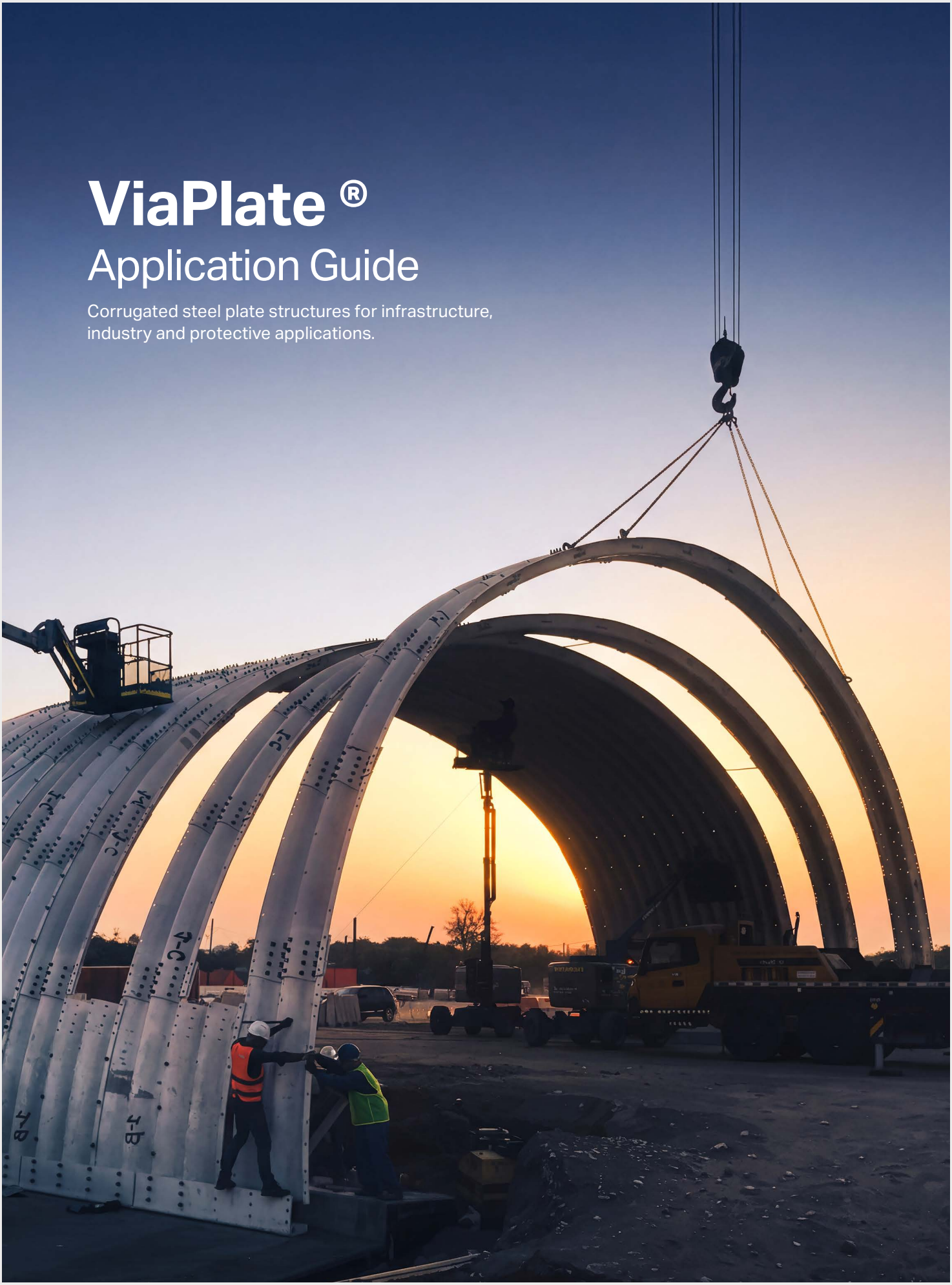
ViaPlate ®

Application Guide

Corrugated steel plate structures for infrastructure, industry and protective applications.



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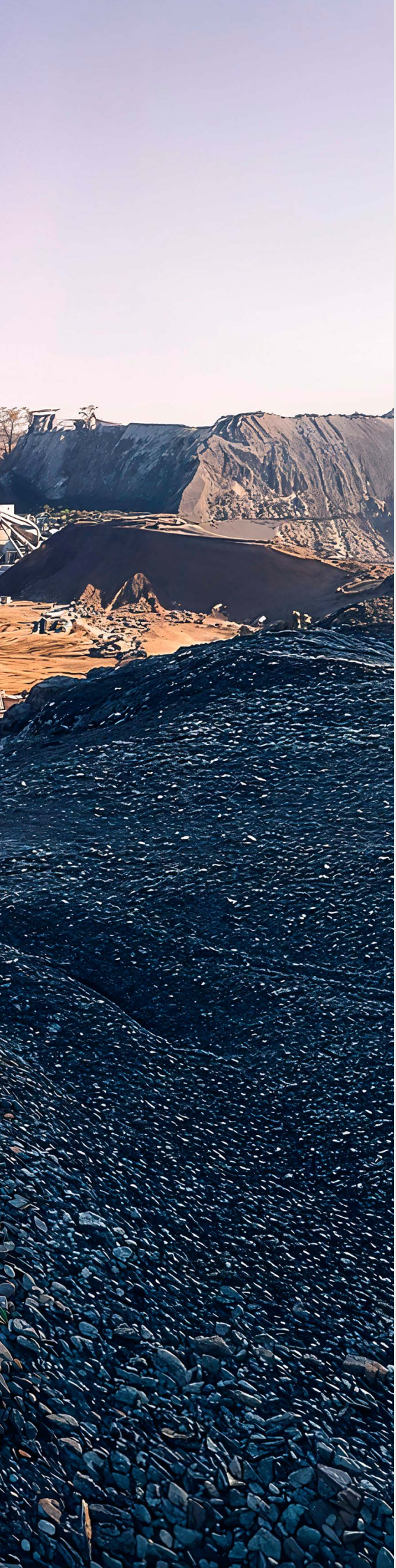

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Corrugated steel plate structures provide an efficient, adaptable solution for a wide range of civil, industrial, and protective applications.

Corrugated steel plate structures with plate thicknesses typically ranging from 3 mm to 12 mm represent an advanced, efficient and highly adaptable engineering solution for a wide range of civil, industrial and protective applications. Known for their high strength-to-weight ratio, modularity and speed of installation, these structures provide an attractive alternative to reinforced concrete, cast-in-place solutions and selected precast systems.

Traditionally used for culverts, small bridges, and wildlife crossings, corrugated steel technology today offers far broader applications. With various corrugation profiles, steel grades, geometries, and advanced design methods, ViaPlate structures can achieve spans from about 1 m to over 30 m, depending on the system and application.

ViaPlate is a system of corrugated steel plates mechanically formed from flat steel sheets, curved to the required geometry, punched, cut and then protected against corrosion, typically by hot-dip galvanizing, with additional protective systems where required by the environment and project service life assumptions.

The plates are assembled on site using bolted connections to create closed or open-profile structures in a wide range of shapes, including:

- circular profiles
- pipe-arches
- horizontal ellipses
- vertical ellipses
- regular arches
- low-rise arches
- high arches
- individually customized shapes for project-specific requirements

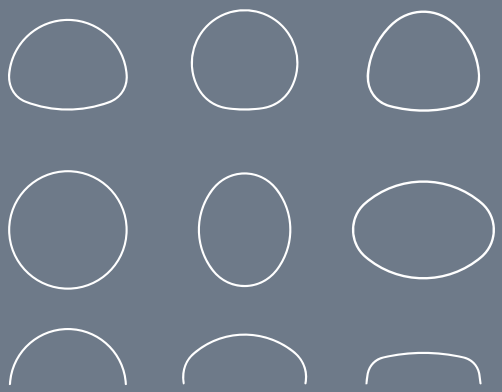
ViaPlate corrugation families and application ranges:

ViaPlate 200 – for smaller spans, typically up to 12 m

ViaPlate 380 – for larger spans, typically up to 25 m

ViaPlate 500 – for the largest spans and heavy-duty applications;
in selected projects, spans may exceed 30 m

ViaPlate 200 – *Up to 12m span*



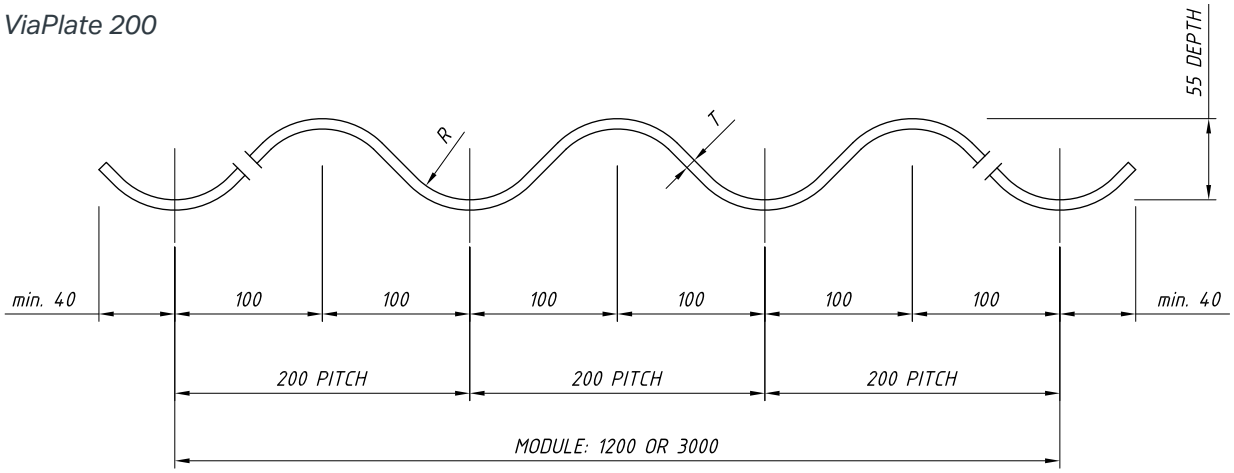
ViaPlate 380 – *Up to 25m span*



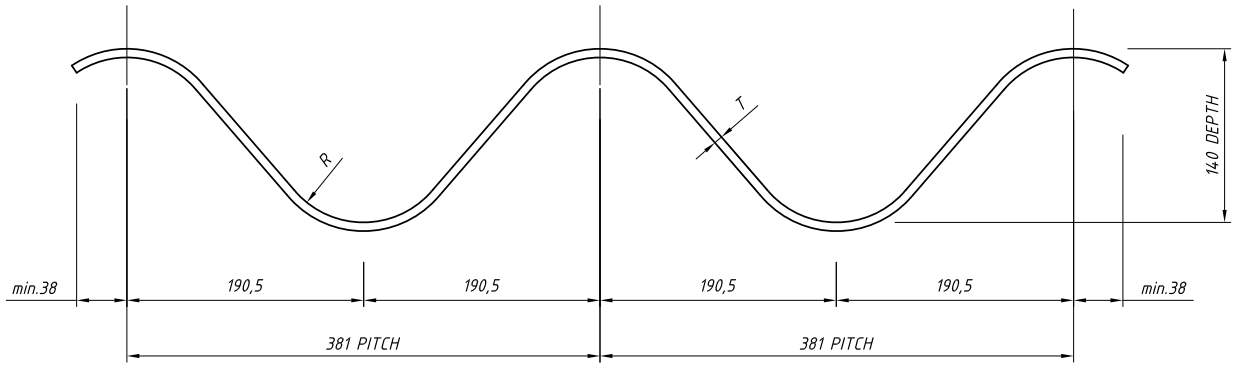
ViaPlate 500 – *Over 30m span*



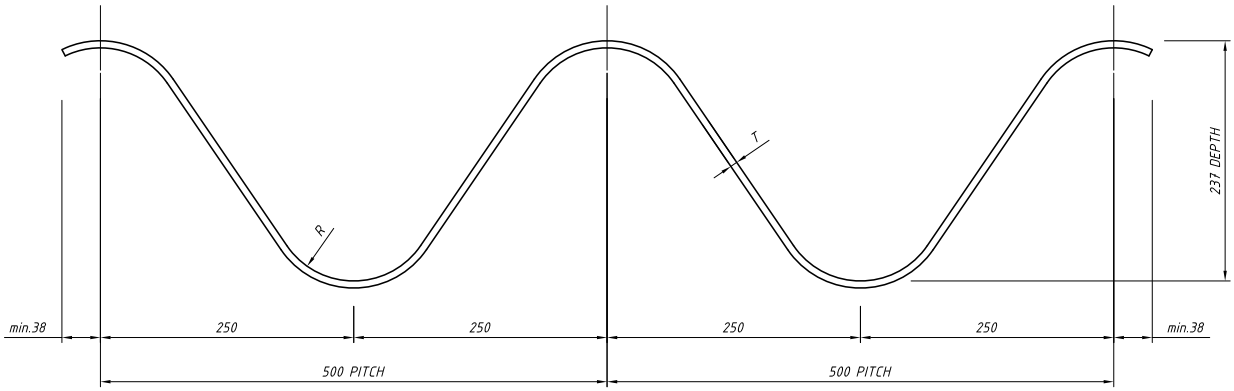
ViaPlate 200



ViaPlate 380



ViaPlate 500



This range allows designers to optimize geometry, structural performance, transport efficiency and installation method for each project.

Why corrugated steel plate structures

Cost optimization

Corrugated steel plate structures can significantly reduce project cost compared with many conventional solutions. Their low self-weight reduces transport demand, handling effort and foundation requirements. At the same time, the modular prefabricated nature of the system helps reduce construction time and site labor intensity. This makes the solution attractive not only for transport infrastructure, but also for mining, defense, water management, energy, logistics, and protective infrastructure.

Typical economic advantages include:

- reduced concrete consumption
- reduced or eliminated formwork
- limited wet construction works
- lower transport weight compared to reinforced concrete alternatives
- lower installation equipment demand
- reduced site labor and shorter project duration

Optimized for long-term value

For many projects, this means a better balance between investment cost, installation time and long-term durability.



Fast project delivery

One of the strongest advantages of ViaPlate is the speed of execution. Structures are delivered as prefabricated plate sets and assembled on site using standard equipment. In many applications, installation can be completed in days or weeks rather than months, depending on structure size and site conditions.

This is particularly valuable where:

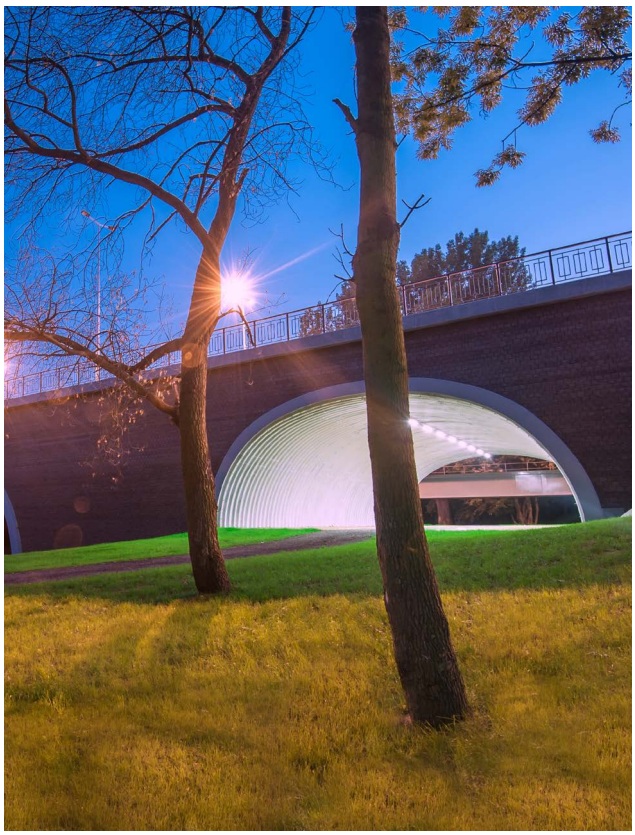
- traffic interruption must be minimized
- railway possession windows are short
- remote site logistics are challenging
- industrial downtime must be reduced
- emergency replacement or rehabilitation is required

Structural efficiency

Corrugated steel structures achieve high load-bearing performance through geometry and interaction with surrounding soil or supporting systems. The corrugation increases stiffness, while the shell form efficiently redistributes loads. In buried applications, properly designed structural backfill becomes an active part of the load-carrying system.

This allows:

- efficient design under road and railway live loads
- adaptation to varying cover depths
- good performance in difficult ground conditions
- favorable behavior under differential settlement
- suitability for dynamic and exceptional loading scenarios







Durability

With properly selected corrosion protection and project-specific detailing, ViaPlate structures can be designed for a **service life exceeding 100 years**. Durability depends on the structure environment, water exposure, backfill properties, abrasion conditions, coating system and maintenance strategy.

Durability can be enhanced through:

- hot-dip galvanizing
- duplex systems combining zinc and paint coating
- additional sacrificial steel thickness where required
- abrasion-resistant solutions in water and industrial environments
- project-specific waterproofing and sealing systems

Sustainability

Compared with traditional reinforced concrete structures of similar function, corrugated steel structures can offer a significantly lower environmental footprint. In selected bridge and culvert applications, life cycle analyses have shown that soil-steel solutions can reduce CO_2 emissions by more than 50% compared with reinforced concrete alternatives.

Key sustainability drivers include:

- lower material mass
- lower transport loads
- shorter construction time
- reduced wet processes on site
- steel recyclability
- lower total resource consumption over the project lifecycle



Technical range and engineering flexibility

ViaPlate structures are not limited to one geometry or one market segment. The system can be configured to suit a broad range of functional and structural needs.

Typical technical range:

- span range: from approx. 1 m to over 30 m
- plate thickness: typically 3 –12 mm
- corrugation profiles: multiple standard families
- steel grades: selected according to structural demand
- connection systems: bolted assemblies adapted to plate arrangement and loads
- cross-sections: open, closed and customized
- layouts: single-span, multi-cell, skewed, curved in plan, variable in longitudinal slope

Typical engineering options:

- customized inlet and outlet geometry
- reinforced concrete collars or headwalls
- steel collar face for simplified end finishing
- technical openings and service penetrations
- ventilation connectors
- shelves and pathways for fauna
- integration with utility crossings
- waterproofing membranes and sealing system
- relining inside existing structures

This flexibility makes ViaPlate suitable both for standard repeatable solutions and for non-standard project-specific applications.

Durability and corrosion protection

With appropriately selected corrosion protection and project-specific detailing, ViaPlate structures can be designed for a service life exceeding 100 years.

They are engineered for long-term performance in contact with:

- air
- backfill
- water
- industrial contaminants
- abrasion or wear conditions

The durability verification process typically includes defining:

- the function of the structure
- the required design life
- the aggressiveness of water, backfill and air
- the plate thickness based on structural analysis
- the corrosion protection system
- the expected annual loss of protective layers
- the resulting service life over time

Advanced corrosion protection

Where required, a **duplex protection system** may be used, combining galvanizing and paint coating. This approach benefits from a synergy effect and is particularly relevant in more aggressive environments, exposed portals, industrial zones or aesthetic applications.

For areas exposed to sunlight and visible architectural surfaces, a polyurethane topcoat may be applied to improve UV resistance and maintain color consistency.



Design and structural performance

ViaPlate structures are engineered rather than selected from a simple product list.

The final solution is determined by a combination of:

- required clear opening
- live load model
- cover depth
- geotechnical conditions
- foundation type
- hydraulic requirements where relevant
- installation conditions
- durability and service life targets

ViaPlate structural design is based on recognized methods such as:

- Swedish Design Method, developed by Prof. Sundquist and Prof. Petterson
- German design method developed by Prof. Klöppel and Dr. Glock, in accordance with ZTV-ING 8.5
- ZTV-ING 8.5
- Canadian Design Method, described in CHBDC - Canadian Highways Bridge Design Code
- US AASHTO LRFD Bridge Design Specifications
- Finite element method (FEM) in complex cases
- Or other design methods as required for the region

Depending on the application, ViaPlate structures can be designed for typical variable live load models such as:

- road and rail load models according to EN 1991-2 (e.g. LM-1, LM-2, LM-3, LM-71)
- AASHTO standard models (e.g. HL-93 truck, tandem loads)
- AREMA manual models (e.g. Cooper E80)
- heavy vehicles used in the mining industry, such as CAT 777
- snow groomers

Custom load models available upon request.

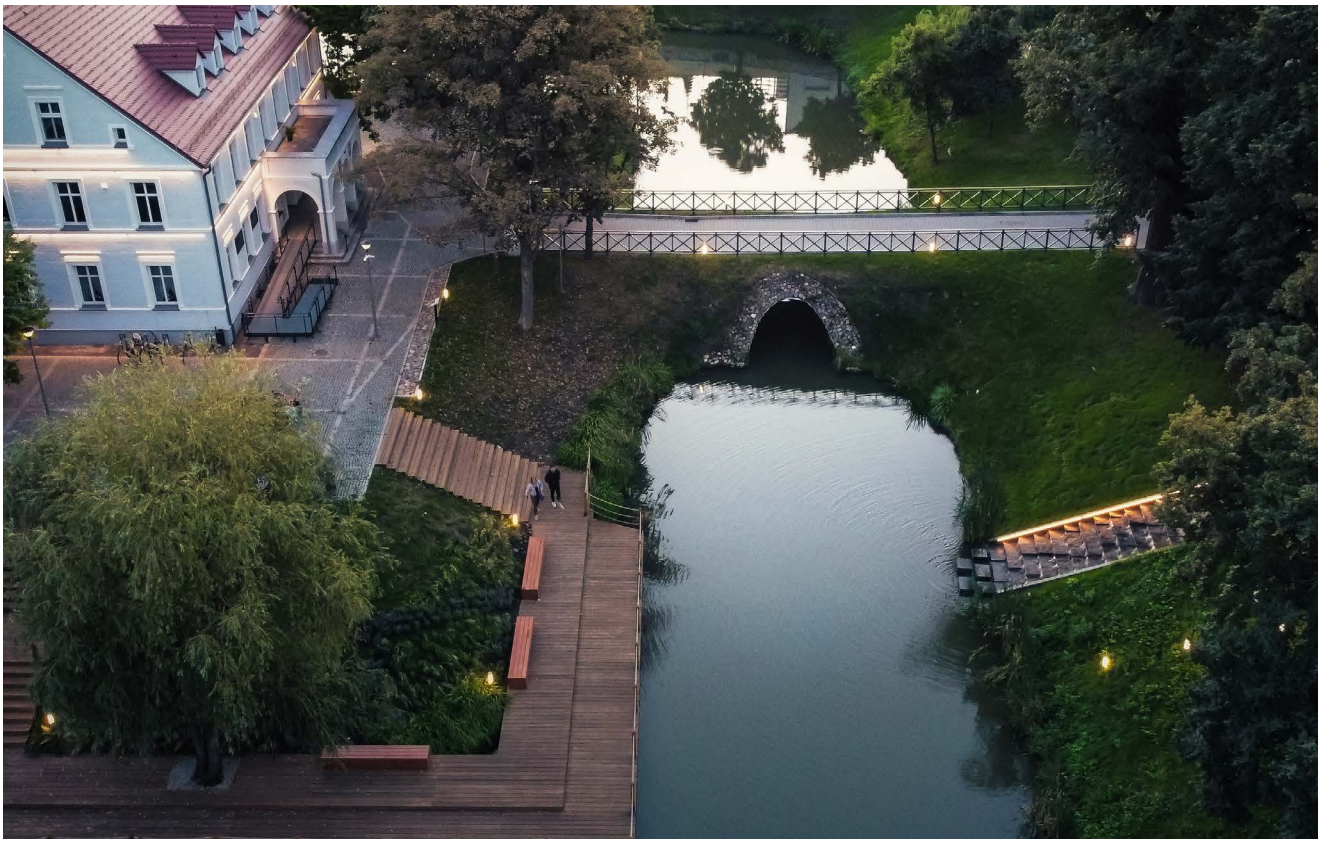
This gives confidence that the technology can be adapted to regional design practice and project-specific approval requirements.

The design process typically includes:

- selection of corrugation type and plate thickness
- selection of steel grade
- definition of cross-sectional geometry
- design of bolted connections
- design of bedding, backfill and surrounding structural zones
- design of foundations or footings
- design of inlet and outlet treatment
- design of corrosion protection and waterproofing where required

In practical terms, this means ViaPlate can be tailored to conventional infrastructure projects as well as more demanding industrial and protective applications.













Production, logistics and installation

ViaPlate structures are manufactured in a controlled factory process. Flat steel plates are mechanically corrugated, curved, cut and punched, then protected against corrosion. All parts are delivered as a coordinated assembly set.

Production and delivery advantages:

- prefabricated, repeatable components
- controlled production quality
- efficient transport due to nesting of plates
- color coding and identification of components
- complete supply with bolts, nuts and accessories
- possibility of staged delivery depending on site schedule

Installation advantages:

- modular assembly with standard equipment
- fast on-site erection
- reduced dependence on heavy temporary works
- suitability for remote locations
- possibility of winter installation and difficult terrain deployment
- reduced disruption to traffic and operations

Assembly can often be performed using relatively light equipment and within a short site schedule. This is one of the key reasons why the solution is attractive for both new construction and rehabilitation.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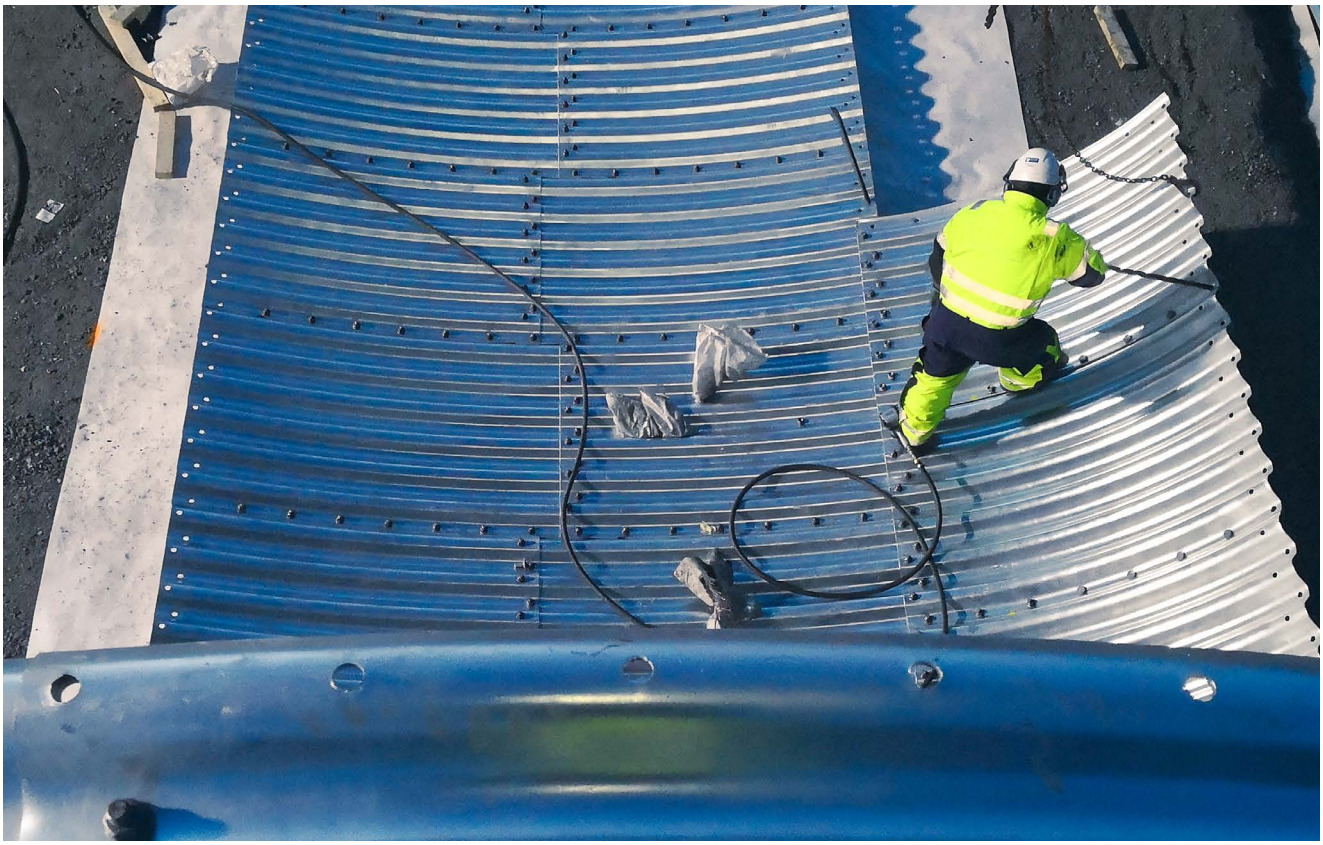


Industries and application areas

Road and railway infrastructure

Road and railway remain the most established application areas for corrugated steel plate structures.

In these sectors, ViaPlate is used for:

- road culverts
- railway culverts
- road underpasses and overpasses
- road-rail grade separations
- pedestrian and cycle crossings
- agricultural crossings
- lower and upper wildlife crossings
- small and medium-span buried bridges

In transport applications, the key benefits are speed of installation, reduced disruption to traffic, efficient construction in embankments and excellent adaptability to required clearances and skew geometries.

For road and railway projects, ViaPlate can be designed for standard live loads according to Eurocode or other relevant national requirements. The system is particularly effective where conventional concrete structures would require extensive formwork, larger foundations or longer closures.

Relining and rehabilitation of existing structures

Relining is one of the most cost-effective ways to extend the life of aging infrastructure. In this method, a new corrugated steel structure is installed inside an existing tunnel, bridge or culvert, and the annular space is filled with suitable grout or concrete.

Typical applications include:

- rehabilitation of old masonry culverts
- structural strengthening of deteriorated bridges
- renewal of railway culverts
- upgrading of hydraulic structures
- adaptation of old structures to higher traffic loads

Main benefits:

- minimal disruption to operation
- reduced demolition and reconstruction work
- short installation time
- extension of service life
- preservation of the existing external form where desired

This makes relining especially attractive in railway environments, heritage-sensitive sites and locations with difficult access.





Mining

In mining applications, corrugated steel plate structures offer a robust and practical alternative where remote site logistics, ground loads and construction speed are critical.

Typical mining applications include:

- conveyor transport tunnels
- technological and service galleries
- ventilation shaft linings
- crossings beneath mine roads
- protective covers for crushers, screens and transfer points
- water retention and process tanks
- emergency and escape passages

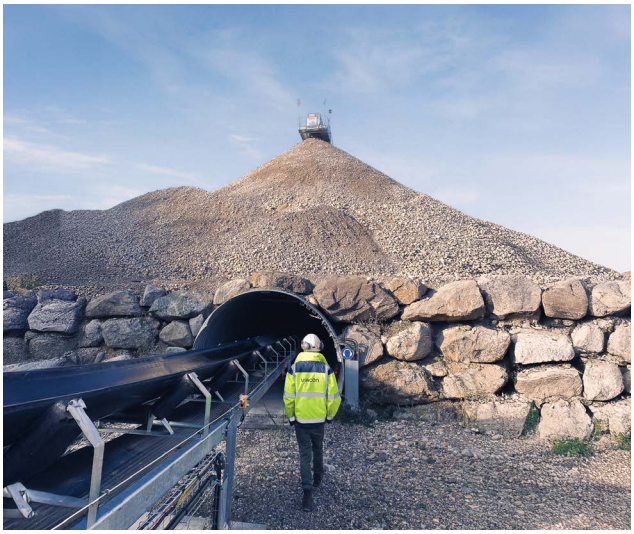
Key advantages for mining:

- high load-bearing capacity under deep cover
- suitability for areas affected by mining-induced deformation
- fast assembly in remote locations
- reduced formwork and concrete works
- efficient transport of modular segments
- good adaptability to temporary and semi-permanent installations

Value engineering & customisation

For conveyor tunnels, the structure can be customized with technical openings, support systems, walkways and maintenance access zones.







Defense and critical infrastructure

ViaPlate also has strong potential in defense-related and critical infrastructure applications, especially where rapid deployment, earth cover and structural resilience are required.

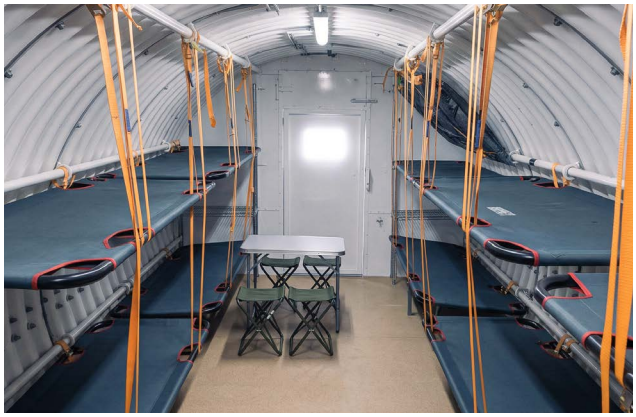
Potential applications include:

- logistics and storage shelters
- protected utility corridors
- ammunition storage structures
- emergency refuge spaces
- protective tunnels for energy and technical infrastructure
- semi-permanent field structures
- embankment-covered shelters
- hangars and protected storage halls

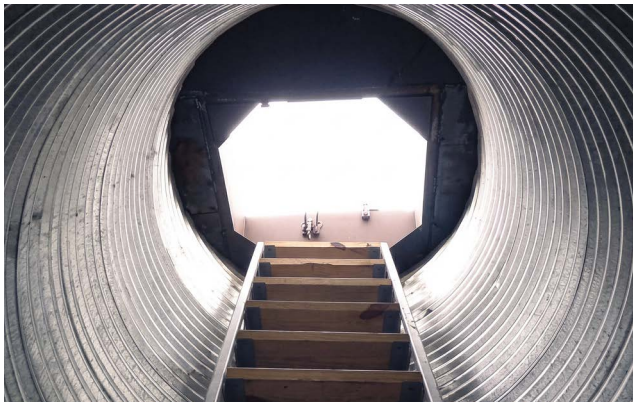
Sector benefits:

- efficient load redistribution under earth cover
- good energy absorption characteristics
- suitability for exceptional and dynamic loads
- modular prefabrication
- rapid deployment capability
- relocation potential in selected configurations













Electric energy, oil & gas

In the energy sector, ViaPlate structures can be used to protect infrastructure, organize service corridors and create durable underground spaces.

Typical applications include:

- high-voltage cable channels
- cable and utility crossings under roads and railways
- protective structures for substations and technical nodes
- service tunnels for energy infrastructure
- pipeline protection casings
- underground tank linings
- protection of process installations

The modular nature of corrugated steel structures is particularly valuable in energy projects because it supports fast execution, reduced excavation exposure time and reliable adaptation to linear infrastructure layouts.

In industrial energy environments, corrosion protection can be adapted to increased aggressiveness and long service life expectations.





Logistics, ventilation and utilidor systems

ViaPlate structures can also be used in logistics and utility-management applications where a fast underground or semi-underground enclosure is needed.

Examples include:

- underground or semi-underground warehouses
- service and utility corridors
- conveyor protection tunnels
- transport channels under storage yards
- utilidor systems for multi-utility distribution
- ventilation tunnels
- technical galleries in industrial plants
- protected passages between buildings or technological zones

The main value here lies in shape flexibility, speed of erection and the possibility of integrating multiple functions into one protected shell.













Water management

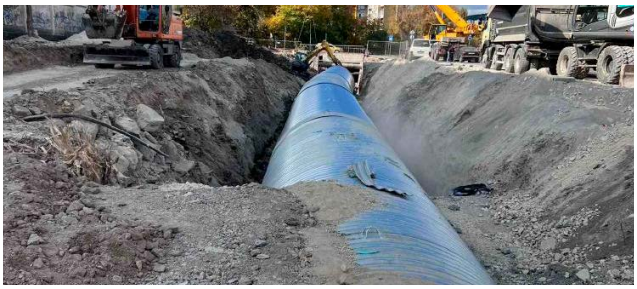
Corrugated steel structures can play an important role in hydraulic and water-management infrastructure, both in flow and storage applications.

Typical applications include:

- watercourse linings
- culverts and hydraulic crossings
- retention tanks
- flood mitigation reservoirs
- buffer tanks
- separator chambers
- stormwater management components
- technical chambers for water infrastructure

Where hydraulic action and abrasion are significant, solutions can be optimized by selecting open structures, additional protection systems or suitable bottom treatments such as concrete slabs or stone reinforcement.

In enclosed tank and reservoir applications, waterproofing and sealing systems can be designed according to the intended operational conditions.









Silos and bulk material storage

Corrugated steel plate geometry is naturally efficient in structures subjected to circumferential and distributed loads, which makes the system suitable for storage-related applications.

Typical examples:

- large-diameter steel silos
- aggregate storage facilities
- bulk material chambers
- process and technological chamber linings
- protective housings for stored materials

Main benefits:

- high circumferential load-bearing capacity
- large possible diameters
- fast assembly
- reduced need for heavy formwork
- efficient transport and installation compared with monolithic solutions

Mountain and protective infrastructure

In mountainous terrain and natural hazard zones, corrugated steel structures can support protective infrastructure requiring robustness, adaptability and fast execution.

Typical applications:

- avalanche protection galleries
- landslide protection galleries
- rockfall protective covers
- protective tunnels above roads and railways
- ravine linings
- slope stabilization structures
- protective covers for exposed infrastructure

Sector benefits:

- resistance to dynamic actions
- structural flexibility
- good suitability for difficult terrain
- modular delivery to hard-to-access sites
- reduced dependence on heavy cast-in-place construction

These applications are especially relevant where construction windows are short and terrain makes traditional solutions difficult or expensive.







Why ViaCon

ViaCon combines manufacturing capability, engineering know-how and practical site experience to deliver corrugated steel plate solutions tailored to project-specific requirements. Beyond product supply, ViaCon supports customers throughout the entire project cycle - from concept selection and preliminary sizing to detailing, delivery and installation guidance.

Our key strenghts include:

- proven experience across multiple markets, including transport infrastructure, rehabilitation, mining, water management, energy and protective applications
- a broad technical range, enabling both standard solutions and complex project-specific configurations
- engineering and design support from concept to completion, including geometry selection, structural optimization, corrosion protection and construction detailing
- controlled factory production, ensuring repeatability, traceability and consistent product quality
- certified quality and management systems supporting reliable manufacturing and project delivery
- efficient logistics and coordinated delivery, supporting phased installation and demanding site conditions
- practical and proven installation methodology, based on modular systems and site-proven assembly procedures
- long-term durability approach, with corrosion protection systems selected according to environment, design life and maintenance strategy
- sustainability focus, supported by environmental declarations and resource-efficient construction principles
- value engineering capability, helping investors, designers and contractors optimize cost, construction time and long-term performance





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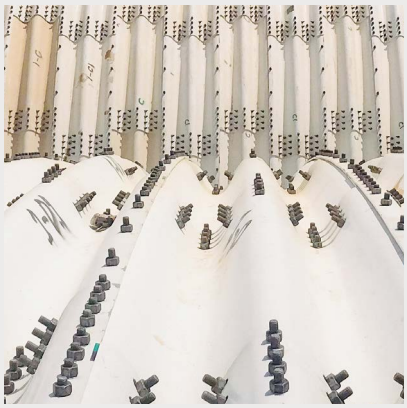
years of experience
in engineered infrastructure and construction solutions across multiple sectors.



100 000

completed projects
across multiple sectors and site conditions.



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countries and markets
with established international presence.

Versatile Applications

A versatile alternative to reinforced concrete and precast systems for culverts, buried bridges, mining, logistics, energy and rehabilitation projects.

Engineering Efficiency

Combines structural efficiency, modular construction, logistics advantages and reduced material consumption.

Durability and Long-Term Value

Designed for long service life, demanding site conditions and flexible project requirements, delivering reliable long-term performance.

Parameters and benefits

Technical snapshot:

- span range: 1 m to 30+ m
- plate thickness: 3–12 mm
- corrugation types: 200×55 / 381×140 / 500×237 mm
- shapes: circular, elliptical, pipe-arch, arch, customized
- design life: 100+ years with appropriate corrosion protection
- installation: modular, bolted, rapid on-site assembly
- applications: infrastructure, industry, mining, energy, defense, water management

Typical design considerations:

- geometry and clearance
- live loads
- cover depth
- subsoil and foundations
- backfill quality
- corrosion environment
- water tightness / abrasion
- interfaces with existing infrastructure

Key benefits

- faster project delivery
- reduced construction complexity
- lower disruption to traffic and operations
- cost-efficient use of materials and site resources
- proven durability for long-term performance
- suitable for both standard and non-standard applications



Partnering from Concept to Delivery

ViaCon works with investors, designers, contractors and public authorities to develop solutions that combine structural performance, construction efficiency and long-term value.

> Need support with concept design or preliminary sizing?
> Send us your project parameters and our team will help you identify the optimal ViaPlate solution.

VIACON

Constructing connections.
Consciously.

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ViaCon is a leader in infrastructure construction solutions. Built on strong Nordic roots, ViaCon embodies a practical, human perspective that brings together technology and verifiable sustainability. The long-term view defines our vision, and by driving smart, future-friendly construction solutions for bridges and culverts, geotechnical and stormwater solutions, we will continue to shape and lead our industry.

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