultation in November 2017, which has helped to inform the design development, and further stakeholder engagement activities are planned.

CHICAGO O'HARE BLUE LINE STATIONS





Location
CHICAGO, ILLINOIS, UNITED STATES

Client
CHICAGO TRANSIT AUTHORITY

Status
COMPLETED IN 2014

The California, Damen and Western elevated stations were built in 1895 and are key historic structures along Chicago's O'Hare Blue Line elevated transit system. After 120 years of serving travellers, however, the stations each required rehabilitation and upgrades.

A team led by WSP provided construction engineering and design review services for the reconstruction of the California, Damen, and Western stations, part of a Chicago Transit Authority (CTA) program known locally as "Your New Blue." Together with the CTA and the design-build general contractor, the WSP team successfully completed the project during two very short construction windows of 42 days for the California station and 62 days for the Damen station, while the Western station remained open throughout construction. The project was delivered under budget with very positive feedback from the public.

Unforeseen structural issues, logistical concerns with off-site renovation work of the historical elements, and the short construction windows added levels of complexity that set this project apart from other station renovations. At the California and Damen stations, the team needed to elevate the platforms in order to meet the elevation of the train floor. Key components also included new light poles and integrated railings, along with the restoration of existing historic railings and light poles.

Awards

- American Council of Engineering Companies-Illinois - Engineering Excellence Special Achievement Award, 2016

CLYDEBANK TRANSPORT HUB





Location
CLYDEBANK, SCOTLAND

Client
STRATHCLYDE PARTNERSHIP FOR TRANSPORT (SPT) AND WEST DUNBARTONSHIRE COUNCIL (WDC)

Status
ONGOING

The Clydebank Transport Hub will be a key element in the regeneration of Clydebank town centre, connecting the urban space with the Queens Quay waterfront development currently under construction. The hub will also support the Connecting Clydebank active travel project, increasing access opportunities with the wider public transport network.

Working alongside IDP Architects, WSP produced the outline design and Outline Business Case (OBC) for this redeveloped transport interchange. The team adopted a staged approach to develop the three design options, focusing on stakeholder engagement and consultation and on extracting the main capital and operational benefits of the redeveloped hub to identify the preferred option.

This single option has been shown to meet the strategic aims of WDC, offer value for money and be both affordable and deliverable. It is now (as of November 2021) being considered by Transport Scotland who will decide whether to take it forward to the next stage of delivery (GRIP 4). In the meantime, the WSP-led design team is actively engaged in ongoing discussions with local and regional governments to identify and mitigate potential planning risks and unlock further potential.

COVENTRY STATION



Location
COVENTRY, UNITED KINGDOM

Client
COVENTRY CITY COUNCIL

Status
ONGOING

PLATFORMS
4

RIDERSHIP 2023/24
6.471 million

TRAINS PER YEAR
400,000

When WSP was appointed to develop a master plan for Coventry Station in 2013, its original Grade II-listed 1960s station building was not designed for 21st century passenger volumes and accessibility was limited by outdated facilities. WSP's master plan was to accommodate predicted passenger growth of 100 percent by 2043 and improve connectivity locally and nationally. The client and stakeholders had a specific vision for an attractive and integrated station working harmoniously with the adjacent architecturally significant building.

Our masterplan was accepted in 2014 and we were re-appointed to undertake a detailed site investigation, Options Selection Study and ultimately scheme design. The study identified solutions for a new step-free station building, footbridge over the railway, platform canopy extensions, 644 space multi-storey car park and bus interchange, which were agreed by the client. The design also facilitates access to a new bay platform to be used for local services to Nuneaton. Our team's deep understanding of the site and relationship with the client team has enabled smooth transition from feasibility into scheme design.

Working with Coventry City Council, Network Rail and local stakeholder groups, we challenged our team to create a design that was a step-change in passenger experience. Our Diversity Impact Assessment (DIA) process obtained feedback from key protected groups. We worked with the existing topography to provide true step-free access at multiple levels, more intuitive wayfinding and helpful features such as guide-dog toilets, changing places and future proofing for EV charging. Our design provides a fully inclusive station facility. WSP continues to work on the selected detailed-design packages of work to assist the client in mitigating risk.

Awards

- Runner-up 'Putting Passengers First' Award, Network Rail Partnership Awards 2018



Jaimal Mistry

DENVER
UNION STATION



Location
DENVER, COLORADO, UNITED STATES

Client
REGIONAL TRANSPORTATION DISTRICT

Status
COMPLETED IN 2014

NEW PARKING SPACES
21,000

PASSENGERS PER DAY BY 2030
200,000

TRAINS PER DAY BY 2030
500

WSP was the lead consultant for a master plan that envisioned Denver Union Station as a new multimodal facility for the Denver region.

The plan encompasses an at-grade, eight-track commuter rail station, relocation of Regional Transportation District's regional bus facility to the new below-grade concourse beneath 17th Street, the relocation of the light rail station at-grade adjacent to the consolidated main line, a new Downtown Denver Circulator bus service for easy commuter rail and light rail transfers, and the refurbishment of the historic Union Station building itself. The development potential for the site includes retail, commercial, office, and residential uses totaling approximately 158,000 square metres.

The new Denver Union Station establishes a single, unified regional multimodal transportation centre that accommodates both public and private modes of ground transportation in one location. The facility unites five transit systems—commuter rail, light rail, local and regional bus, the16th Street Mall Shuttle, and the free MetroRide Circulator—within a single transit district. It also reuses one of Denver's architecturally historic buildings and creates a pedestrian-friendly transportation district that helps to connect neighborhoods and create a new gateway to downtown Denver.

As prime consultant for the project, WSP was responsible for transforming broad design concepts into a functional design program. This included overseeing the master plan; alternatives analysis; environmental studies; preliminary engineering; rezoning to encourage high-density, mixed-use development; local historic designation; design visualization; public outreach; and facilitation of a public-private partnership.

DUBAI
ROUTE 2020
7 STATIONS EXPANSION



Location
DUBAI, UAE

Client
JACOBS/ROADS AND TRANSIT AUTHORITY

Status
COMPLETED IN 2020

LENGTH OF LINE EXTENSION
15 km

ABOVE GROUND STATIONS
5

UNDERGROUND STATIONS
2

Featuring Dubai's largest metro station, a series of innovative underground and overhead track segments, and seven LEED Gold-certified stations, Route 2020 is a standout transit system that was delivered ahead of Dubai Expo 2020 to facilitate mobility around the Emirate and serve both residents and visitors.

As a sub-consultant to Jacobs, and as part of the Expolink 2020 Consortium (Alstom-Acciona-Gulermak), our project team was responsible for Detailed Design and Design Support during the construction of all seven of the Route 2020 metro stations, including two underground stations, two depots, and the iconic Expo 2020 station. To deliver the project on time, construction activities in all stations had to go in parallel to the design activities, which introduced more constraints and challenges to the design. However, our WSP team dealt with these in a very proactive way and demonstrated a great deal of resilience, flexibility, and out the box thinking.

The 15-km extension of the Dubai Metro Red Line from the new Jebal Ali interchange Station to Expo 2020 Station has a capacity to serve 25 million passengers per day linking all seven new stations (one Interchange station with the Red Line, the iconic Expo station, three elevated stations, and two underground stations).

The seven stations are Jebel Ali Station, The Gardens Station, Discovery Gardens Station, Al Furjan Station, Jumeirah Golf Estates Station, Dubai Investment Park Station, and Expo Station. All seven stations were certified under the LEED Gold Standard. The extension has been equipped with an innovative and energy-efficient LED lighting system and a fully-electronic braking system.

The project delivered safe and smooth transport for the residents of Dubai and is also viewed as a vital future link to Al Maktoum International Airport (a short future extension including 3 stations).

This project is a great example of global collaboration, as it has drawn upon the expertise of our teams in the Middle East, United Kingdom, Poland, India, Hong Kong, and Canada.

EDINBURGH GATEWAY STATION



Location
EDINBURGH, UNITED KINGDOM

Client
BALFOUR BEATTY

Status
COMPLETED IN 2016

AREA OF CONCOURSE
303 m^2

PLATFORM LENGTH
265 m

PROJECT SAVINGS
>£2 Million
(CAD 3.3 Million)

The Edinburgh Gateway station is a new, "airport quality" train station on the East Coast Main Line, running from Edinburgh to Aberdeen and connecting passengers to the airport. The project involved development of a new station, concourse, and bridge linked to a vertical transfer building for trams, a feature wall, and an underpass for pedestrian and cyclists below the main artery road into the city.

WSP was appointed as Balfour Beatty's lead designer on the design and build contract. We completed the full "one-stop shop" delivery service, including mechanical, electrical, public health, and communications designs, as well as civil and structural work, and used BIM modelling for the full design.

By revisiting the outline designs, our team identified ways that would not only enhance the overall design but save the client significant costs. Replacing part of the lightweight ethylene tetrafluoroethylene (ETFE) roof pillows with an extended canopy removed the health and safety risks associated with cleaning them of diesel fumes and steam engine discharge, an action that saved almost £1.4m in construction costs. Our review found further significant savings in remodelling the car park, platform, and overall station layout, leading to over £2M in total savings.

Awards

- Winner of Saltire Society and ICE 'Building' award, 2017



EDINBURGH
WAVERLEY STATION



Location
EDINBURGH, UNITED KINGDOM

Client
NETWORK RAIL

Status
COMPLETED IN 2013

ROOF
34,000 m^2

PANELS REPLACED
17,000

ORIGINALLY BUILT
1866

Waverley Station is the largest station in the UK outside of London. Originally built in the mid-1850s, it sits in the middle of Edinburgh city in Scotland. We undertook design work alongside the contractor-client in a co-located office, with responsibility for the refurbishment and strengthening of the station roof, the remodelling of the concourse, and renewal of the platforms.

As lead designer, we also coordinated all the other specialist design elements, including new siphonic drainage, glazing, cladding, maintenance access systems, station lighting, and ventilation. One of the biggest challenges was the geometrically complex roof structure. Our 3D modelling helped us understand how all the different roof components would be integrated into a single design, and established a build sequence, managing conflicts between components. The entire 34,000m^2 roof was replaced with clear, strengthened glass to shed new light on the station concourse and platforms.

Parts of the 3D model were also used on the design drawings. These isometric views of the roof also facilitated an efficient construction process. Using modern materials in a Victorian station also presented challenges. On one occasion, where there were no modern equivalents, damaged ornamental cast-iron plates had to be replaced like-for-like.

ESPOO
FINNOO METRO STATION & HELSINKI METRO LINE
West Extension - Länsimetro



Location
ESPOO, FINLAND

Client
NLÄNSIMETRO OY, CITY OF ESPOO AND HSY HELSINKI AREA ENVIRONMENTAL SERVICES

Status
COMPLETED IN 2022

AREA
24,000 m²

LONGEST ESCALATORS FINLAND
78 m

ESTIMATED POPULATION IN THE AREA
17,000

The City of Espoo is designing Finnoo area around a new metro station that forms the centre of this emerging neighborhood of 17,000 residents. WSP has been responsible for the structural engineering of the Finnoo metro station and its track line structures as well as the design of the area's main streets and the bridge connecting them.

The structural design of the metro station started in 2015 and included the underground and surface parts of tunnels, shafts and station. WSP's structural engineers worked as part of the Sigma group formed by the design consultants, which was responsible for the last section of the new west extension of Helsinki area metro line (Länsimetro).

WSP designed the demanding concrete and steel structures of the metro station. A special challenge was the connections to the rock underground. There were strict requirements regarding the life span and the durability of external stress. In addition, soil impurities had to be considered in the concrete structures. Teams from Finland and India worked in close cooperation during the project.

The outcome is a sustainable and high-quality metro station. The last section of new metro extension began service in December 2022, ahead of schedule.

In addition to the metro site, WSP's experts designed the concrete structures of the bridge next to the metro station, the steel frame structures of the above-ground parts for the underpass and the driving ramp. We were also involved in the planning of the area's water supply and lighting.

The underpass serves pedestrian traffic of the future shopping center and metro station, as well as bus passengers, and enables cyclists to access the large bike park next to the subway. In terms of appearance, the City of Espoo wanted to give space to art and design. WSP designed the steel and glass artwork for the underpass and the stairwell. Sustainable development has also been a part of the principles guiding the planning; for example, underflow green roof solutions manage rainwater in a more ecologically sustainable way and support the preservation of biodiversity in a densely built area.



FREMONT
WARM SPRINGS STATION



Location
FREMONT, CALIFORNIA, UNITED STATES

Client
BAY AREA RAPID TRANSIT DISTRICT

Status
COMPLETED IN 2017

ELECTRIC VEHICLE CHARGING STATIONS
42

BART RAIL EXTENSION
8.7 km

PARKING SPACES
2,082

The Warm Springs/South Fremont Station of BART (Bay Area Rapid Transit) integrates cars, bicycles, and pedestrians into the region's public transportation network, making it more convenient for commuters to ride BART trains north into Oakland and San Francisco.

The new station, which is part of an 8.7km BART rail extension project, offers 2,082 parking spaces and includes 42 solar-powered electric vehicle charging stations as a pilot program. Bike lockers and bike racks were also installed to ensure that the station is fully accessible by cyclists—with a new pedestrian bridge planned for completion in 2018.

The intermodal transit hub itself covers 13.75ha and includes photovoltaic panels on the roof and in the parking lots that can generate 512 kilowatt hours of energy—enough to meet the station's daytime power needs. WSP provided the BART project with design and construction-phase services, including civil, structural, rail systems, and tunnel/geotechnical engineering, design support, right-of-way acquisition support and procurement support.

In addition to the station, we undertook preliminary engineering design of two rail lines, three control rooms, five track power facilities, and two box tunnels, including 100 percent design of a 1.6km cut-and-cover tunnel that travels under Lake Elizabeth in Fremont Central Park.



GLASGOW
ANNIESLAND STATION



Location
GLASGOW, SCOTLAND, UNITED KINGDOM

Client
STORY CONTRACTING LTD

Status
COMPLETED IN 2025

PLATFORMS

3

SOLUTION TO SHALLOW MINE WORKINGS BENEATH STATION

Filling the mining voids with grout

ORIGINALLY BUILT

1874

Led by our Rail Stations team, experts from across the business played a key role in boosting accessibility at Glasgow's Anniesland railway station.

WSP was appointed by Story Contracting Ltd in February 2023 to deliver the approval in principle and detailed design for the high-profile CAD 7.4 million (£4 million) project, which is part of Network Rail's Access for All (AfA) program.

Despite a surprising geotechnical discovery that threatened to undermine the whole project, a collaborative effort saw the upgraded station open to the public on schedule.

With its three platforms located on a bridge above a busy road in Glasgow, Network Rail was keen to improve Anniesland station's accessibility as part of its extensive AfA program. Our detailed design featured two airport-quality lifts either side of the railway bridge, giving customers step-free access, from street to train. It affords customers a safer, easier and more comfortable experience. And for people with reduced mobility, including those with bicycles, pushchairs, or heavy luggage, the improvements are particularly beneficial.

Initial desktop studies found no record of mine workings beneath Anniesland station. However, Glasgow is located above a major coalfield, leading our geotech experts to recommend further investigation. Story subsequently appointed Soil Engineering Ltd to conduct a thorough ground investigation, which involved drilling seven, 40m deep boreholes. The results confirmed the existence of potentially show stopping, unrecorded very shallow mine workings beneath the station and the bridge.

Reacting swiftly, our team devised a new scope of works to enable Network Rail's high-profile station upgrade to be delivered on schedule. Our solution involved filling the mining voids with grout (a combination of cement and pulverised fuel ash). And to avoid the potential impact of vibration on the bridge and other nearby infrastructure – a serious concern for Network Rail – instead of injecting the grout into the mine workings under pressure, it was carefully emplaced under gravity head.

With Network Rail, Story and WSP working collaboratively, this investigative drilling and mine working phase took place within a compressed timeframe, between December '23 and January '24 and allowed the project to continue on the original timeframe with no disruption to the pre-planned railway possessions and road closures for the lift shaft piling works and ultimately leading to the successful delivery of the project.



HONG KONG
HUNG HOM STATION



Location
HONG KONG, CHINA

Client
MTR CORPORATION

Status
COMPLETED IN 2021

LONG THROW SPRINKLERS IN A RAIL STATION IN HONG KONG

1st

PASSENGERS DURING RUSH HOUR

26,000

STATION FIRST OPENED

1975

Located on the Kowloon peninsula, Hung Hom Station, previously expanded in 1998 with the new concourse designed by Foster and Partners, has been extensively modified to become a super interchange station—connecting people from east to west via the Tuen Ma Line and north to south via the East Rail extension to Hong Kong Island.

With the new Tuen Ma Line platforms at Hung Hom Station commencing service in 2021, the former Ma On Shan Line is now linked with the former West Rail Line to provide more alternatives for passengers travelling to different districts. In addition, with the extension of the East Rail Line from Hong Hom Station to Admiralty Station via Hong Kong's fourth cross-harbour tunnel (opened in June 2022), Hung Hom Station also plays an important role to bring people from the Northeast New Territories and Kowloon peninsula to Hong Kong Island.

To accommodate the rail extension, an underground level platform and an at-grade platform has been built beneath and alongside the existing station podium. A key challenge is to maintain full operations of the existing railway lines while modification works take place. To minimize noise during the daily train operations from 5 a.m. to 1 a.m., the station can only undergo three to four hours of noise-bearing construction a day.

WSP is the detailed design consultant on station services design for the station modification work. The design also includes the improvement of the existing fire protection system by adding long-throw sprinklers. Indeed, Hung Hom Station is the first Hong Kong railway station to adopt these long-throw sprinklers.

Unlike other conventional subway stations, where the electrical and mechanical (E&M) plant rooms are typically located underground, the Hung Hom Station extension will use an existing freight yard for platform and E&M plant rooms, reducing construction cost for underground space. The project also involves the decommissioning of existing commercial areas during different construction phases, under an operating station environment and without affecting the operation of customs immigration and quarantine and the intercity train service.

HONG KONG
KOWLOON STATION



Kowloon Station serves as a key transport hub for the Airport Express and Tung Chung Line, connecting the city with the airport and the town of Tung Chung.

WSP served as the mechanical & electrical design consultant from concept to detailed design stages. Key elements included HVAC, security and surveillance systems, as well as fire protection and detection systems. Since Kowloon Station connects to the immersed tube tunnel under Victoria Harbour, WSP also designed the flood detection system linked to the floodgates.

Located in the West Kowloon area, the station has a 220,000m^2 station floor area spanning two underground levels and one ground level, in addition to extensive top-side development comprised of a shopping complex, fully landscaped podium gardens, and a comprehensive commercial/residential development. At the time of construction, Kowloon Station featured the world's deepest bored piles (105m) to support this commercial/residential development. Airport check-in services are also available for the Airport Express passengers.



Location
HONG KONG, CHINA

Client
MTR CORPORATION

Status
COMPLETED IN 1998

HONG KONG
TSEUNG KWAN O EXTENSION STATIONS



Tseung Kwan O Line is an underground rail line built to serve the town of Tseung Kwan O. Built mainly on reclaimed landfill, the town was previously accessible only via a road tunnel. The 10km rail line provides an alternative and efficient mode of transport for its residents, with trains running every two minutes. Its five stations are integrated within commercial/residential buildings as transport-oriented developments (TODs). All stations on the Tseung Kwan O Line are fully air-conditioned and fitted with platform screen doors to enhance safety and energy saving.

WSP was the lead consultant in a consortium of international consultants for Po Lam and Hang Hau Stations, with responsibility for planning, project management, architectural services, civil/structural, station mechanical, electrical and plumbing (MEP) systems, system-wide coordination, tender packaging, and construction-stage supervision.

Po Lam Station is an at-grade terminus station. WSP implemented various cost-saving initiatives including a re-arrangement of the station rail operation to a pinched loop configuration, removing the need for a running track and the associated platform, thereby reducing the estimated construction costs by over 40 percent.

Hang Hau Station is a semi-underground station with the track and side platforms below ground, served by a common at-grade concourse. Use of a top-down construction method allowed for excavation to continue below ground, while sealing the project at street level to minimize noise and dust pollution.

Under a separate contract, WSP was the MEP consultant for the Tseung Kwan O and Tiu Keng Leng Stations, with responsibility for station MEP systems design and construction-stage supervision.



Location
HONG KONG, CHINA

Client
MTR CORPORATION

Status
COMPLETED IN 2002

HONG KONG
SOUTH ISLAND LINE STATIONS



Location
HONG KONG, CHINA

Client
MTR CORPORATION LIMITED

Status
COMPLETED IN 2016

RAIL SYSTEM
Fully Driverless

DEPTH OF STATIONS
Up to 40 m

DAILY PASSENGER CAPACITY
170,000

The South Island Line provides a much-needed alternative mode of transport to the 350,000 residents living in the Southern District, who had faced daily traffic congestion to and from the downtown area of Hong Kong. With daily capacity of 170,000 passengers, the South Island Line (East) is Hong Kong's second fully automated medium-capacity mass transit system. Running partly underground and partly elevated, it spans 7 km from the downtown hub in Admiralty to the South Horizons residential development, via three intermediate stations located in Ocean Park, Wong Chuk Hang, and Lei Tung.

WSP provided civil, structural, mechanical, and electrical engineering consultancy services for the underground South Horizons Station and Lei Tung Station including associated above-ground entrances and the ventilation buildings. WSP also served as the lead mechanical, electrical and plumbing consultant for the elevated stations of Wong Chuk Hang and Ocean Park.

A temporary traffic deck was erected to maintain the operation of a public transport interchange while construction of the South Horizons Station proceeded below. In order to move forward in the limited underground space, WSP relocated part of the station facilities and utilities to a two-storey building above ground.

With the platforms situated 40 metres below ground, the cavernous Lei Tung Station is one of the deepest stations in Hong Kong. The two-level underground station is comprised of a concourse on the upper level and an island platform on the lower level. Four high-speed passenger lifts carry passengers from street level to the concourse below.

Wong Chuk Hang Station is an above-ground station that is situated above a nullah. The station also serves as the future interchange station for the South Island Line (West). Originally planned as a double island platform with the South Island Line (West) taking up the center dual tracks, the project has been revised to two island platforms stacked on top of one another.

Being naturally ventilated, Ocean Park Station has large spans of windows at the concourse level to take advantage of cross breezes and natural daylight. With the absence of chiller plants and air-conditioning, only blower fans increase the natural air circulation throughout the summer, making this station one of the greenest in Hong Kong.



Ocean Park Station

HONG KONG
TUEN MA LINE STATIONS



Location
HONG KONG, CHINA

Client
MTR CORPORATION

Status
COMPLETED IN 2021

LENGTH OF LINE
56.2 km

FULL JOURNEY TIME
73 minutes

NUMBER OF STATIONS
27

The 56km-long Tuen Ma line is the longest line of Hong Kong's MTR network, connecting the former West Rail Line and Ma On Shan Line with six new stations. WSP was heavily involved in the former West Rail Line section, which mainly served the western New Territories, linking them directly to the downtown area of Tsim Sha Tsui in Kowloon. The West Rail Line involved the construction of nine new stations and modifications to three existing stations.

WSP was the lead consultant, project manager and construction supervisor for the elevated Kam Sheung Road Station and the nearby 21ha depot. Aspects of design included architectural, civil, structural, MEP, and safety and risk management. Under a separate contract, WSP served as the MEP consultant for the Siu Hong Station and Tuen Mun Station. Services included design of the cabin concept based on a fire engineering approach to achieve effective smoke control for the station trading areas, rail systems, as well as station building services.

WSP was also commissioned to perform a comprehensive energy survey for all nine stations as part of an operational cost-saving assessment and to create a sustainable environment for the future. In this energy survey, WSP was tasked to identify major energy consumption items, analyze the energy consumption data, identify any energy saving opportunities and recommend further actions to enhance energy performance.

Our latest involvement in the Tuen Ma Line is the full multidisciplinary engineering design of Hung Shui Kiu Station, an additional station between the existing Tin Shui Wai Station and Siu Hong Station to serve the needs of a new development area. This is Hong Kong's first station to be built on the live tracks of existing railway viaducts. Hence, it is required to ensure minimal impact on the normal rail operations while construction takes place.



Hin Keng Station

INVERCLYDE
GOUROCK STATION





Location
GOUROCK, SCOTLAND, UNITED KINGDOM

Client
BALFOUR BEATTY

Status
COMPLETED IN 2012

Gourock rail station is on the shoreline of the Firth of Clyde in Inverclyde, Scotland. The existing concrete sea wall protecting the quayside of platform one was regularly overtopped by sea water, causing temporary flooding to the station platforms that resulted in line closures.

As lead designer, WSP was responsible for design of the refurbishment works. This included the demolition of redundant station buildings, strengthening of the existing buildings and station roof, platform and concourse resurfacing and associated drainage, two new platform canopies, and renewal of all lighting, CCTV, and PA systems. We also performed the coastal defence design that included the addition of rock-armoured revetment, to further protect the station area by reducing wave impact. Finally, WSP also carried out an environmental impact assessment of the revetment.

We were able to reduce construction cost by changing the design to steepen the revetment, reducing material quantities.

The discovery of significant structural damage to the existing timber columns supporting the concourse roof structure led to the design of new steel columns and additional roof bracing. We completed this design on a fast-tracked program to minimize delays to the ongoing ground level civil works and canopies.

LIVERPOOL
HAMILTON SQUARE STATION





Location
LIVERPOOL, UNITED KINGDOM

Client
GALLIFORD TRY

Status
COMPLETED IN 2015

We successfully delivered essential improvements to Hamilton Square Station as part of a £40 million upgrade, intended to breathe new life into the existing Merseyrail stations, offering a new look and improved signage.

This design and build project needed to be ready in time for the Grand National at nearby Aintree giving WSP just six months to provide Tier 1 Principal Contractor Galliford Try with the civil engineering, MEP, telecoms, and rail systems work needed to upgrade this Victorian underground station to modern standards.

This was particularly challenging as the station featured significant gaps between platform and train (sometimes of nearly 300mm), which required the platform to be raised and lowered in places—with the platform riser wall being repaired during the process. We worked in close coordination with the architect to replace the clad lining of the tunnels to ensure that the designs were fully integrated.

In addition to designing the temporary hoarding so workers could carry out operations safely next to the live track, we delivered the full electrical works to provide attractive customer information and advertising screens on the upper concourse. Our team also replaced electrical systems and lighting with more modern and efficient versions throughout the station.

Problem solving often characterizes design and build work. Working collaboratively with Network Rail engineers, we produced an “idealized” track alignment. Given that the track was on a relatively tight radius through the station, we offset the platform edge to bring stepping distances into tolerance, therefore avoiding costly wholesale track realignment on the approach and exit to the station.

LONDON
ABBEY WOOD STATION



Location
LONDON, UNITED KINGDOM

Client
BALFOUR BEATTY

Status
COMPLETED IN 2018

NEW HOMES BUILT
1,720

TRIP TO HEATHROW
51 Minutes

PASSENGERS PREDICTED PER DAY ON ELIZABETH LINE
52,000

The southeast section of the Crossrail project will link the central Crossrail lines emerging at Plumstead Portal to a new station and turnback facility at Abbey Wood. In 2010, WSP was appointed to the design-and-build contract to undertake design and consultancy services.

A key aim was for Abbey Wood station to act as a catalyst for regeneration and provide opportunities for local employment and support local authority development aspirations. A major challenge was delivering these aspirations within a densely populated urban residential environment while maintaining an operational railway.

Successful delivery was achieved through a series of complex construction stages across a broad range of infrastructure. The existing three-kilometre rail corridor was widened from two to four tracks, to make provision for the Crossrail lines. New rail systems, including two different power systems for the adjacent lines (AC overhead lines and DC traction rail), were added. Provision of major civil engineering infrastructure in the form of ground improvement works, drainage, utility diversions, highway realignment, four new footbridges, and alterations to two existing highway bridges and lineside infrastructure were also delivered. A new terminus station, including two island platforms, is also a part of the design, with an interim station implemented during the construction phase.

WSP formed a core team to integrate with the client's project delivery team. Through its technical capability, this team led the multidisciplinary engineering design, project engineering management, environmental consultancy, and systems integration across the entire project. This team also provided BIM management, project controls, town planning and consents support, and environmental management services including: environmental assurance, interim CEEQUAL assessments, environmental surveys, and contaminated land assessments. Our engineering design teams included civil and geotechnical engineering, highways and bridges, drainage, plant equipment, signalling and electrification.



LONDON
BRENT CROSS WEST STATION





Location
LONDON, UNITED KINGDOM

Client
VOLKERFITZPATRICK

Status
ONGOING

In 2020, WSP was appointed by VolkerFitzpatrick (Principal Contractor) to provide multidisciplinary design services and construction support in the delivery of Brent Cross West, a new Thameslink station for North-West London located on the Midland Main Line.

WSP has worked closely with architects Chapman Taylor to design an iconic and inclusive station that will bring new levels of passenger service and connectivity to the Brent Cross and Cricklewood areas.

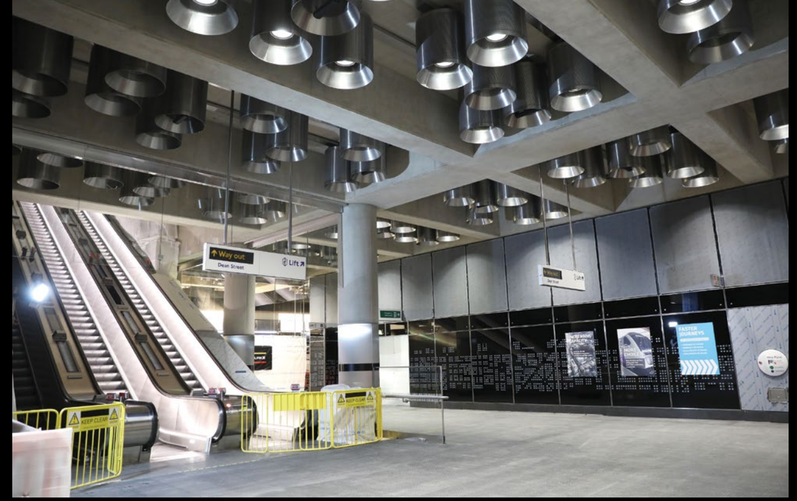
The £40 million (CAD 66 million) station is a central part of a local regeneration programme being delivered by joint venture partners Barnet Council and Argent Related, which will deliver upto 7,500 homes and 25,000 new jobs.

As the main gateway to a vibrant new town centre, Brent Cross West will have capacity for upto eight peak stopping services per hour and platforms that can accommodate 12-carriage trains.

Along with a 32-metre enclosed overbridge for pedestrians and cyclists, the station features step-free access from entrance to platform, provided via escalators and lifts. It will also accommodate parking for 68 cycles supporting the active travel needs of customers and local residents.

Set to open mid-2023, Brent Cross West station will facilitate over two million passenger journeys in its first year of operation and around five million upon the completion of the Brent Cross Cricklewood regeneration project in 2031.

LONDON
TOTTENHAM COURT ROAD STATION





Location
LONDON, UNITED KINGDOM

Client
LAING O'ROURKE / CROSSRAIL

Status
ONGOING

Tottenham Court Road Station is in the heart of Soho, where the recently upgraded Tube station currently serves over 100,000 passengers a day. This number will grow to over 170,000 when the Elizabeth line opens in autumn 2019. The design includes two oversite developments incorporating commercial space, residential space and a new theatre, as well as a significant public realm enhancement that will transform the protected conservation area.

WSP is working with Crossrail Ltd on the detailed design of the new western ticket hall at Tottenham Court Road and is providing construction support for the contractor Laing O'Rourke. When complete, Tottenham Court Road station will feature two 234-metre long platforms and new concourse areas extending between two new ticket halls at Dean Street (western ticket hall) and Goslett Yard (eastern ticket hall).

The construction of the station is a complex phased operation, and its method and sequence of construction is an integral part of the design process. The work is being integrated with the adjacent London Underground station upgrade, to provide interchange with the Central and Northern lines.

WSP's team consists of an experienced multidisciplinary team of engineers, architects, acousticians, environmentalists, and specialists in engineering safety management, fire, EMC, RAMS, and design assurance. The 100+ team is co-located in the site project office working in a collaborative environment alongside Crossrail Ltd, Laing O'Rourke and their supply chain as well as the system-wide contractors. Specific focus is on the co-ordination of the integrated Bentley Microstation 3D model, which is being developed into a full asset-tagged BIM model.

LONDON
BOND STREET STATION



Location
LONDON, UNITED KINGDOM

Client
CROSSRAIL LTD, TRANSPORT FOR LONDON

Status
COMPLETED IN 2022

UNDERGROUND LINES
(25KV OVERHEAD LINES)

35 m deep

TICKET HALLS

2

BOND STREET STATION TEAM

160+ members

The Elizabeth line is a brand new high frequency railway for London and the south east which will link Reading and Heathrow Airport in the west to Shenfield and Abbey Wood in the east. Bond Street is one of the ten new stations on the 21km tunnelled section of the new route connecting to the existing underground stations and surface services.

As lead consultant, we provided a multidisciplinary design service for the station, integrating the 6.2m diameter running tunnels and the 10m diameter mine sprayed concrete platforms. Our top down design solution was dictated by the integrated programme requirements and location of the existing Jubilee line running tunnels directly under the western ticket hall box.

We created a station environment aligned with Crossrail Ltd's design vision to create a light, safe, and contemporary space for the 21st century. Our design emphasises the customer experience, considering such matters as wayfinding and ambient lighting (both day and night) to provide calm, ordered, and logical spatial arrangements. The modern classical approach gives the station entrance broad portals flanked by colonnades.

Bond Street is in central London (Mayfair) and is surrounded by roads. Making extensive changes in this densely populated, congested, and constrained space required outstanding planning to avoid disruption to retailers and residents. We minimised risk to the many listed, high-value buildings in the area.

Inner city development is about keeping the city moving. We worked with key stakeholders, to understand their needs and create the best station possible. Collaboration enabled us to unlock the surrounding highways to provide traffic and transport services and ensure the safe and timely delivery of this high-profile project.



LONDON
FARRINGDON STATION



Location
LONDON, UNITED KINGDOM

Client
NG BAILEY/ BAM FERROVIAL KIER JV/CROSSRAIL LTD.
AM FERROVIAL KIER JV/CROSSRAIL LTD

Status
DESIGN COMPLETED DECEMBER 2020

PLATFORM TUNNELS LENGTH
3 Football Pitches

TRAINS PER HOUR
>140

NEW TICKET HALLS
2

Farringdon station will be one of the busiest stations in the United Kingdom, connecting Thameslink with the London Underground. Over 140 trains per hour will flow through the Farringdon interchange when it becomes London's only link between Thameslink, the Elizabeth Line and London Underground lines, serving passengers from outer London to business hubs in the city and Canary Wharf. It includes two Elizabeth Line platform tunnels, each the length of three football pitches, linking two new ticket halls to the east and the west.

In August 2012, WSP was appointed to develop the detailed Mechanical, Electrical and Public Health (MEP) designs for the ticket halls, platforms, lifts and escalators, and provide construction support. This required close collaboration with our client and all design parties including the railway system contractors. Our MEP Engineers and 3D BIM modellers have been co-located with the contractor's architect to efficiently and effectively solve complex design challenges in constrained spaces. This collaborative approach has enabled us to deliver a co-ordinated and integrated MEP design for all the station areas, to a BREEAM excellent rating, and ensure Crossrail Ltd.'s delivery schedule remains on track for this station.

At the height of activity, WSP had a team of approximately 40 engineers working together producing design deliverables.

WSP delivered the final design to our client team in December 2021, having issued the final deliverables: updated Amtech report (electrical system modelling), clash detected CAD model and final as-built drawings.

LONDON BRIDGE STATION



Location
LONDON, UNITED KINGDOM

Client
SINGLE OPTION DEVELOPMENT: NETWORK RAIL

DETAILED DESIGN - CONSTRUCTION: COSTAIN

Status
COMPLETED IN 2018

PASSENGERS PER YEAR
90 million

TRACKS
15

TRAINS PER HOUR
24

London Bridge station has been completely rebuilt, transforming the city's oldest station into one fit for the 21st century by making it modern, spacious and fully accessible. This has all been achieved while keeping London's fourth busiest station open for the 50 million passengers who use the station each year, and will help the Thameslink Programme deliver a metro style service of 24 trains per hour through central London from 2019.

WSP was appointed as lead designer, and was faced with the challenge of developing an affordable world-class design which delivered the necessary railway improvements while keeping London Bridge Station operating with minimum disruption.

The scheme involved the design of an 8,000m^2 concourse at street level, with a live railway running over the top on a viaduct, incorporating its Victorian brick arches, and featuring a new deck supported on columns located within the concourse. Several parts of the station were heritage-listed, and we incorporated these original features into the final design, while creating an attractive environment that allowed free passenger movement through the station from street to platform level.

Despite significant changes to scope, our project team completed services within the timescale through a flexible approach to delivery, co-location of staff and progressive sign off of deliverables. We also introduced almost £40 million of savings to the original project costs through innovative design solutions, and avoidance of costly utilities diversions.

During the 5 year construction phase, we functioned as lead designer for the management and preparation of all construction-related design documents. Completion of the design was subject to several significant challenges, including the need to maintain the integrity of the Victorian arches during demolition.

Over the five-year construction period, the key challenge has been to minimize disruption for passengers. The complex construction strategy involves a phased demolition and reconstruction with over 70 sub-stages, ensuring that the station remains operational throughout the works. Through expert programming and collaborative working, the London Bridge team has met all of the possession dates.

Awards

- CEEQUAL Sustainability Award – Outstanding (96.9%)
- Putting Passengers First Rail Partnership Awards 2018
- Overall Winner of New London Awards 2018
- Station of the Year Award, National Rail Awards 2018



© Rick Roxburgh

LONDON
PADDINGTON STATION



Location
LONDON, UNITED KINGDOM

Client
COSTAIN SKANSKA JV/CROSSRAIL LTD

Status
ONGOING

PUBLIC ART

Cloud Index by Spencer Finch

TRAINS AT PEAK TIMES

24

STATION DEPTH

23 m

The heritage of the existing Grade I station, and the adjacent Grade II Listed Macmillan House have been reflected and preserved in the design of Paddington Elizabeth line station. The station is a 260m long x 25m wide and 23m deep box which sits below Eastbourne Terrace, a busy thoroughfare within Westminster. There are direct links to the existing National Rail station and the LU Bakerloo line via a new passenger tunnel entering the Elizabeth line station below platform level. Interchange is also possible with the Circle, District and Hammersmith & City LU lines. To minimize disruption, the box was designed top-down to enable Eastbourne Terrace to be re-opened in February 2014 while construction work continued below.

WSP is completing the detailed design and fit out of the station, as well as providing construction support. We are providing an experienced multidisciplinary team of engineers, architects, facade engineers, and specialists in bomb blast mitigation. Support is also being provided by our specialists in Engineering Safety Management, Fire, EMC, RAMS, and Design Assurance.

The team is co-located in the site project office working in a collaborative environment with Costain Skanska and their supply chain, and the Crossrail Project Team, and interfacing with systemwide contractors. Specific focus is on design and clash detection/co-ordination of a Bentley MicroStation 3D model which will be developed into a full asset tagged BIM model. The design ensures that the station operates safely, reliably, efficiently, and is easily maintained.



MANCHESTER
GOLBORNE STATION



Location
GREATER MANCHESTER, UNITED KINGDOM

Client
NETWORK RAIL

Status
ONGOING

NEW PLATFORMS

2

PUBLIC CONSULTATION

Nearly 2,200

RESPONDENTS SUPPORTING VOTE

93%

Golborne Station is a vital addition to the regional transport network, supporting the TfGM 2040 Transport Strategy and aligning with the Greater Manchester Bee Network's goal of integrating public transport services. Located on the WCML, the station will enhance connectivity, reduce car dependency, and drive economic growth as part of the broader Golborne Masterplan. The project has strong public support, with over 93% of consultation respondents in favour and nearly 2,200 indicating they would switch from car travel to using the station. The station will play a crucial role in sustainable regional development by improving accessibility for residents without private vehicles and cut travel times to key employment hubs like Manchester city centre.

As the Lead Designer, WSP has been commissioned to progress the station design through the Outline Design phase (PACE 2 ES4 AIP), ensuring compliance with Network Rail standards and facilitating progression to the detailed design and construction phases. The project scope includes:

- The construction of two new platforms to accommodate six-car Electric Multiple Units (EMU) for future rail services
- A fully accessible footbridge with lifts and stairs linking to the Local Authority car park
- New platform waiting shelters
- Telecommunications upgrades including public address systems, help points, CCTV, customer information screens, and notice boards
- Signalling, track and overhead line modifications
- Relocation of existing maintenance facilities and track access points
- Improved parking and accessibility features including five blue badge bays and a designated pick-up/drop-off area

WSP also committed to integrating sustainable solutions within the project, including Carbon Modelling to assess and minimize the environmental footprint, optimised drainage and energy-efficient lighting to improve sustainability, pedestrian flow modelling to ensure efficient passenger movement and safe evacuation procedures, and design to cost and affordability strategies in alignment with TfGM's business case and financial frameworks.

The Golborne Station site presents unique engineering and operational challenges, which WSP is addressing through innovative design solutions: managing Overhead Line Equipment and track clearance constraints while ensuring compliance with updated safety standards, integrating new infrastructure within an active rail corridor while minimising disruption to existing services, and stakeholder engagement and coordination to ensure alignment with the Wigan Masterplan and broader regeneration initiatives.



MELBOURNE
CAULFIELD TO DANDENONG STATIONS



Location
MELBOURNE, VICTORIA, AUSTRALIA

Client
LEVEL CROSSING REMOVAL AUTHORITY

Status
COMPLETE

LENGTH OF TRACK
72 km

STATIONS
5

INCREASE IN CAPACITY
42%

As part of the Victorian Government's initiative to improve public rail safety, the Level Crossing Removal Authority oversaw the removal of 50 dangerous and congested level crossings across Melbourne. The Caulfield to Dandenong project removed nine dangerous level crossings on the Cranbourne-Pakenham line in Melbourne, and rebuilt five train stations along the line with new modern facilities: Carnegie, Murrumbeena, Hughesdale, Clayton, and Noble Park Stations.

The reliability of the metropolitan, regional and freight services is expected to markedly improve with the completion of the project. When the project was completed in 2023, capacity on the Pakenham and Cranbourne lines increased by 42 percent, providing room for an additional 11,000 passengers in the morning peak.

The project was being delivered by a project Alliance consisting of Lendlease, WSP, CPB Contractors, and Aurecon together with Metro Trains Melbourne and the Level Crossing Removal Authority. Supporting the group was urban design and landscape architects Cox Architecture and Aspect Studios, as well as property developer Lendlease Urban Regeneration. We were part of the project team that delivered the detailed design and construction phase design services.

For the tender design, we worked to deliver an innovative, robust and cost-effective solution, using BIM technology to provide visualizations of the project through 3D models. This resulted in a unique design plan centered on maximizing open space. It delivered the completion of all nine level-crossing removals as "rail-overs", placing an elevated rail above the existing corridor. Designing the line this way eliminated the issue of major barriers separating communities and offered numerous other benefits, including new station precincts with safer access for bus and car drop offs, as well as incorporating retail and gateways to new open space.

The design team has focused on incorporating a number of innovations to deliver one overall integrated scheme. On average, trains operate along the railway 8m above the existing ground level. Stations are elevated at 10m above ground level, which assists with reducing traction power consumption as trains brake uphill into stations and accelerate downhill out of stations.

MELBOURNE
FOOTSCRAY TO DEER PARK STATIONS



Location
MELBOURNE, VICTORIA, AUSTRALIA

Client
REGIONAL RAIL LINK AUTHORITY

Status
COMPLETED IN 2015

ADDITIONAL PASSENGER TRIPS PER DAY
54,000

REDUCTION ON 36 MONTH PROGRAM
4 Months

GREEN STAR RATING AT STATIONS
4-Star

The Regional Rail Link project is one of Australia's largest public transport infrastructure projects and Melbourne's first new major rail line in 80 years. The Footscray-Deer Park Alliance section of the project involved, among other deliverables, the design and construction of new stations at West Footscray and Sunshine, and a major upgrade at Footscray in Victoria.

We delivered upgrades to Footscray station, including new platforms adjacent to Irving Street, improved station entrance, and forecourts incorporating escalators, ramps, lifts and stairs. For the rebuild of West Footscray station, the work included ramps, lifts, and stairs. The rebuild of Sunshine station included a new platform and pedestrian overpass, improved station entrance, ramps and forecourts, lifts, and stairs.

WSP was predominantly involved with the design management, design development, and detailed design of all elements of the works, including track alignment, traction power, civil/structural design, signalling design, and design of new and upgraded stations.

The WSP team actively participated in delivering an innovative design delivered on an accelerated timetable, enabling a four-month program reduction on a 36 month baseline program. The innovative design also brought about improved community through enhanced urban design outcomes.

Innovation through the design development phase strongly influenced innovation during delivery. This included optimizing the functional layout of West Footscray station by re-aligning the station overpass to provide improved connectivity with population centres on each side of the rail corridor, as well as optimizing design solutions to provide minimized whole-of-life costing. By implementing the ground-breaking application of LED lighting to minimize the carbon footprint of new stations, we were able to achieve a 4-Star Green Star rating at both new and modified stations. Optimizing modularization and the use of precast elements allowed us to support the safest, most economical, and quickest build.

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Awards

- Infrastructure Partnerships - Australia's Infrastructure Project of the Year, 2014
- Premier's Sustainability Award - Infrastructure and Buildings category, 2014



© Peter Bennetts 2014

MELBOURNE
SOUTHERN CROSS STATION



Location
MELBOURNE, VICTORIA, AUSTRALIA

Client
LEIGHTON CONTRACTORS / CIVIC NEXUS

Status
COMPLETED IN 2007

PLATFORMS
16

TRACKS
22

ORIGINAL CONSTRUCTION
1859

Southern Cross Station - the redeveloped and revitalised Spencer Street Station - is located on the western side of Melbourne's central business district. With its close proximity to the growing Docklands area, Southern Cross Station acts as an efficient and comprehensive public transport hub for commuters, providing connections to bus services, metropolitan, regional and interstate trains, trams, and taxis.

A key design feature of the station is the large span wave-form roof: the undulating structure was developed to assist with the extraction of diesel fumes and other air contaminants, by way of a louvered natural ventilation system. Whilst the northwest and southwest winds are essential to the operation of the ventilation system, the roof also serves as a means of sheltering passengers from the sun, wind, and rain. Passenger amenities within the station include retail tenancies, a food court, waiting areas, baggage-handling, and information systems. A two-storey office 'pod' beneath the roof provides accommodation for station administrative staff.

The development also features above-rail air-rights, commercial developments at '664 Collins Street', a medium-rise office and carpark development, and 'West End Plaza', a major retail centre.



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MELBOURNE
SOUTHERN PROGRAM ALLIANCE STATIONS



Location
MELBOURNE, AUSTRALIA

Client
LEVEL CROSSING REMOVAL AUTHORITY

Status
ONGOING

STATIONS
27

LEVEL CROSSING REMOVAL
85

AWARD
2020 Australian Engineering Excellence

The Victorian Government's Level Crossing Removal Project is overseeing the largest rail infrastructure project in the state's history. It will see the removal of 85 of Melbourne's most dangerous and congested level crossings by 2025. The project will also see the upgrading or building of more than 27 train stations, laying many kilometres of new track, and making associated rail improvements. Removing the level crossings will reduce risk for pedestrians, cyclists and motorists as well as creating new community spaces for residents and visitors to enjoy.

The Southern Program Alliance (SPA) is removing level crossings on the Frankston line. Together with our Alliance partners, Lendlease, Acciona/Coleman Rail, Metro Trains Melbourne and the Level Crossing Removal Project, WSP is delivering the Initial Works Package and Additional Works Packages 1-4.

WSP's scope of work includes, but is not limited to:

- Environmental and planning services
- Architectural, urban design and related services, including landscape design
- Civil engineering, including roads, drainage, car parks, park and ride facilities, pedestrian and bicycle paths
- Systems engineering including requirement management, interface management and configuration control
- Railway engineering, including track, signalling, stations, traction power, communication and train control system, and maintenance and stabling facilities
- Stakeholder engagement and consultation
- Development of project management plans, including procurement, contract administration
- Risk identification and management services
- Project cost estimating and scheduling

Our design approach focuses on minimizing environmental impacts while maximizing access to the surrounding areas and anticipates future works that will improve accessibility to the beach from Carrum station, including cycle paths, upgrades to the local reserve and sports clubs as well as a periscope at Carrum station that provides a view of the bay from the station.

Client outcomes include:

- Reduced congestion on local roads
- Improved safety around train lines
- New open space for the community
- Legacy left with local stakeholders including schools and businesses
- Preservation of historical buildings
- Improved connections between public transport, stations, local shops and amenities such as the beach
- Improved reliability of train services
- Modern train stations with latest functionality for DDA passengers
- Stakeholder engagement and consultation



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NEW YORK CITY
34TH STREET/HUDSON YARDS STATION



Location
NEW YORK CITY, NEW YORK, UNITED STATES

Client
METROPOLITAN TRANSPORTATION AUTHORITY

Status
COMPLETED IN 2015

LENGTH OF EXTENSION
2.4 km

DEPTH OF STATION
38.1 m

LAST NEW SUBWAY STATION
25 Years

When a new subway station opened at New York City's Hudson Yards, it marked the culmination of more than a decade of work by WSP in planning a new neighborhood and bringing rail transit to midtown Manhattan's far west side. The new station, at 34th Street and 11th Avenue, serves the city's No. 7 line subway, which was extended 1.5 miles from its previous terminus at Times Square (8th Avenue at 42nd Street).

The 34th Street station, the first new station in 25 years and the 469th in the system, is deep by New York City subway standards—125 feet underground—and is reached by escalators and inclined elevators. Designing the project posed several challenges. The need to avoid the existing tunnels, buildings and other infrastructure required relatively deep tunnels—about 100 feet deep in most places. As the TBMs dug the tunnels, a cavern for the station was mined through the drill-and-blast method.

WSP led conceptual, preliminary and final design for the subway extension, assisted the MTA in developing the phased construction program and contract packages, prepared the project's eight-volume, 6,600-page environmental impact statement and provided construction support services. Final design services included civil, structural, geotechnical, architectural, mechanical, electrical and communications design elements, as well as construction cost estimating and scheduling support services. As a consultant to the contractor, we also served as systems integrator, responsible for ensuring that mechanical-electrical-plumbing systems perform as designed.

Awards

- American Council of Engineering Companies – Grand Award, 2016
- American Council of Engineering Companies – Empire Award, 2016
- Urban Land Institute New York – Excellence in Development Award, Civic Space Category, 2016
- American Institute of Architects New York State – Excelsior Award, Public Architecture Design, New Construction Category, 2016
- New York State Society of Professional Engineers, Metro Chapter – Project of the Year Award, 2016



NEW YORK CITY
EAST SIDE ACCESS GRAND CENTRAL TERMINAL STATION



Location
NEW YORK CITY, NEW YORK, UNITED STATES

Client
METROPOLITAN TRANSPORTATION AUTHORITY CAPITAL CONSTRUCTION / LONG ISLAND RAIL ROAD

Status
COMPLETED IN 2023

PROJECT VALUE

USD 11.1 Billion
(CAD 15 billion)

TIME SAVED BY COMMUTERS

30 minutes

NEW TURNOUTS

50

WSP is leading a joint venture of three firms that is responsible for final design and construction phase services for the Long Island Rail Road (LIRR) East Side Access project, which will bring LIRR service directly to Grand Central Terminal.

With over 1,127 kilometres (700 miles) of track, 11 branch lines and 124 stations, the LIRR is the most extensive commuter rail network in the United States. Chartered in 1834, it is also the oldest railroad in the nation still operating under its original name. Yet the reach and capacity of the railroad has remained unchanged since it first connected to Manhattan's Penn Station in 1910. Now, for the first time in more than a century, the LIRR has embarked on its first major expansion with the East Side Access.

The project includes significant construction at two of New York City's busiest railroad facilities: Grand Central Terminal in Manhattan, and Harold Interlocking in Queens.

Grand Central Terminal accommodates Metro-North Railroad (MNR) services, with MNR platforms on two levels. The project is converting many of the tracks and platforms on the Lower Level into a new LIRR passenger concourse. Existing structural elements are being re-framed to create space for escalators. To avoid disruption to commuter services, works trains are scheduled to operate at night, and most excavated rock is transported on conveyors to Queens, from where it is trucked away.

Harold Interlocking railroad junction accommodates LIRR and Amtrak trains approaching Penn Station from the east. The project will create an interlocking of approximately double the existing size, including 50 new turnouts. Three new tracks will descend into tunnels in the middle of the expanded interlocking.

Construction has been planned, designed, staged and executed to minimize disruption to existing services and communities. The project has not impacted the on-time performance of existing services, which has helped to maintain public support.

The Manhattan side of the project has been likened to orthoscopic "keyhole" surgery, with minimal impact on Grand Central Terminal and limited construction traffic in Manhattan. The work in Queens is more visible, but the safety and performance of the railroads remain foremost considerations.

The project is approaching completion, which will provide a once-in-a generation improvement for commuters.

NEW YORK CITY
FULTON CENTER



Location
NEW YORK CITY, NEW YORK, UNITED STATES

Client
METROPOLITAN TRANSPORTATION AUTHORITY CAPITAL CONSTRUCTION

Status
COMPLETED IN 2014

SUBWAY LINES
9

PUBLIC AREAS
6,000 m^2

SEPARATE CONSTRUCTION CONTRACTS
11

The Fulton Center brought together five underground stations built by three competing subway systems. The new station makes transferring among nine subway lines (A, C, J, Z, R, 2, 3, 4, 5) convenient and rational—two qualities sorely lacking in the old Fulton Street station, which forced travellers to navigate a confusing jumble of passageways.

The new transit center, which features an aboveground structure clearly visible from the street, aims to make underground transit less congested and circuitous and more accessible to people with disabilities. The centerpiece of the station is a glass-and-steel structure at the corner of Broadway and Fulton streets that features a soaring glass oculus, 27m high, and a large atrium. The public areas of the complex include 6,000 square meters of high-quality shopping and dining for travellers and visitors.

WSP, in joint venture with Bovis Lend Lease, served as consultant construction manager to the MTA, ensuring that construction was carried out in accordance with the approved design, and advising the client on issues that arose during construction. Given the complexity of the new structure, and the need to maintain 24/7 passenger access to all subway lines, managing the construction process posed a number of challenges.

The project comprised 11 separate construction contracts. Joint venture responsibilities included preconstruction services during the project's design phase, technical assistance during bid and award, and construction management of all contracts during the construction and close-out phases.
In addition to the foundation and building, the joint venture provided oversight for the demolition of various commercial and office buildings necessary to clear the site, a cut-and-cover tunnel for the new underground passageway below Dey Street, and various subway station improvements.

One of the major challenges during construction was consolidating multiple communications systems—for functions such as fire alarm, public address, and smoke exhaust—into a central command center in the new building. Other problems were posed by the need for construction crews to work around temporary corridors and covered passageways that were constantly in use by subway patrons.

Awards

- New York Construction News - Project of the Year Civil/Public Works, 2010
- Engineering News-Record New York - Project of the Year, 2015
- ASCE Metropolitan Section - Construction Achievement Project of the Year, 2015



NEW YORK CITY
MOYNIHAN TRAIN HALL



Location
NEW YORK CITY, NEW YORK, UNITED STATES

Client
EMPIRE STATE DEVELOPMENT

Status
COMPLETED IN 2020

PASSENGERS PER DAY
700,000+

SQUARE METRES
23,700

LEED CERTIFICATION
Silver

In an effort to recreate the grand entrance to the city that was lost when the original Penn Station was demolished, Empire State Development (ESD) dramatically reconfigured the James A. Farley Post Office—which sits 15.24 metres above Penn Station's platforms—into Moynihan Train Hall, a 21st-century transit destination.

Moynihan Train Hall increases Penn Station's concourse space by more than 50 percent and reshapes the travel experience of the busiest passenger transportation facility in the Western Hemisphere, used by more than 700,000 passengers per day—more than LaGuardia, John F. Kennedy and Newark International Airports combined. The 23,700-square-metre state-of-the-art facility includes 11,150 square metres of retail space.

Since 1991, WSP USA has worked with ESD, Amtrak, the United States Postal Service, the Metropolitan Transportation Authority, Long Island Rail Road, the Port Authority of New York and New Jersey, developers Vornado Realty Trust and The Related Companies, L.P., and countless other stakeholders to help guide the project to successful completion. Under WSP USA's project management, this innovative public-private partnership project was completed on time and on budget, despite challenges due to the coronavirus pandemic.

The USD 1.6 billion (CAD 2.2 billion) transformation of the 109-year-old Farley Post Office building includes state-of-the-art security and a contemporary, digital passenger experience. The facility features marble floors, glass and metal-panelled walls, new vertical transportation, interior and exterior lighting, a new lounge and passenger hospitality waiting areas, public information displays and beautiful, large-scale site-specific artwork that reflects the past, present and future of the train hall.

The train hall blends classical and contemporary design and features a one-acre sky-lit atrium, a signature clock, cutting-edge technology, clear wayfinding, full accessibility and public art. It also significantly improves the convenience, health and daily experience for passengers, neighbours and visitors.

Moynihan Train Hall achieved the U.S. Green Building Council's rigorous Leadership in Energy and Environmental Design (LEED) Silver rating and is the first project worldwide to qualify for certification under the LEED for Transit Building Design and Construction, keeping New York on track for sustainability in the 21st century. WSP administered the LEED certification and commissioning process.

Awards

- Construction Management Association of America 2021 Project Achievement Award, Transportation: Construction Value Greater than USD 50 Million (CAD 68 million)
- Engineering News-Record 2021 Best Transit Project
- American Council of Engineering Companies 2022 Grand Conceptor Award



© Empire State Development

NEW YORK CITY SOUTH FERRY STATION



Location
NEW YORK CITY, NEW YORK, UNITED STATES

Client
METROPOLITAN TRANSPORTATION AUTHORITY

Status
COMPLETED IN 2017



Manhattan's South Ferry subway station is back in service, fully rehabilitated following severe flooding sustained in Superstorm Sandy in 2012.

The South Ferry terminal station, which dates to 1905 and had been extensively renovated in 2009, was submerged in 24m of water – an estimated 57,000m3 of water from track level to the concourse level, and was forced to close.

The intrusion of salt water and sewer water caused a great deal of damage to both the station environment and the operational system equipment, including the escalators/elevators, fare control, electrical, mechanical/ventilation systems, communications systems, and track/signal systems.

WSP, in joint venture, performed station rehabilitation, flood mitigation designs and construction-phase support to bring the South Ferry subway station back on line in 2017. The firm was also responsible for leak remediation, addressing the leakage problems that the station and adjacent tunnels experienced since the original construction of the complex.

Other station improvements and customized design solutions included: hardening of various rooms and ventilation structures to handle flood loads; use of marine-type flood doors and watertight hollow metal doors for several critical rooms; use of flood panels at elevator doors, stairs and service corridors; large-capacity pumps at track level, powered by emergency generators; vent covers for street grates; and check valves, backwater valves, and isolation valves to minimize or prevent water infiltration in critical rooms.

Awards

- American Council of Engineering Companies of New York - Gold Award for Transportation, 2018

NEW JERSEY PERFORMING ARTS CENTER (NJPAC) STATION



Location
NEWARK, NEW JERSEY, UNITED STATES

Client
NEW JERSEY TRANSIT

Status
COMPLETED IN 2006



The NJPAC / Center Street Station is located on the Broad Street extension of the Newark Light Rail system, which connects the downtown district, providing service to Newark's two major intermodal facilities—Penn Station and Broad Street Station. Connecting Newark's two major rail stations, the extension offers more travel mode options within downtown Newark. The NJPAC / Center Street Station provides easy access to NJ TRANSIT's other light rail line, its commuter rail and bus networks, and Amtrak, PATH, Greyhound services.

From Penn Station, Newark, the city's main rail hub, Broad Street extension light-rail vehicles travel north to Broad Street Station in less than 10 minutes, stopping at Center Street near the New Jersey Performing Arts Center (NJPAC), Atlantic Street's growing commercial district and Riverfront Baseball Stadium, and returns southbound, stopping at Washington Park's cultural and academic institutions and again at Center Street.

All stations were designed to be compatible with adjacent structures by using similar elements and materials. Public art displayed at the stations includes leaning rails, windscreens and paving inserts inspired by historical or cultural connections or the local communities. The NJPAC / Center Street Station includes a Walk of Fame commemorating New Jersey's rich performing arts community; granite blocks in the rail bed form patterns replicating musical scores from Newark's rich jazz heritage. It also serves the New Jersey Performing Arts Center neighborhood, which is a growing mix of performance venues, parks and residential and commercial activities.

OTTAWA
CONFEDERATION LINE STATIONS



Location
OTTAWA, ONTARIO, CANADA

Client
INFRASTRUCTURE ONTARIO,
CITY OF OTTAWA

Status
ONGOING

STATIONS
13

EXPECTED TRIPS IN 2021
51,000,000

EXPECTED TRIPS IN 2031
76,000,000

WSP as part of an engineering joint venture that delivered the design for the design-build consortium Rideau Transit Group, which constructed and is maintaining Ottawa's O-Train light rail transit system. The project (phase 1) involved converting a portion of the existing bus rapid transit system into a light-rail transit system and adding new track in other areas, including upgrading existing stations and construction of
new stations for a total of 13 stations.

Project challenges included the design of the administration portion of the maintenance and storage facility building as a post-disaster facility, as it contains system-critical computer systems.

WSP provided overall project and design management including management of seven main subconsultants and several other specialists. The services WSP provided were as follows: the structural, mechanical and electrical preliminary designs for the above-ground stations and maintenance & storage facility; station and guideway civil, structural and utility pre-designs;
traffic and environmental pre-designs; IT and security; landscaping; bridges; and commissioning services on the project.

Ridership of the new O-Train system is projected to reach 76 million trips in 2031. The O-Train will manage a peak flow per direction and per hour of 18,000 passengers in 2031, greatly improve transit times in the central Ottawa area, and provide the convenience of three underground stations in the city core

PRESTON STATION ROOF RENEWAL



Location
PRESTON, UNITED KINGDOM

Client
GALLIFORD TRY

Status
ONGOING

PLATFORMS
7 in public use

TRAINSHED ROOFS
3

RIDERSHIP 2021/22
4,165,000

Preston Station in Lancashire is a Category B station on the West Coast Main Line. The station comprises three large trainshed roofs situated over the platforms and passenger concourse areas. In recent years there have been failures to the cast iron decorative elements on the Grade II listed roof, posing a risk to passengers and demonstrating deterioration of the roof. Temporary repairs have already taken place, although a permanent solution is now required to rectify these problems long term.

The overarching aim of this project is to address these issues by refurbishing the roof and associated infrastructure whilst taking careful consideration of the building's heritage values, the historic nature of the building and its associated Grade II listing.

WSP is working with Galliford Try specifically to consider the following interventions:

- Renewal and/or repair failing cast iron roof elements
- Repainting of all metalwork
- Renewal of roof coverings
- Renewal of above-ground and below-ground drainage systems
- Removal of redundant access systems, providing new where appropriate
- Installation of photovoltaic panels and a new station lighting system

WSP is working in collaboration with BDP for this commission who are providing a package of architectural and heritage-related support.

By utilising WSP's expertise in the inspection of historical structures and our knowledge of remedial repairs work, in conjunction with BDP's appreciation for the enhancement of heritage building, we are producing a design solution that will enrich the environment at this busy station. We will also be working closely with Network Rail and Galliford Try to create a Future Ready® and sustainable design aligned with Network Rail's net zero targets.

SAN FRANCISCO CENTRAL SUBWAY STATIONS



Location
SAN FRANCISCO, CALIFORNIA, UNITED STATES

Client
SAN FRANCISCO MUNICIPAL TRANSPORTATION AGENCY (SFMTA)

Status
COMPLETED IN 2023

DAILY TRAVELLERS
43,700

STATIONS
4

FIRST USE OF INCLINED PILE WALLS
1.2m dia tangent piles

WSP has been involved in the Central Subway project since 2003, when it led the joint venture responsible for preliminary engineering to transform the subway from a largely cut-and-cover alignment to a direct route optimized for pressurized face tunnel boring machines. The firm continued as the lead in two joint ventures for the final design of the tunnels and underground stations. Central Subway is the second phase of the Third Street Light Rail project and extends the line 2.7km northward through the Yerba Buena district to Union Square and Chinatown.

The light rail extension descends underground through a double portal under Interstate 80 and continues northward to three new underground stations. The Yerba Buena/Moscone Station employed a top-down, cut-and-cover method, with an off-street headhouse and entrance designed to support a future affordable housing development. The Union Square/Market Street Station, unique for its use of inclined tangent piles as the station walls, extends two city blocks from the BART (Bay Area Rapid Transit) and Muni Metro Powell Street Station under Market Street to Union Square. The Chinatown Station has an off-street station headhouse that extends more than 30 metres below ground through sand into sandstone and shale bedrock. Fully mined sequential excavation methods were used for the platform and crossover caverns to lessen traffic disturbance to Stockton Street, a major commercial and bus transit artery through Chinatown.

It now serves 43,700 travellers daily and significantly decreases travel times along Fourth and Stockton streets, two of San Francisco's most congested corridors. It decreases travel time and increases mobility by connecting local communities with limited transit access and low automobile ownership, and enables more housing development in the southeast section of the city.

Awards

- 2015 Outstanding Transportation Project of the Year in California, American Society of Civil Engineers (ASCE) Region 9
- 2020 Project of the Year (USD 60M to USD 600M; CAD 82M – 819M) – Chinatown Station, International Tunnelling and Underground Space Association (ITA) Tunnelling Awards
- 2020 Innovative and Contributing Underground Spaces – Union Square/Market Street Station, International Tunnelling and Underground Space Association (ITA) Tunnelling Awards



SCOTLAND
EAST KILBRIDE AND HAIRMYRES STATIONS



Location
SCOTLAND, UNITED KINGDOM

Client
NETWORK RAIL

Status
ONGOING

PLATFORM EXTENDED
9

SAVINGS
£50 million saved
(CAD 79 million)

SUSTAINABILITY
Decarbonizing ten miles of railway

The Larkfield to East Kilbride Electrification (LEKE) scheme began in 2018 as a pioneering effort to support economic growth in Scotland by providing an electronic rail network into Glasgow Central from East Kilbride. The line was designed to accommodate forecasted passenger demand through the East Kilbride corridor whilst supporting the Scottish Government's plans to decarbonise passenger services by 2035. LEKE has been delivered by a multidisciplinary WSP team, from feasibility stage up to single option development.

WSP's dedicated stations team was responsible for delivering two new stations buildings at East Kilbride and Hairmyres as part of LEKE. With support from IDP Architects, WSP provided its client with multidisciplinary designs that fulfilled the functional specification and were fully integrated into the adjacent electrification scheme. WSP's trained Diversity Impact Assessment superusers provided Diversity Impact Assessments at the existing stations and provided consultations to local user groups. The team also completed accessibility reports at the stations where existing access was reviewed and improvements proposed to support stakeholder commitments to the project.

LEKE is the first project to apply Network Rail's Efficient Electrification (EE) solution, a series of tools, techniques and equipment to reduce the cost, improve the management of and increase the efficiency of electrifying train infrastructure. WSP has played a significant role in developing EE standards with the aim to drive greater cost and energy efficiency out of the railway. By applying this concept on LEKE, WSP reduced the requirement of rebuilding bridges and infrastructure, which saved the client £50 million (CAD 79 million).

Using a fully coordinated 3D model to develop the multidisciplinary designs, WSP took the client through the journey of design development showing progress at critical milestones including design development reviews and interdisciplinary design checks and reviews. Early contractor involvement during these reviews allowed our design teams to collaborate with the wider project team and stakeholders. By doing this, our client was able to fully engage with the design, progress and understand design concepts. This ensured a smooth sign off process for our designs at the end of the single option development stage.





SEATTLE
ANGLE LAKE STATION



Location
SEATTLE, WASHINGTON, UNITED STATES

Client
SOUND TRANSIT

Status
COMPLETED IN 2016

GARAGE PARKING SPACES
1,092

RETAIL SPACE
242 m^2

BUDGET SAVED
$40 Million

A new light rail extension, station and parking garage are providing travellers with convenient transportation in Greater Seattle. The 1.6km South Link Extension to Angle Lake Station in the Seattle suburb of SeaTac connects Sound Transit travellers to the existing 30km Link light rail that runs north to Seattle-Tacoma Airport, the city's downtown, Capitol Hill, and the University of Washington. Angle Lake Station will serve as the southern terminus for Seattle's light rail system until a planned extension of the system opens in 2023.

WSP provided design-build project management services on behalf of Sound Transit. The project included a double-track elevated guideway between the new terminal station and the existing tracks, as well as a park-and-ride garage. The project was completed ahead of schedule and $40 million under budget.

The elevated Angle Lake Station consists of a canopied centre platform built on precast girders with a topping slab and an at-grade plaza level. A steel-framed canopy protects travellers from the elements, and escalators and elevators provide easier access to the station from the ground level. One of the notable features of Angle Lake Station is a sculpture on the platform entitled "Cloud" by artist Laura Haddad. The sculpture consists of 6,000 hanging disks that alter their appearance when there are changes in light, weather, or when a train approaches.

By 2018, 5,400 passengers are expected to use the new station on a daily basis. Angle Lake Station is the 16th station on the Link light rail line. The new 1,092-space parking garage built adjacent to Angle Lake Station offers a commuting alternative for students, workers and visitors heading to downtown Seattle and the University of Washington. WSP provided civil, structural, architectural, systems and mechanical, electrical and plumbing engineering for the parking garage, a concrete structure with a blue steel exterior.



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SINGAPORE
CIRCLE LINE STATIONS (STAGES 4 AND 5)



Location
SINGAPORE

Client
LAND TRANSPORT AUTHORITY OF SINGAPORE

Status
COMPLETED IN 2011

STAGE 4 AND 5 LINE LENGTH

17 km

NUMBER OF STATIONS

12

NUMBER OF DRIVERLESS THREE-CAR TRAINS

64

The 35.5 km Circle Line forms a connection with several existing Mass Rapid Transit lines, allowing passengers to transfer between rail lines while avoiding the city centre.

The Circle Line was constructed in five stages, with stages 4 and 5 completed in October of 2011. Stage 4 extended 9.8 km connecting Caldecott to Kent Ridge. Stage 5 extended 6.8km linking Haw Par Villa to HarbourFront. WSP was the architectural and engineering consultant for stages 4 and 5, providing architectural, civil/structural, and MEP engineering services for the stations and associated tunnels.

WSP extended its services to the construction stage by providing construction supervision services, with over 60 site staff for underground stations, twin bored tunnels, underpinning of road bridges, cut and cover tunnels for turn-back facilities, demolition, and re-building of three pedestrian overhead bridges.

The Circle Line is a fully-automated, fully-underground, medium-capacity MRT system, of which Stages 4 and 5 consist of 12 stations, served by a fleet of 64 driverless three-car trains. Buona Vista Station is a 6-level underground interchange station, which also serves as one of four civil defence facilities.



© Larry Gill

SINGAPORE
DOWNTOWN LINE STATIONS



Location
SINGAPORE

Client
LAND TRANSPORT AUTHORITY OF SINGAPORE

Status
COMPLETED IN 2017

STATIONS
34

LENGTH OF LINE
42 km

DEEPEST MRT STATION IN SINGAPORE
Bencoolen Station

The Downtown Line is a 42 km underground Mass Rapid Transit system, with a fleet of 81 fully-automated, driverless three-car trains with 34 stations, 15 of which can alternatively serve as civil defence shelters during national emergencies. It was constructed in three phases, opened in December 2013, December 2015, and October 2017.

The first phase of the line formed a loop in the downtown core. WSP provided tunnel ventilation engineering services as well as civil, structural, and MEP consultancy services for Promenade Interchange station, which is comprised of a 42m-deep stacked-platform underground interchange station with 7 basement levels and 1.12km of bored tunnels. It is the second deepest Mass Rapid Transit station in Singapore. Top-down construction and 1.5m-thick diaphragm walls were utilized to prevent the settlement of surrounding buildings.

The second phase extends 16.6km with 12 stations, bored/cut and cover tunnels and a depot, connecting the downtown Bugis Station with Bukit Panjang in northwest Singapore. WSP was the lead MEP consultant for the 12 stations, depot, and tunnels, including the design of the environmental control system, fire protection system, architectural lighting, as well as interfacing with 9 design–build main civil contractors and construction supervision services. One of the key challenges of the project was the underground construction works adjacent to the existing Expo MRT station, which had to remain fully operational during construction. Rochor Station also faced a major construction challenge due to different ground conditions and the need to temporarily divert the Rochor Canal.

For the 21 km-long third phase connected Chinatown Station with Expo Station, with 16 stations, WSP was the lead MEP consultant for the stations and associated tunnels. Project work encompassed ECS, fire protection, escalators, and lighting. This project included Bencoolen Station, with 6 basement levels reaching to a depth of 43m, the deepest MRT station in Singapore.

Awards

- Singapore Concrete Institute – Excellence Award, 2015
- Downtown Line 2 M&E Services – ACES Design Excellence Award, 2016
- MacPherson Interchange Station – Fire Safety Design Excellence Award, 2017

SINGAPORE
THOMSON-EAST COAST LINE STATIONS



Location
SINGAPORE

Client
LAND TRANSPORT AUTHORITY OF SINGAPORE

Status
ONGOING

LENGTH OF LINE
43 km

STATIONS
31

INTERCHANGES
7

The Thomson-East Coast Line will be Singapore's sixth Mass Rapid Transit (MRT) line that connects the northern and eastern regions of Singapore with the downtown district. The 43 km, fully underground, medium-capacity MRT line will be one of the world's longest driverless rapid transit lines. WSP is the lead electrical and mechanical consultant for 11 of the 31 stations, as well as for the East Coast Integrated Depot.

Spanning 31 stations from Woodlands North station to Sungei Bedok Station in the east, the line will open in stages from 2020 to 2025.

Stage 1 consists of Mandai Depot, 2 new stations, and 1 refurbished station from Woodlands North to Woodlands South, officially opened on 31 January 2020.

Stage 2 consists of 5 new stations, 1 refurbished station, and 1 station box from Woodlands South to Caldecott, officially opened on 28 August 2021.

Stage 3 consists of 9 new stations and 4 refurbished stations from Caldecott to Gardens by the Bay. Stages 1 through 3 stretch across 30 km.

Stage 4 consists of 7 new stations from Gardens by the Bay to Bayshore.

Stage 5 consists of the East Coast Integrated Depot, 1 new station, and 1 refurbished station from Bayshore to Sungei Bedok. Stages 4 through 5 stretch 13 km.

The Thomson-East Coast Line interchanges at 7 stations with 5 MRT lines, and 13 stations will also serve as civil defence shelters.

Awards

- Singapore's Ministry of Transport - Value-for-Money Achievement Award, 2014



STOCKHOLM CENTRAL STATION



Location
STOCKHOLM, SWEDEN

Client
NATIONAL SWEDISH TRANSPORT ADMINISTRATION

Status
COMPLETED IN 2017

PASSENGERS PER YEAR
60 Million

POPULATION OF METRO STOCKHOLM
2.2 Million

DAILY PASSENGERS
300,000

Stockholm Central Station is the busiest station in Sweden, both for long-distance travel and in the Stockholm commuter network, with 60 million passengers per year and a forecast of 150 million passengers per year by 2030. Adjacent to the central station is the main metro station (T-Centralen), which is the only station where all metro lines meet. More than 300,000 passengers pass through the metro station every day.

In 2017, commuter trains moved from existing tracks at Stockholm Central Station to a completely new line underneath the city centre, the City Line. The City Line is a vital project for long-term rail development in the region and for the creation of an efficient public transport system that meets city requirements. This new line has dramatically improved travel into and out of the city. The system includes a 6km new tunnel under the city centre and two new stations. The main one, City Station, is located under Stockholm Central Station and the metro lines passing through T-Centralen.

The project aims to increase capacity, permissible speed, and safety at Stockholm Central Station to accommodate for the needs of transport to, from, and within Stockholm. The station's redevelopment was conducted in its existing environment, with different transportation modes, and involving a very complex setup of the north and south yards of the station with very limited space.

WSP was also responsible for coordination with other consultants to ensure overall project success. We mobilized an experienced multi-disciplinary team of engineers, construction planners, cost managers, and environmentalists, to establish a clear strategy aiming to reduce the risk and provide development and clarity to the delivery program.

Our mandate included rail design and engineering, as well as strategic consulting, in order to raise capacity and speed while increasing safety. We were involved in the project program from early studies all the way through to detailed design and construction documents. We provided services, specifically for the design of permanent way, overhead lines equipment design, land development, risk analysis, and operational analysis, as well as coordination for other technical fields.



SYDNEY
GLENFIELD JUNCTION STATION



Location
SYDNEY, NEW SOUTH WALES, AUSTRALIA

Client
TRANSPORT FOR NSW

Status
COMPLETED IN 2014

OPENING AHEAD OF SCHEDULE
4 Months

TRAINS PER HOUR
Up to 24

COVERED WALKWAY
300 m

Glenfield Junction is a complex train station project that required innovation in design because construction had to be completed in a live rail environment with limited access. Nonetheless, the new station opened for service four months ahead of schedule.

The new station facilitates interchange between the rail lines and provides various improvements, including an upgraded rail/bus interchange, grade-separated northern and southern flyovers, a multi-story commuter car park, covered bus stops and taxi stands, a covered walkway, and an expanded rail corridor.

The Glenfield Junction Alliance had to overcome the challenge of working within a live passenger and freight rail corridor with highly restricted site geography that required interfacing with the Southern Sydney Freight Line, an ethane gas pipeline, a nearby waste landfill, a floodplain, and protected forest areas. WSP's lead structure team developed an alternative platform design that reduced the amount of excavation work required for the pile caps. In fact, the careful use of innovative methods, segregation walls, and precast concrete ensured efficient project delivery.

The station upgrade was part of a larger initiative, the South West Rail Link, which was launched in response to issues of reliability and passenger growth on the Australian rail network.

Awards

- New South Wales Engineers - Australia Excellence Awards, Project Infrastructure Category, Winner, 2013
- Australian Engineers - Australia Excellence Awards, Finalist, 2013.
- Civil Contractor Federation Awards - Civil Construction, Finalist, 2013.
- Bentley Be Inspired Awards - Innovation in Rail and Transit, Finalist, 2011.
- WorkCover New South Wales SafeWork Awards - 'Best Workplace Health and Safety Management System' Category, Finalist, 2011.
- Permanent Way Institute - Ken Erickson Award, Winner, 2011.



SYDNEY
CONCORD WEST STATION



Location
SYDNEY, NEW SOUTH WALES, AUSTRALIA

Client
TRANSPORT FOR NEW SOUTH WALES

Status
COMPLETED IN 2015

NORTH STRATHFIELD UNDERPASS LENGH
148 m

DISCIPLINES INVOLVED
21

DESIGN COMPLETED AHEAD OF SCHEDULE
8 Months

A new aerial concourse was built at Concord West Station, with four new lifts and platform upgrades that have improved accessibility. The upgrade also included a new ticket office, information displays, wayfinding signage, a family accessible toilet, and additional bike parking. Customer safety has also been improved with new CCTV and additional help points.

WSP, in joint venture, completed the detailed design and provided construction phase services for an alliance team comprising Bouygues Travaux Publics, John Holland, and Transport for NSW. We also delivered the Review of Environmental Factors (REF) and the submission report for NSRU in October 2012, as well as the associated signalling works as part of the Sydney Clearways Program. The complex detailed design project was delivered, eight months ahead of schedule. This was a significant achievement given the diverse and technically challenging scope of the works involving 21 different disciplines. The overall project was then commissioned six months ahead of schedule.

Technological innovations were key to the success of the project. BIM was used in the design of Concord West Station to plan construction work around passenger movements. Revit was responsible for ensuring that the 2D deliverables were produced based on a digitally-engineered finished product; the team had "built" the station in the office before it was built on site. Design models were used for some areas where a high level of design coordination and construction staging was required. As a result, there were very few construction design changes required, and the station was constructed while maintaining normal services.

Awards

- Australian Engineering Excellence Awards – Project Infrastructure, Winner, 2016.
- Consult Australia Awards for Excellence – Design Innovation, Highly Commended, 2016.

SYDNEY
SYDNEY METRO WATERLOO



Location
SYDNEY, AUSTRALIA

Client
JOHN HOLLAND GROUP AND MIRVAC

Status
COMPLETED IN 2024

GREEN STAR DESIGN
6 Star

SERVICE DESIGN LIFE
30 years

STATION PLATFORM (BELOW GROUND)
25 m

The new Sydney Metro Waterloo integrated station development revitalizes the Waterloo precinct and provides the community with a safe and seamless transport interchange, along with a mixed-use precinct to boost liveability. Waterloo Station connects with the CBD metro railway stations at Martin Place, Gadigal (formerly Pitt Street) and Barangaroo, and the new metro platforms at Central Station.

Our multidisciplinary team helped to deliver the new Sydney Metro Waterloo integrated station development (WISD), which is comprised of the Waterloo Station and the over station development (OSD) buildings.

The WISD is a mixed-use precinct and has been recognized as a state significant development. The precinct is the catalyst for the urban revitalization of Waterloo, sustainable job creation and an integrated mix of community facilities, commercial space, and new homes including social and affordable housing.

The OSD buildings comprises of four buildings above and next to the station, it includes two high-rise and two mid-rise buildings in a gross area of 12,871 m2 and GFA of just under 70,000 m2.

Waterloo Station is one of the six new stations that make up the transformative Sydney Metro City & Southwest project that span from Chatswood in the north, before heading under the harbour, through Sydney's CBD, onto Sydenham.

The station is being designed for durability with a design life of 30 years on all services. Our team took a Future Ready design approach that responds to future trends, including design considerations for climate adaptation, temperature and flooding, along with robust blast requirements for the security of passengers, and operations and maintenance.

Sydney's transport network is predominantly above ground: ferries, trains, buses and light rail. Overcoming the complexities of designing buildings to be constructed over a station has required substantial coordination with the broader tunnel and station systems design teams, to enable integration of the below ground station interface. Transitioning the movement of people to travel underground has meant that the customer experience from a design perspective is everything.

A key feature of the Waterloo integrated station development is the activation of the public realm for the enjoyment of the local community.

Our pedestrian modelling and civil engineers introduced a range of initiatives to improve accessibility for pedestrians and cyclists. These include reducing traffic to 40 kilometres an hour, removing a roundabout, creating a new bike lane and providing bike storage at the station.

Waterloo Station was completed in 2024. It was opened as part of the Sydney Metro City & Southwest project. The OSD buildings will achieve completion from 2025 and beyond.

TORONTO
BAYVIEW STATION



© Downsview1068



Location
TORONTO, ONTARIO, CANADA

Client
TORONTO TRANSIT COMMISSION

Status
COMPLETED IN 2002

WSP was retained by the Toronto Transit Commission to undertake preliminary design and detailed design, as well as to provide construction liaison services for Bayview Station, a major station on the Sheppard Subway Line.

Key features of WSP's input included: an extensive stakeholder consultation program; design of a 325 m long station box and cross-over structures; cut-and-cover construction to depths of 25 m under Sheppard Avenue; complex traffic staging on Sheppard Avenue and Bayview Avenue—high volume arterial roadways; major utility relocations; major shoring and unwatering systems; and station entrances from nearby buildings—with the main entrance and substation integrated for future high-rise overhead development.

We were also involved in the three-level station with a pedestrian tunnel connection to the west entrance under Bayview Avenue; bus loop; Passenger pick-up and drop-off interface, complex construction interface with twin tunnels below Sheppard Avenue, reconstruction of Sheppard Avenue and Bayview Avenue intersection, and extensive reconstruction of both roads within contract limits.

TORONTO
CASTLE FRANK STATION


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Location
TORONTO, ONTARIO, CANADA

Client
TORONTO TRANSIT COMMISSION

Status
COMPLETED IN 2012

Castle Frank Station features the construction of a new full-time exit facility connecting the subway platform to the existing bus platform at street level. This is achieved by constructing an underground pedestrian tunnel over the train tunnel that terminates with a new stair, which emerges into a street-level pavilion attached to the bus platform.

WSP provided project management, mechanical, electrical, structural, civil engineering design, landscape architecture, and contract administration services for the Toronto Transit Commission's Fire Ventilation Second Exit Program. Under the program, six subway stations were identified as requiring a second means of egress from platform level to street level. This was achieved by constructing an underground pedestrian tunnel over the subway train tunnel which links to a new stair that emerges into a street-level pavilion attached to the bus platform.

This renovation project included a new ground-level entrance and exit area, access stairs to the platform level, and a connection tunnel above the subway box structure linking each of the platforms. As an extension of the work, WSP was asked to produce design documents for upgrades to the building envelope, electrical systems, mechanical systems, and miscellaneous interior improvements.

TORONTO
GUILDWOOD STATION REDEVELOPMENT



Location
TORONTO, ONTARIO, CANADA

Client
METROLINX

Status
COMPLETED IN 2020

PASSENGERS THIS YEAR
250,000

HOUR WINDOW TO INSTALL NEW TUNNEL
53

LEED CERTIFICATION
Silver

Guildwood Station, established in 1977, served a few thousand rail passengers annually before the growth of its surrounding neighbourhoods and of local GO commuter travel. This growth led to serving up to nearly 250,000 passengers a year and the eventual need for its redevelopment. The redevelopment involved seven major scope items requiring concrete construction to facilitate the structural and architectural requirements of the project.

Completed in June 2019, the project involved enhancing accessibility, creating a stronger visual identity and increasing flexibility to accommodate future track expansions and electrifications. Working with Kenaidan Contracting, WSP provided tunnel design, installation methods and sustainable features to target LEED Silver certification while meeting the needs of the owner, Metrolinx.

Because the Lakeshore East Corridor rail lines remained live throughout the redevelopment, constructing the tunnels required extensive work and involved the installation of 330 temporary caissons (nearly 300 metres of temporary shoring) during evenings and weekends to avoid service interruptions. As part of the new tunnel installation, the existing tail lines had to be cut, removed and then reinstated all within a 53-hour window. WSP provided the track and signal design, specifications as well as the construction supervision for that work.

Guildwood station is constructed using a combination of materials to achieve the architectural vision, the station building's steel-framed roof and canopy, lined in wood, establishes a strong horizontal datum against the site's slope and is punctuated by an illuminated signage tower. Internal staff spaces, tunnel entry, washrooms and utility rooms are found built in the berm and buried under the landscape using a concrete structural system, seamlessly transitioning from the landscape to the green roof, and up to the rooftop courtyard.

Straying from Metrolinx's traditional designs involving precast, the redeveloped station features a multipurpose utility building incorporating a long cast-in-place design, and a green roof that blends in with the landscape. The building houses the boilers for the platform snowmelt system, electrical and communications rooms, and a generator.

Awards

- 2019 Ontario Concrete Awards – Project of the Year Award and Infrastructure Award
- 2021 Award of Merit, Public Buildings in Context Category, Toronto Urban Design Awards

TORONTO-YORK SPADINA SUBWAY EXTENSION (TYSSE)



Location
TORONTO, ONTARIO, CANADA

Client
TORONTO TRANSIT COMMISSION (TTC)

Status
COMPLETED IN 2017

LENGTH OF EXTENSION
8.6 km

NEW STATIONS
6

CURRENT DAILY RIDERSHIP
57,000

The Toronto-York Spadina Subway Extension (TYSSE) was the first expansion of Toronto's subway system in almost 15 years. Planning and design commenced in 2008 and revenue Service was achieved in 2017.

The extension of the Toronto Transit Commission's Line 1 subway involved the design and construction of 8.6km of twin tunnels and six new underground stations: Downsview Park, Finch West, York University, Pioneer Village, Highway 407 and Vaughan Metropolitan Centre. The project also ncluded three bus terminals, a regional train station connection, almost 3000 new commuter car parking spaces, and the expansion and upgrade of an existing TTC train storage and maintenance facility.

WSP, in joint venture with two other engineering firms, were part of an integrated project team. The project team, led by the TTC, managed the TYSSE project from the outset to completion—leading a large team of architects, engineers, project managersand designers to ensure all facets of the project aligned to bring about a successful outcome.

WSP provided project management and subject matter experts in electrical, mechanical, civil and structural engineering, and third-party stakeholder engagement professionals to coordinate planning, property, transportation and environmental issues. WSP also provided building science and sustainability consulting services.

TYSSE incorporated innovative approaches to the design and construction of the new stations. Art was integrated into the stations, and whenever possible the stations were designed to allow natural light to reach into their interiors supporting orientation and wayfinding.

A notable aspect of the project was the decision of the project team to require that an underground train storage structure that was located under a major hydro/pipeline corridor be tunnelled using the sequential excavation method. This permitted the underground structure to be built without re-locating existing hydro, oil and gas pipelines, thereby reducing the project's risk and cost.

At some of the underground stations, a high water table and the associated buoyancy risk presented a technical challenge. Extensive control measures were required to address this issue. Different stations applied different solutions. The designs implemented to address buoyancy included the integration of micropiles into the station base slab, tension piles or 2m-thick reinforced concrete floor slabs.

Modern amenities of the TYSSE included farecard-enabled gates, Wi-Fi in the stations and tunnels, and integrated customer connections to a broad range of other transit services, such as regional bus and rail, bus rapidways and future light-rail transit. The extension also incorporated a new train signalling system (automatic train control).

Awards

- 2016 PEO York Engineering Project of the Year Award Winner - Large Sized Company Category
- 2015 Tunnelling Association of Canada - Infrastructure Project of the Year

WSP designed elements of three of the TYSSE stations, Downsview Park, Finch West, and Highway 407 Stations; work was delivered by firms since acquired by WSP.



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TORONTO
UNION STATION ENHANCEMENT PROJECT (USEP)

Location
TORONTO, ONTARIO, CANADA

Client
METROLINX

Status
ONGOING

CONTRACT MODEL

Canada's first major alliance procurement project

SERVICE OPERATION

Two-way, all-day service every 15-minutes

TRANSIT INFRASTRUCTURE

Two new GO train platforms

As Union Station was built nearly a century ago, significant improvements are needed at the station and across the GO Transit network to meet growing ridership demand and support future service increases. Within the Union Station Rail Corridor (USRC) program, there are multiple projects in planning and implementation, one of which is USEP.

USEP is a GO Expansion Enabling Works project that is required in advance of the On-Corridor (OnCorr) Works project in order to facilitate future track closures for the reconstruction of platforms within the existing trainshed, and to optimize the overall OnCorr Works construction schedule. This project is the first major Canadian project that utilizes the Alliance contracting model for project procurement and delivery.

WSP is a prime team member and lead designer as part of the ONTrack Alliance team. WSP provided design in relation to all required disciplines including building and rail corridor design. Overall scope highlights include structural modifications between two bridges to open access between York and Bay Street, station platform modifications, a new signal system, all associated drainage systems in the rail corridor, BIM modelling, and systems engineering and integration including defining project requirements and tracking throughout the design.

USEP scope includes construction of new platforms with canopies and vertical access elements including stairs and elevators. The construction of two new tracks that allow future passenger trains to travel at higher speeds. Construction of new concourse area below the new platforms that will connect York, Bay, Via Concourse, Union Scotiabank Galleria, and both York and Bay Streets.

In addition, ONTrack Alliance team, which is made up of Metrolinx, Infrastructure Ontario, Kiewit, Alberici, WSP Canada Inc. (WSP), and MASS Electric, has achieved ISO 44001:2017 Collaborative Business Relationships certification. The team's collaborative relationship management system for the Union Station Enhancement Project (USEP) is the first in Canada to meet all the requirements for this international standard.

USEP will optimize rail capacity in the south train shed, provide additional station capacity and connectivity throughout the station, and enable the GO Expansion program (OnCorr). The completion of the USEP scope of work will allow for greater train and pedestrian capacity throughout the station.

Image created by A49 as part of ONTrack Alliance

TORONTO
UP EXPRESS UNION STATION



Location
TORONTO, ONTARIO, CANADA

Client
METROLINX

Status
COMPLETED IN 2015

MAIN PLATFORM LEVEL
1,100 m^2

MEZZANINE LEVEL
600 m^2

PEARSON AIRPORT CONNECTION
Terminal 1

The Union Pearson Express provides express, high-quality rail service connecting Union Station in downtown Toronto to Terminal 1 at Pearson International Airport.

WSP provided detailed design and engineering services for the UP Express Union Station platform and waiting lounge. This is a new station facility that was constructed as an addition to an existing building – the Skywalk – located immediately to the west of Union Station. Challenges of this project included constructing a significant addition at Union Station over existing structures and within a live rail corridor.

The main 1100m^2 platform level is comprised of a customer service desk, a retail service area, public washrooms, and a waiting platform, along with a second 600m^2 mezzanine level with a waiting lounge, a crew room, public and staff washrooms, and mechanical, electrical, and communication rooms.

The station's platform is completely enclosed, and features a platform screen door system for passenger comfort and safety. The platform doors open in synchronization with the doors for the light rail vehicles used by the UP Express service. The Union Station platform and waiting lounge was the last element of the UP Express project to proceed into the construction stage.

The WSP team successfully project managed and designed this complicated addition on behalf of Metrolinx. The team effectively managed multiple stakeholders as well as the Contractor throughout the project.

Awards

- Global AirRail Awards - Project of the Year, 2013



© Tom Arban Photography

TORONTO
UNION STATION REVITALIZATION PROGRAM



Location
TORONTO, ONTARIO, CANADA

Client
CITY OF TORONTO

Status
ONGOING

DAILY PASSENGERS
500,000

ORIGINAL CONSTRUCTION
1927

TRACKS
16

Constructed 100 years ago in downtown Toronto, Union Station is the largest and busiest rail station in Canada. The City of Toronto has undertaken the Union Station Revitalization Program as part of the strategy to increase the daily ridership through Union Station. The key objectives for the Revitalization Program include improving the quality of pedestrian movement in and around the station, restoring heritage architecture, and transforming Union Station into a major destination for shopping and dining. The project is currently in its second and third stages.

Upon general completion of Stage I, Stage II/ III construction began in 2015: adding a second storey below track level to the Bay Concourse; rehabilitating the VIA Rail (intercity train) waiting area; general heritage restoration; and the addition of glass roofing along the exterior moats surrounding the station to create an indoor-conditioned space between buildings.

The most significant engineering challenge undertaken for this project was the excavation of an additional storey below track level. A shoring system was designed to support the train tracks while the existing concrete columns were excavated around, partially demolished, and then extended one full storey. This system was designed to allow trains to operate at full capacity throughout construction.

WSP was retained by the City of Toronto to provide program management services for Stages II and III of the Union Station Revitalization Program. As the program manager, WSP is the main point of contact between the city, the prime consultant, and the general contractor. The WSP team is providing vital program oversight through risk management and claims avoidance, schedule review and mitigation, contract administration and change management, cost consulting, and site services. Site staff proactively resolve onsite issues to ensure a successful project delivery.



TORONTO
WELLESLEY STATION





Location
TORONTO, ONTARIO, CANADA

Client
TORONTO TRANSIT COMMISSION

Status
COMPLETED IN 2020

The Wellesley Station addition provided an alternate public access route connecting the station platform level with Dundonald Street through a proposed condominium development. This project included a new set of access stairs to the platform level and a connection tunnel above the subway box structure linking each of the platforms. The connection tunnel extended from the box structure to an adjacent development, where the ground level entrance and exit were integrated into the proposed condominium.

WSP provided design management, mechanical, electrical, structural, civil engineering design, landscape architecture, and construction support for the Toronto Transit Commission.

UDDINGSTON
ACCESS FOR ALL SCHEME (GRIP STAGE 4)


WSP used augmented reality to envision a new accessible footbridge



Location
UDDINGSTON, SCOTLAND, UNITED KINGDOM

Client
STORY CONTRACTING

Status
COMPLETED IN 2021

To improve accessibility for all passengers, including Persons with Reduced Mobility (PRM), Network Rail has commissioned Story Contracting to introduce an unobstructed, accessible route for passengers at Uddingston station. This route will extend from the station's entrance and drop-off point to and between each platform.

WSP was appointed by Story to produce the multidisciplinary GRIP Stage 4 (Approval in Principle) design, where we implemented a new type of footbridge featuring full height glazing with lantern-topped lift towers and a dynamic articulated engineered structure.

Working with Story, the WSP team designed a scheme that aims to improve on the standard footbridge design with amendments made to suit Uddingston station and its specific requirements and constraints. And with our architectural partner, IDP, we amended the generic design details to improve constructability and unlock cost benefits for the client.

WSP adopted a multidisciplinary approach to driving continuous improvement throughout the design process. For example, the cable management system was adapted to suit the specific dimensions of the station without comprising the overall architectural vision or our client's standards.

The design also provides a generous four-metre clearance between the lift and stair structures and the platform edge. As well as enabling a safer working environment, it also means PRM can benefit from use of train access ramps throughout the entire construction phase, improving inclusivity and optimizing safety.

VANCOUVER
CANADA LINE STATIONS



Location
VANCOUVER, BRITISH COLUMBIA, CANADA

Client
SNC LAVALIN

Status
COMPLETED IN 2009

STATIONS
16

COMPLETED AHEAD OF SCHEDULE
3 Months

LENGTH OF PLATFORMS
40 to 50 m

The Canada Line is a rapid transit system that is approximately 19km long and connects Downtown Vancouver with the International Airport and the City of Richmond. It is fully separated from general traffic with track that is either below-grade or elevated, with only a short section of at-grade rail.

This high profile project is an integral part of Vancouver's transportation infrastructure and was a key component of the City's 2010 Olympic Bid commitment. The project was completed on budget and 3 months ahead of schedule, and was an incredible success during the Olympic Games. Even today, it continues to surpass ridership targets.

WSP provided multidisciplinary engineering services for 4 stations and civil engineering services for 13 of the 16 Canada Line Stations. Engineering for this project was highly complex, as the line spans two municipal authorities and travels through widely differing urban contexts with widely varying services and requirements. Each Canada Line station is slightly different in appearance, designed to blend in with its surrounding neighbourhood, and features as much local material as possible, including the abundant use of wood. Above ground stations were designed with an open-air concept, which negated the need for much mechanical or glazing, while maximizing natural light.

Awards

- Gold Award for Infrastructure Excellence, Canadian Council for Public- Private-Partnerships, 2009
- National Award for an Engineering Project, Engineers Canada, 2013
- Schreyer Award (for most technically innovative project), Canadian Consulting Engineering Awards, 2010



WELLINGTON STATION



Location
WELLINGTON, NEW ZEALAND

Client
KIWIRAIL

Status
COMPLETED IN 2010

DAILY PASSENGERS
29,000

DAILY TRAINS
390

DAILY TRIPS
44,000



Wellington Station, the main railway hub in the eponymous capital of New Zealand, has been serving its community since it was constructed to amalgamate two previously existing rail stations in 1937. Each day, 29,000 passengers make 44,000 trips on 390 trains, (a number that excludes long-distance services through the station), up from 7,600 passengers and 140 trains daily in its first year of operation in the 1930s.

By 2007, the station was experiencing considerable delays because of a bottleneck caused where the rails entered the station. In the original design, four sets of tracks merged in the railway yards into two main lines that fed the eight station platforms. With four times the ridership than its original design, the bottleneck was causing delays for trains trying to enter or leave the station, negatively impacting passenger experience.

Our solution was to construct a third main line in order to alleviate the congestion problem. This new line is bidirectional, so that during the morning rush its signals allow trains to travel into the station and during the evening rush its signals allow trains to exit the station, thus doubling the capacity of Wellington Railway station during peak periods.

WSP served as sub-consultant for this project, providing planning, project management, and engineering design services to the upgrade of the infrastructure, the related railway signalling, and power supply. Throughout the work it was crucial that the station remained fully operational so as not to disrupt the lives of the people that depend on the station for their daily commuting needs. We produced a very detailed, staged work plan to assure that the station was open throughout the whole process.

WESSEX STATIONS



Location
WESSEX, UNITED KINGDOM

Client
C SPENCER LTD., NETWORK RAIL

Status
COMPLETED IN 2013



WSP was appointed to the multidisciplinary design and build contract extension of platforms at 50-plus stations in the Wessex region of southeast England. This work is a part of the South East Train Lengthening Programme (SETLP) required to deliver Network Rail's commitment to their Strategic Business Plan. In order to do so, we delivered the design, construction and commission of the infrastructural element required to facilitate the introduction of new, longer ten-car trains by extending each station's platform.

The sites were of varying complexity and were required to be designed and constructed at multiple locations simultaneously. The key to success was planning the design and installations to ensure that disruption was kept to an absolute minimum.

WSP was lead designer, and we delivered design and construction support for infrastructure services, including signalling, civil and structural engineering, mechanical and electrical engineering, permanent way, as well as conductor rail and telecommunications design.

The stations where the platforms were extended were: Ashtead, Barnes Bridge, Berrylands, Bookham, Boxhill & Westhumble, Brentford, Chessington North, Chessington South, Chiswick, Clandon, Clapham Junction, Claygate, Cobham & Stoke D'Abernon, Earlsfield 1, 2 & 3, Effingham Junction, Effingham Junction sidings, Epsom, Epsom Sidings, Ewell West, Fulwell, Guildford, Hampton, Hampton Court, Hampton Wick, Hinchley Wood, Horsley, Kempton Park, Kew Bridge, Kingston, Leatherhead, London Road, Malden Manor, Motspur Park, New Malden, Norbiton, Oxshott, Raynes Park 1, Raynes Park 2 & 3, Raynes Park 4, Shepperton, Stoneleigh, Strawberry Hill, Sunbury, Teddington, Thames Ditton, Tolworth, Upper Halliford, Vauxhall (7 & 8), Virginia Water, Weybridge, and Worcester Park.

INTERNATIONAL AGILITY

83,000
EMPLOYEES

14B
2024 NET REVENUES* (CAD)

ENR
Engineering News-Record

TOP INTERNATIONAL DESIGN FIRM

#1
TRANSPORTATION

#1
MASS TRANSIT AND RAIL

Source: ENR Global Sourcebook 2024



OUR GUIDING PRINCIPLES

We value our people and our reputation.

We are locally dedicated with international scale.

We are future-focused and challenge the status quo.

We foster collaboration in everything we do.

We have an empowering culture and hold ourselves accountable.



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