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International Project Solutions

Grace for Mass Transit



GRACE

Grace for Mass Transit



1 Bangalore Metro Rail Corp. Ltd. (BMRCL)
India

2 Crossrail
UK

3 San Francisco BART (Bay Area Rapid Transit)
USA

4 Seoul Subway
Korea

5 Metro Panamá
Panama

6 Société de transport de Montréal (STM)
Canada

7 Paris Metro
France

8 Dubai Metro,
United Arab Emirates

9 New York Grand Central Station
USA

10 Shanghai Maglev
China

11 Metro São Paulo,
Brazil

12 Singapore Metro
Singapore

Grace for Mass Transit

“ You can’t understand a city without using its public transportation system. – Dr. Erol Ozan ”

Grace Capabilities

Grace’s products have a long and successful track record on metro systems around the world. From the first (London) to the biggest (New York); to the busiest (Seoul); to the longest (Shanghai), Grace’s waterproofing, fireproofing and/or specialty concrete admixtures products have been used on all of these systems, as well as on more than 50 others globally.

Water and moisture intrusion, structural and aesthetic deficiencies in concrete or inconsistencies in fire protection can cause significant damage to the Mass Transit infrastructure, resulting in high replacement costs, lost revenue, and serious disruption in travel. This is why designers from around the world turn to Grace Construction Products’ solutions to protect these crucial elements of today’s modern transportation environment for the life of the project. Designers often select Grace products to enhance the durability and sustainability of their projects.

Working on projects across borders and continents has become a common and necessary practice in recent years. Grace has a global network of experts to assist and ensure that projects run smoothly - from the earliest design phases through construction and completion. Grace’s team provides both design services and site services and consists of some of the most experienced and engaged people in the field. Our broad technology portfolio allows for a variety of solutions regardless of the design or location.

Grace products have been used on Mass Transit projects around the world for almost half a century

AMERICAS

| | |
|--|--------|
| DART (Dallas Area Rapid Transit) | USA |
| Los Angeles Metro | USA |
| MARTA (Metropolitan Atlanta Rapid Transit Authority) | USA |
| MBTA (Massachusetts Bay Transportation Authority) | USA |
| Metro Fortaleza | Brazil |
| Metro Ipanema (Rio de Janeiro) | Brazil |
| Metro Panamá | Panama |
| Metro São Paulo | Brazil |
| Miami Metro Rail | USA |
| NJ Transit Authority | USA |
| NYCTA (New York City Transit Authority) | USA |
| San Francisco BART (Bay Area Rapid Transit) | USA |
| San Mateo Transit Center | USA |
| Seattle Sound Transit Light Rail | USA |
| Société de transport de Montréal (STM) | Canada |
| Toronto Transit Authority | Canada |
| WMATA (Washington Metro Area Transit Authority) | USA |

ASIA PACIFIC

| | |
|----------------------------------|-----------|
| Beijing Metro | China |
| Brisbane Eastern Busway Terminal | Australia |
| Busan Metro | Korea |
| Guangzhou Metro | China |
| Hanzhou Subway | China |
| Harbin Subway | China |
| Hong Kong MRT | China |
| Kuala Lumpur LRT | Malaysia |
| Nagoya Metro | Japan |
| Nanjing Metro | China |
| Seoul Metropolitan Subway | Korea |
| Shanghai Maglev | China |
| Singapore Metro | Singapore |
| Taipei Metro | Taiwan |
| Tianjin Metro | China |

EMEAI

| | |
|---|----------|
| Bangalore Metro Rail Corp. Ltd. (BMRCL) | India |
| Barcelona Metro | Spain |
| Budapest Metro | Hungary |
| Copenhagen Mini Metro | Denmark |
| Crossrail | UK |
| Dubai Metro | UAE |
| Grenoble Tramway | France |
| London Underground | UK |
| Lyon Tramway LTS | France |
| Metro de Sevilla | Spain |
| MM Metro Milan | Italy |
| Nantes Light Rail | France |
| Nice Tramway Line | France |
| Paris Metro | France |
| Sofia Metro | Bulgaria |
| St Etienne Metro | France |
| St. Petersburg Rail Terminal | Russia |
| Warszawa Metro | Poland |

Grace Brands are Globally Recognized



Mass Transit Applications

Waterproofing Underground Stations & Tunnels

Stations underground require a dry environment to ensure continued operations, safety and aesthetic appeal. All Grace structural waterproofing membranes, whether pre-applied to the substrate in confined spaces or post-applied to the structure, develop an adhesive bond to the concrete. This bond creates a uniform and continuous waterproofing system, preventing lateral water migration and protecting the structure from the devastating effects of water infiltration.

Grace's waterproofing, waterstops and drainage solutions have been successfully used for over 40 years to protect cut and cover tunnel structures around the globe. More recently, Grace products have been used in conventional tunnel lining applications. With its complete line of fully-adhered waterproofing systems, Grace is a single source for maximum protection against water pressure, ground settlement, and contaminants such as chlorides, sulphates, radon and methane or other industrial site contamination.

Soil Stabilization

Underground construction often involves unforeseen and challenging soil conditions. Subsurface water, fractured rock, or unstable sands are just a few of the conditions that can be encountered. Grace offers solutions with two component polyurethanes, low viscosity acrylate resins and microfine cements to stop water, stabilize soils and keep projects on schedule.

Above Ground Stations & Buildings

Protecting people and spaces above ground from the elements is just as important. Grace's sheet, liquid and hybrid membrane systems are engineered specifically for each part of the building envelope.

Elevated Decks/ Green Roof

Above ground horizontal surfaces include station plazas, podiums, green roofs and platforms. Grace's waterproofing membranes and drainage composites are applied directly to the structural deck and typically covered by a permanent wearing surface.

Station Platforms

In addition, certain Grace membranes provide excellent electrical insulation properties for use on platforms in both underground and above ground stations.

Engineered Façade

Weather-resistive barriers are an integral component of the engineered façade or wall assembly. Regardless of the wall design or geographic location of the project, Grace offers a complete line of fully-adhered permeable and impermeable solutions to ensure proper wall performance and integration with other portions of the building envelope.

Sloped Roof

Grace's roofing underlayments have set the standard globally on some of the most intricate roof designs and demanding climatic conditions. Aesthetically pleasing, architectural sloped roof systems are designed to shed water quickly and are not always successful at preventing leaks caused by wind driven rain, snow, ice melt and at critical detail areas and complex geometries. A properly designed roofing underlayment membrane can offer superior in place performance and leak protection for the design life of the structure.

Grace for Mass Transit

Structural Concrete

Grace offers a wide variety of admixtures and fibers to meet design and construction requirements for mass transit systems. Corrosion inhibitors cost effectively protect reinforcement in parking structures and viaducts. Cracking in slab on ground and platforms comprised of composite steel decks are mitigated through the use of synthetic macrofibers and shrinkage reducing admixtures.

Architectural Concrete

Grace's integral color, surface retarders and high range water reducers are combined to create architectural precast panels, precast/prestressed elements, and decorative concrete pedestrian areas. Designers use contrasting pavement finishes to help with zoning and direction finding.

Fire Protection

Passive Fire Protection is critical for life safety and protecting the structural integrity of the steel members and concrete in enclosed transit systems from fire damage. Grace's high and ultra-high density spray-applied cementitious fireproofing is proven to protect against the most severe fire exposures and withstands air erosion, abrasions, impact damage, corrosion, and extreme environments. Grace also offers polypropylene microfibers that greatly improve the spalling resistance of concrete when exposed to extreme fire temperatures.

Maintenance and repair solutions

Over time, even the best designed underground transit systems develop leaks. Grace offers the latest chemical grout technology with the DeNeef line of polyurethane and acrylate grouts. These innovative products provide permanent leak sealing solutions that stop water and protect the reinforcing steel. Rapid cure times allow for the fast turnaround schedules with minimal disruption to transit service.



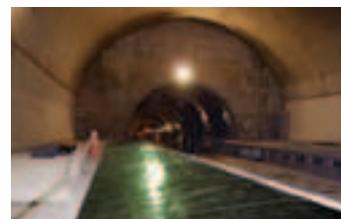
Preprufe® Pre-applied Waterproofing



De Neef Grout Application



Grace concrete Admixtures



Bituthene® Post-Applied Waterproofing



Grace architectural concrete



Monokote® Fireproofing

Grace for Mass Transit

Grace technical experts can assist throughout your project delivery process

- Recommend the optimal product solution for your project location.
- Work internationally with the project team throughout the entire design and construction process.
- Provide jobsite expertise and support.
- Facilitate global projects in all major construction segments.

Grace supplies products to more than 120 countries worldwide, through its plants and facilities in more than 40 countries, supported by a team of almost 6,000 people.

Key regional offices include:

UK (London), France (Paris), Italy (Milan), Belgium (Brussels), Poland (Warsaw), Turkey (Istanbul), U.A.E. (Dubai), Saudi Arabia (Dammam), India (Delhi), China (Shanghai, Hong Kong), Singapore, South Korea (Seoul), Australia (Sydney), USA (Boston, Chicago, San Francisco), Brazil (Sao Paulo) and many more locations globally.

Worldwide Headquarters

North America

W. R. Grace & Co.—Conn., 62 Whittemore Avenue, Cambridge, MA 02140-1692

www.graceconstruction.com/international-projects

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