Solutions for the U.S. Infrastructure Industry

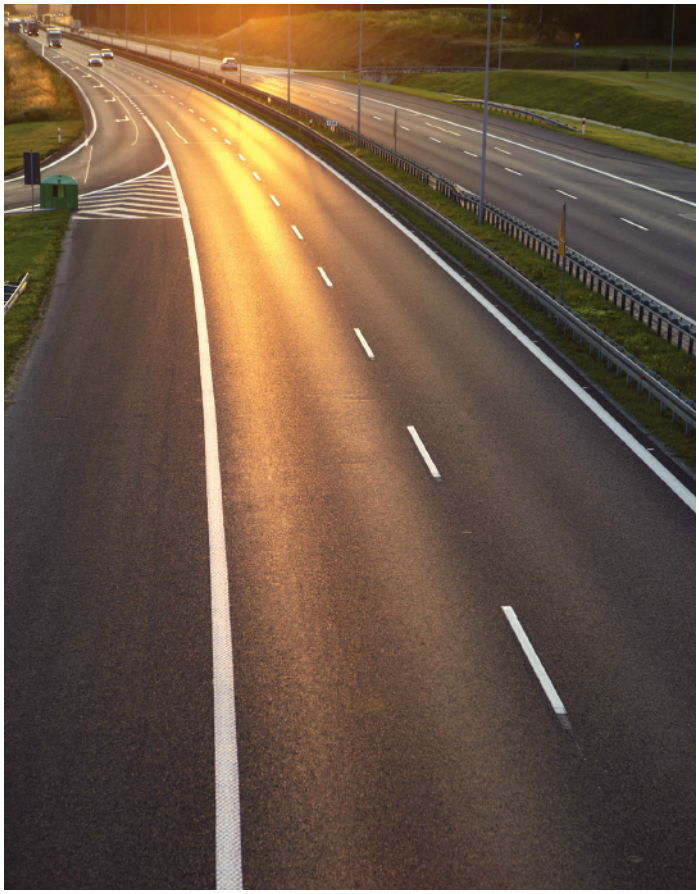
Dow's Products Offerings

Products That Work for the U.S. Infrastructure Industry

The infrastructure of the United States is being improved to meet the evolving demands of the industries that rely on it and the people who use it every day. Roads, marine structures, airports, rail systems, water distribution and power generation systems must all be optimized to facilitate regional expansion and enable both domestic and international competition. Such infrastructure development requires support from new technologies – sustainable, efficient solutions that increase performance and facilitate builder confidence.

And that's where Dow comes in. We're working to support the infrastructure industry and strengthen its ability to innovate through more sustainable and industry-accessible practices. We offer products that work for roads, structures, signage and road marking, as well as applications for industrial support and camps.

Dow can help you to identify the product solution that best meets your requirements, thanks to a broad portfolio of products and alliances with key players in the infrastructure industry.



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Roads, Highways and Bridges

The United States has more than 4 million miles of roads to support the movement of its products and people. These roads must be built and maintained to withstand heavy traffic and adverse environmental conditions. They must also be constructed safely, using technologies that reduce construction time, and materials that prolong the life of the road.

Dow is aware of these challenges and offers many solutions. Our products can help increase the performance and durability of asphalt; improve aggregate adhesion, dust suppression and vegetation control; and result in safer and more reliable roads. This adds value for the builder, by improving construction processes and minimizing maintenance.

Asphalt Additives

Asphalt and aggregates are essential materials in the construction of a highway, and they must comply with standards to minimize problems caused by moisture, deformation and wear – providing a safe and reliable surface.

Dow makes amines used in the production of asphalt additives that help minimize the impact of temperature changes on the road, promote stability, and improve interactions between asphalt and aggregates – ultimately increasing performance levels and extending the lifetime of the road.

Anti-Strip Agents

Anti-strip agents are liquid additives used with asphalt; they act as surfactants to increase the bond strength between the asphalt and the aggregates. These agents can significantly extend pavement life and protect against stripping caused by water infiltration between the links of these two components. Products include DETA, TETA, TEPA, HPA-X, and Amine DCT.

Cold-Mix Additives

Cold mixes feature surfactants in the asphalt and water mixture that decreases its viscosity and allows better handling. The resulting mixture, which does not require heat to apply, is generally used for patching and maintaining the road. TERGITOL™ and TRITON™ product families are often employed.

Warm-Mix Waxes and Emulsions

Warm asphalt mixtures are produced from the addition of waxes or emulsions to the binder in order to lower mixing/laying temperatures. This means reduced fuel consumption and lower levels of volatile compounds in the environment.

Asphalt Reinforcement

In road construction, quality asphalt and aggregates are needed to meet design requirements for soil, traffic and safety.

To obtain appropriate strength characteristics and durability from an asphalt mixture, it may be necessary to use reinforcing additives. Dow has monomers that are used in the manufacturing of high-technology acrylic fibers for asphalt reinforcement, minimizing problems such as deformation, cracking and wear. This increases the life of the road and reduces the time required for maintenance.

This technology forms a three-dimensional network to evenly distribute loads and improve mechanical performance, promoting asphalt layer thickness reductions of up to ½-inch. The result is a decrease in the amount of raw materials required for road construction – without compromising the strength properties and durability of the asphalt. Moreover, this technology is resistant to both acidic and basic materials, microorganisms, ultraviolet rays, moisture and high temperature operation (does not melt).

Using our acrylate monomer contributes to increases in:

- Resistance to indirect tension, expressed as Relative Thermal Index (RTI)
- The degree of asphalt Performance Grade (PG)
- Indirect Tensile Strength Retained (TSR)
- Flexibility to allow greater % course aggregate (CA)
- Pavement life
- The bending beam 4 points
- The dynamic modulus of asphalt mixtures
- User safety

Other benefits:

- Works in Stone Matrix Asphalt (SMA) mixtures and Hot Mix Asphalt (HMA)
- Holds and stabilizes the drained asphalt
- Increases mechanical properties
- Reduces permanent deformation
- Modifies asphalt rheology, increasing its hardness and improving its performance grade
- Reduces maintenance costs by up to 45%

Vegetation Control

The presence of undesirable vegetation around roadways has negative impacts on road safety and the proper functioning of the road. Weeds can block the line of sight of the driver; promote the spread of invasive species; damage wiring; and cause erosion, corrosion, potholes and flooding due to poor drainage.

Milestone™ Herbicide from Dow AgroSciences performs effective control of vegetation in industrial areas such as power grids, railways, roadsides and forests. These products help prevent unwanted vegetation that can cause injury to the road and community, without affecting agriculture.

Dust Suppression

The presence of particulate matter during road construction may lead to health problems for workers, environmental damage, delays in construction time and even accidents. Dow presents a solution for dust control on unpaved roads, specifically designed to minimize problems caused by the presence of particulate matter in the air.

ROHMIN™ DC 5500

Rohmin™ DC 5500 is a product formulated from renewable sources. It facilitates the penetration and permanence of water in soil, acting as a binder of the smallest particles (<10 microns) and generating dense aggregations to efficiently control dust on unpaved roads. The product can be applied to diverse types of soils and dust-generating sources.

Characteristics:

- Low surface tension for increased substrate wetting
- Ability to agglomerate fine particles
- Environmentally friendly product, made with renewable materials

Benefits:

- Provides better, longer lasting control of fine particles
- Improves air quality by suppressing dust clouds
- Easy to apply, generating a water-based solution to be used according to Dow recommendations
- Reduces fuel and water consumption due to increased time between applications
- Reduces worker health issues and improves impact on communities

Structures

Concrete and cement are key materials in many engineered structures. These materials are an essential foundation of roads, bridges, skyways and tunnels that must withstand aggressive designs, heavy traffic flows and challenging environmental conditions.

Recognizing the importance of these materials in infrastructure, Dow offers a portfolio of additives and coatings to improve the durability, strength and reliability of concrete and cement.

Performance Improvement of Concrete

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Durability and Performance Improvement of Concrete

Properties such as durability, structural capacity, aesthetics and compatibility with other materials such as steel and metal make concrete a widely used material for infrastructure and construction. Dow products support a wide range of Concrete Admixtures, moisture barrier, insulation, and concrete bedding strips.

Portfolio:

- TERGITOL™ NP TRITON™ and ECOSURF™ SA surfactants manage the effects of Air Entrainment, especially with Fly Ash
- Amines like TEA and TIPA can be used to adjust cure speeds, useful in cold weather climates
- Concrete defoamers are enabled by Polyglycol P-Series and DOWFAX™ surfactants
- DOWANOL™ DPM and TPnB work to minimize shrinkage and cracking of concrete
- STYROFOAM™ Insulation used as a bedding strip material for bridges

High Performance Coatings

Dow offers the industry polyurea-based coating systems applicable to most substrates with the use of a special primer to provide a totally waterproof membrane, combating severe corrosion, abrasion and erosion. These systems are applied by qualified contractors.

Characteristics:
- 100% solids (solvent free)
- Layer thickness (1.5 mm minimal)
- Excellent elongation and tension properties
- Compatible with epoxy primers even on surfaces with higher humidity
- Greater moisture tolerance than polyurethanes
- Requires mechanical application

Benefits:
- Fast application and drying
- Great chemical resistance
- Flexibility even at very low temperatures (-20°C, -4 °F)
- Impact and abrasion resistant

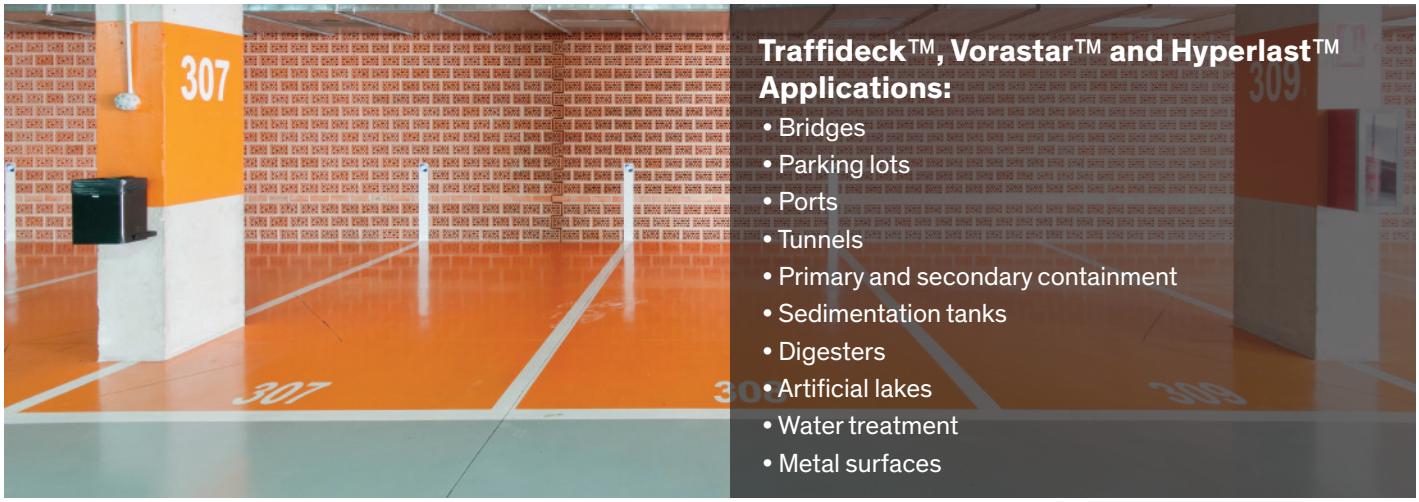
TRAFFIDECK™ Waterproofing and Deck Coating Systems
This four-layer, polyurea-based waterproofing system reinforces the concrete, protecting it from wear and corrosion and extending its useful life. In addition, Traffideck™ protects high traffic roads, providing an alternative to traditional waterproofing techniques by offering unique specifications and application methods.

VORASTAR™ and HYPERLAST™
Vorastar™ and Hyperlast™ polyurea elastomer systems are designed for industrial applications, specifically for the protection of concrete surfaces and aluminum. Thanks to the intrinsic characteristics of polyurea, these products are resistant to high temperatures, corrosion and moisture.

Characteristics:
- Monolithic membrane with fast spray application
- Effective solution to replace lower efficiency laminated membrane systems
- Strong bond with concrete and metal

Benefits:
- Cost -effective
- Quick drying, so structure is back in service faster
- Waterproofing protection with lasting durability

Benefits:
- Environmentally friendly: Free of solvents, volatile organic compounds (VOCs) and odors
- Minimizes health and safety risks
- Low maintenance
- Impact resistant
- Easy to repair
- Easy to apply
- Can be applied in low temperatures
- High durability
- Protects metal structures, increasing lifetime
- Fast structure back to service



Traffideck™, Vorastar™ and Hyperlast™ Applications:
- Bridges
- Parking lots
- Ports
- Tunnels
- Primary and secondary containment
- Sedimentation tanks
- Digesters
- Artificial lakes
- Water treatment
- Metal surfaces

Industrial Coatings for Protection of Structures and Coating for Floors

To meet the application and use challenges associated with structural maintenance and protection coatings, as well as floor coatings, Dow has developed a novel technology that combines the chemical resistance with the durability of acrylic systems. Maincote™ AEH is a hybrid two-component system that offers the ability to formulate coatings with very low VOC levels while extending use, and minimizing application and drying time.

Features and Benefits:

- VOC < 50 g/L
- Good durability and gloss retention
- Fast drying, cure and development of hardness
- Greater UV resistance
- Excellent chemical resistance
- Does not require the use of solvents during manufacture and application

Principle Applications:

- Concrete coating for flats and commercial garages
- Wall coverings for institutional buildings (schools, hospitals)
- Coatings for steel structures

Construction Solutions

Industrial and infrastructure construction applications have grown considerably in the past decade. This has increased demand for high-performance, environmentally friendly materials that reduce waste, optimize productivity, and meet project cost and technical requirements. Dow has a number of solutions that support the production of high-performance materials, offering durability, structural capacity and aesthetic possibilities that can meet the new challenges of infrastructure and construction.

Curing Membrane

The cured membrane is a coating-based acrylic that provides an efficient and economical way to control evaporation of moisture during the critical hydration process, promoting appropriate cure in cases where traditional techniques are not viable.

The cured membrane is applied to the fresh concrete within the first hours of installation, forming a film that reduces water evaporation and allows greater hydration of concrete. Dow acrylic technology helps improve the key properties of concrete, increasing its resistance and minimizing cracks, offering more efficient and cost-effective performance and achieving better protection of the long-term surface.

Benefits:

- Excellent durability
- Excellent water retention to promote optimal hydration
- UV stability
- Stain and whitening resistance
- Minimizes concrete cracking
- Cost-efficient
- The membrane does not need to be removed

Mortar Modifier

Mortar modifiers are polymers dispersions. They increase the performance of mortars, ensuring better adhesion to surfaces and improved mechanical properties. These solutions can be used in patching and repair mortars, floor coverings, decorative vertical mortars and waterproofing. These Dow dispersion polymers enable mortars to be applied even with low water content.

Benefits:

- Reduces porosity
- Increases chemical and humidity resistance
- Provides good workability at low water levels vs. non-modified mortars
- Limits the propagation of micro-cracks
- Offers resistance to impact and abrasion

Concrete Sealers

Concrete sealers are additives that modify the permeability of the surface, reducing water penetration and efflorescence cracks while improving the appearance of concrete and enhancing resistance to soiling. Dow provides polymers for applications in water- or solvent-based sealers and some acrylic solutions, ready for use.

Benefits:

- Water infiltration resistant
- Chemical, UV and abrasion resistant
- Easy to apply
- Efflorescence resistant

Cement Membranes

Cement membranes modify surface permeability to resist the passage of water. They are used with concrete, mortar and masonry substrates for applications including roofing and waterproofing. They are also used in self-leveling mortars and in tanks, reservoirs and pools. They are available in two forms: two-component (a liquid phase and a solid phase are mixed before use) or one-component (one solid phase).

Dow has a portfolio of styrene-acrylic emulsions with water resistance and low odor, to be used according to the needs and product features: flexible and non-flexible.

Benefits:

- Protects the structure from water penetration, but allows vapor passing
- Excellent adhesion over cement substrates
- Easy and fast to mix and apply
- Good abrasion resistance

Super Plasticizers for Concrete

Dow offers pre-polymers such as MPEGs for use in the manufacture of super plasticizers – before special, next-generation additives are incorporated in the production of high-performance concrete. These pre-polymers reduce the need for water, providing increased workability and lower porosity concrete.

Concrete Adhesive and Sealants

Dow polyurethane prepolymers are designed for formulating concrete adhesives and sealants. Its low viscosity and excellent reactivity allow for easy applications. The offering allows for reduction of time and work associated with removing old coatings, resistance to dirt pick up, strong adhesion, and paintability.

Traffic Markings & Road Delineation

Safety is the primary goal in road construction. Infrastructure companies are working to build safer, more reliable roads, to help minimize risks to drivers and passengers and encourage the growth of commercial and tourist transportation. This results in the need for perfectly marked and signaled roads, coating made from materials that can resist adverse environmental conditions while accommodating high traffic flow and providing greater visibility, reflectance for drivers and enhanced durability.

Road Paint Solutions

Dow manufactures road paint solutions made from water-based polymers, specifically designed to improve durability and facilitate the application of paint on the road. While providing the expected benefits of a solvent-based paint, our water-based solutions offer improvements for the environment and help to increase safety on the road. Dow is setting the standard in the industry for signs and road markings.

FASTRACK™

Fastrack™ is a polymer technology patented by Dow; it has a fast drying mechanism with improved resistance to washing and rain, even under conditions of high humidity. It can also be applied at low temperatures with quick drying capabilities. Fastrack™ is a sustainable technology that helps reduce emissions of volatile organic compounds.

Benefits:

- Quick dry
- Water-based / reduced VOC
- Outstanding durability and toughness
- Excellent adhesion to road surfaces

Polyethylene Pipe

Municipal governments, private businesses and homeowners across the U.S. are choosing polyethylene (PE) pipe for both new projects and the refurbishment of older systems based on the various advantages PE offers over traditional materials such as steel, ductile iron, concrete and PVC.

Dow offers an industry-leading portfolio of PE resins for pipe and irrigation applications, combining proven solutions with the latest innovations to deliver opportunities for exceptional long-term performance, efficient processing and installation and, in many cases, lower overall costs.

Portfolio:

- CONTINUUM™ Bimodal Polyethylene Resins for natural gas distribution pipe, municipal and industrial water pipe, oil and gas pipe, energy pipe systems, industrial and chemical processing pipe and mining pipe.
- DOWLEX™ PE-RT Resins for radiant floor heating pipe.
- FINGERPRINT™ Polyethylene Resins for drip irrigation tubing and tape.
- HYPERTHERM™ Resins for flexible hot and cold water pipe in residential and commercial plumbing.
- INTREPID™ Bimodal Polyethylene Resins for oil and gas pipe, energy pipe systems and other high-performance pipe applications.

Benefits of Polyethylene Pipe:

- Toughness and durability for long life expectancy
- Ability to produce virtually leak-free systems
- Light weight and flexibility
- Chemical and corrosion resistance
- Excellent hydraulic properties
- Wide service temperature range
- Low thermal conductivity
- Ease and versatility of installation

Other Solutions

In the infrastructure industry, there are support functions that are not directly related to construction but are still essential to project success. Sometimes, workers need to build temporary camps because of a project's geographic location. These camps must provide all necessary resources to ensure an adequate quality of life for those who live there. In addition, it is essential to prevent situations that affect the health of workers and the environment. Dow provides solutions to two problems that can be encountered: ultrafiltration membranes, which provide a continuous supply of safe drinking water, and dust suppressants, which effectively control particulate matter.

Camp Water Treatment

Ultrafiltration
Ultrafiltration (UF) is a process in which water and dilute matter pass through a membrane, while solids are retained. The UF membranes have a high capacity of bacteria removal and separate most viruses and colloids, therefore obtaining effective purification.

INTEGRAPAC™
DOW IntegraPac™ Ultrafiltration Skids offer an innovative and reliable solution for producing high-quality water and, at the same time, improving the cost-effectiveness of the installation.

Applications:
- Soft water
- Waste water recuperation

Benefits:
- Quality water at all times
- Modular design that can be assembled to manage a wide range of flux
- Corrosion resistant
- Standardized pieces. No need to cut, measure, weld or glue pieces together
- Easy to inspect and replace at the end of its useful life

Product Stewardship
Dow has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis for our product stewardship philosophy by which we assess the safety, health, and environmental information on our products and then take appropriate steps to protect employee and public health and our environment. The success of our product stewardship program rests with each and every individual involved with Dow products - from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

Customer Notice
Dow strongly encourages its customers to review both their manufacturing processes and their applications of Dow products from the standpoint of human health and environmental quality to ensure that Dow products are not used in ways for which they are not intended or tested. Dow personnel are available to answer your questions and to provide reasonable technical support. Dow product literature, including safety data sheets, should be consulted prior to use of Dow products. Current safety data sheets are available from Dow.

U.S., Canada, Mexico:

General Info:
Call toll-free: 1-800-258-2436
Call: 1-989-832-1556

Chemical Products:
Call toll-free: 1-800-447-4369
Call: 1-989-832-1542

Plastic Products:
Call toll-free: 1-800-441-4369
Call: 1-989-832-1426

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