REXSTEEL

www.rexsteel.kr

01 Company Introduction

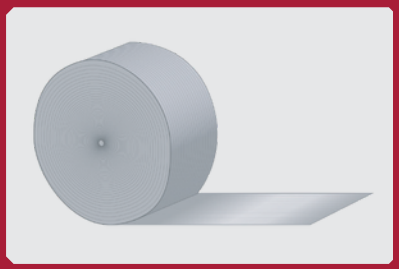
"Economical Cost! Fast Construction!"

With a team of highly experienced engineers in the corrugated steel plate industry, we at Rexsteel have embarked on a new endeavor with a strong sense of purpose.
Our large-diameter corrugated steel plate, Rex-Plate, is manufactured using differentiated facilities and processes that set it apart from conventional corrugated steel pipes. We take pride in our product's enhanced quality, as well as the reduced assembly and construction time and costs it offers.
Furthermore, we are committed to the continuous improvement of our product quality and technological development through ongoing research into corrugated steel pipe structures.
Rexsteel is expanding its presence not only in the domestic market but also into the global arena. We are also building a successful track record in exporting integrated plants that provide both the facilities and technology for corrugated steel plate production.
Looking ahead, Rexsteel pledges to broaden the scope and elevate the standards of our potential, striving to become a small yet strong and significant enterprise.
Thank you.

The Rexsteel Team

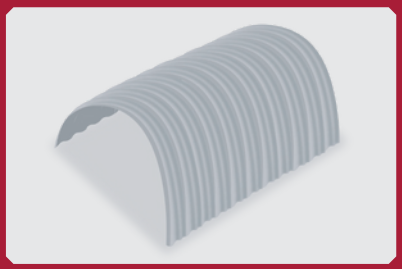
▶ Corrugated Steel Plate: Production and Assembly

1. Raw material steel coil



2. Corrugation of steel plates

3.Bending acoording to design

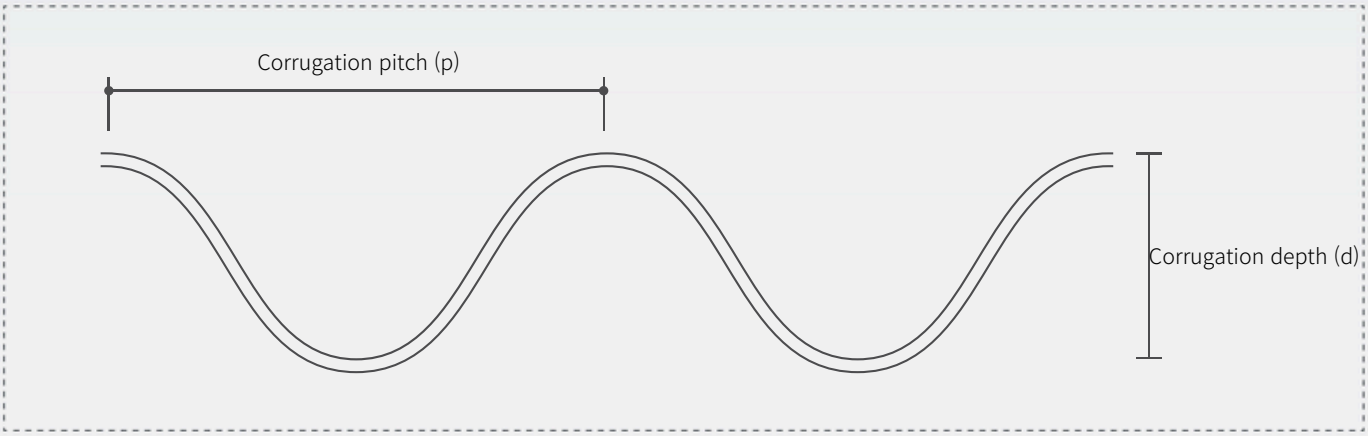


02 Introduction to corrugated steel plate

▶ What is a corrugated steel plate?

Corrugated steel plate is a structural material formed by shaping a steel plate with corrugations of a specific standard to increase its flexural rigidity, bearing capacity, and durability. It has the characteristics of a buried structure that supports loads through its interaction with the surrounding ground.

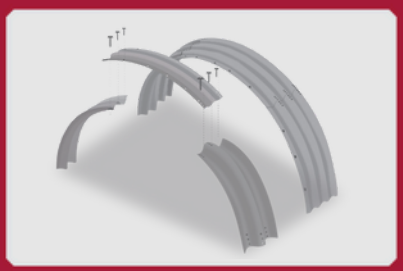
▶ Corrugated steel plate illustration



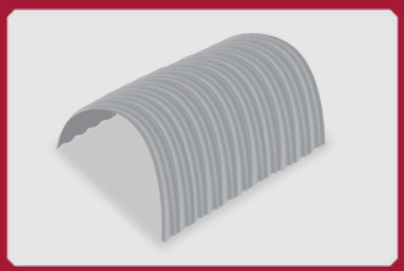
▶ Corrugated steel plate standard - Deep corrugation type

Model	Products	Thickness(t)	Pitch(p)	Depth(d)
REX-B381	Rex-Plate	3.4 ~ 8.0mm	381mm	140mm

4. Assembling



5. Completed structure

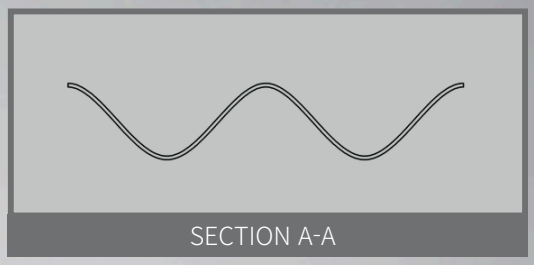


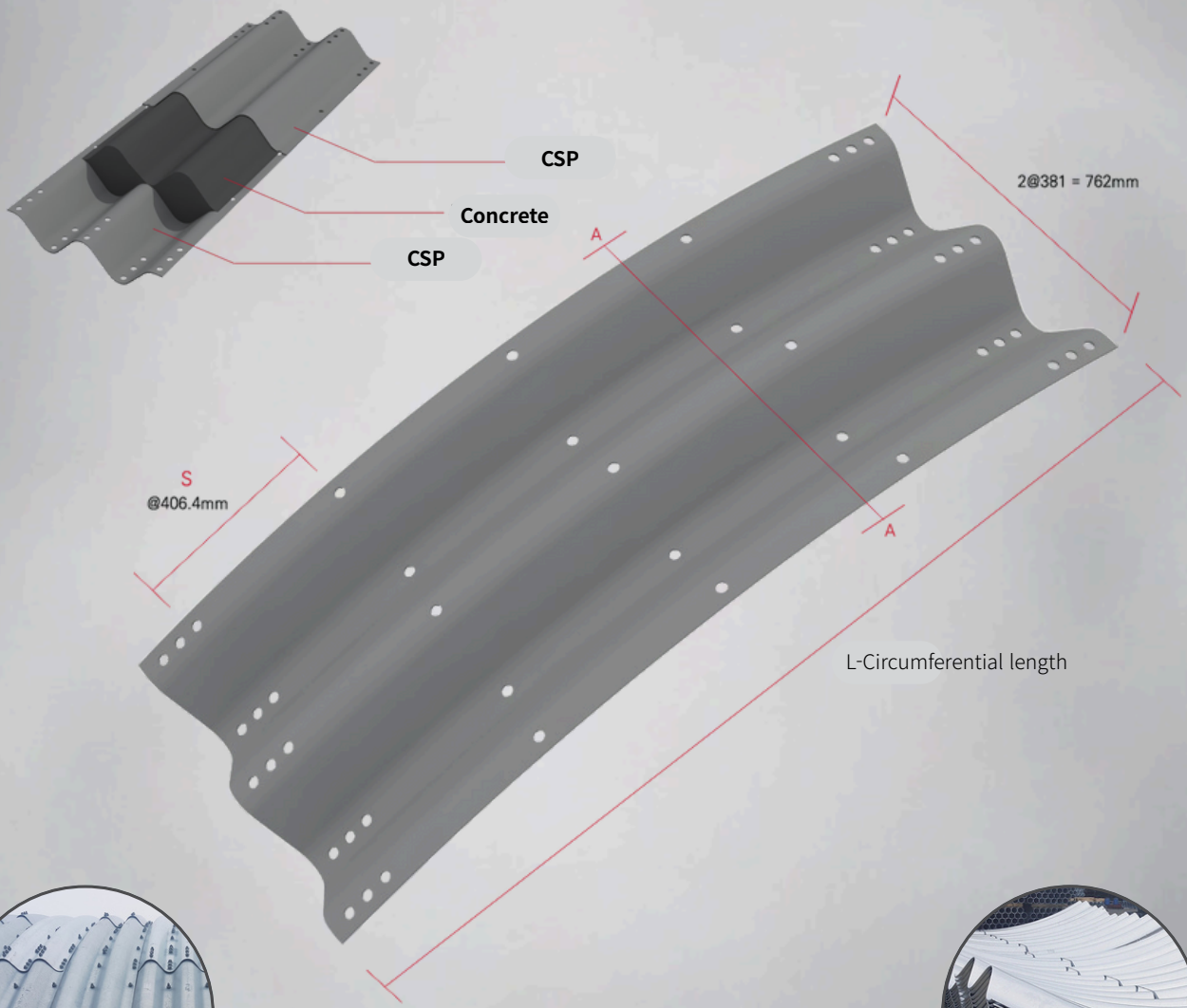
6. Construction completed

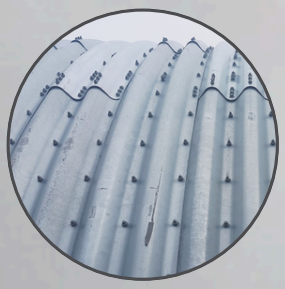
▶Deep corrugated steel plate

Similar to SECTION A-A, this is a product that improves the structural load-bearing capacity of corrugated steel plate against stress concentration caused by high fill and eccentric soil pressure, by increasing the pitch and depth of the corrugation more than three times compared to a standard corrugated steel plate.

Unlike existing products bent by a press, this product improves the dimensional accuracy through roll forming and extends the circumferential length (L) of the steel plate from the existing 4.0m to 5.2m.

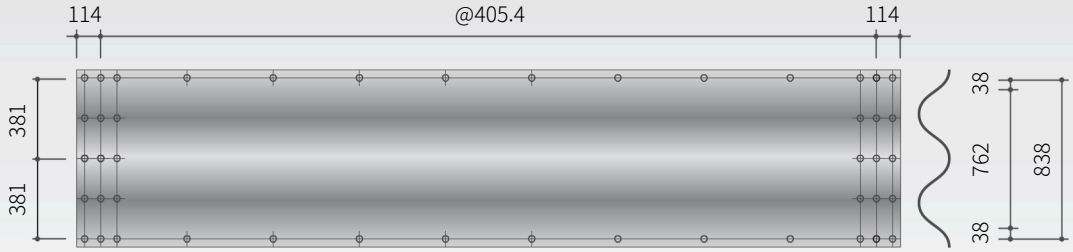






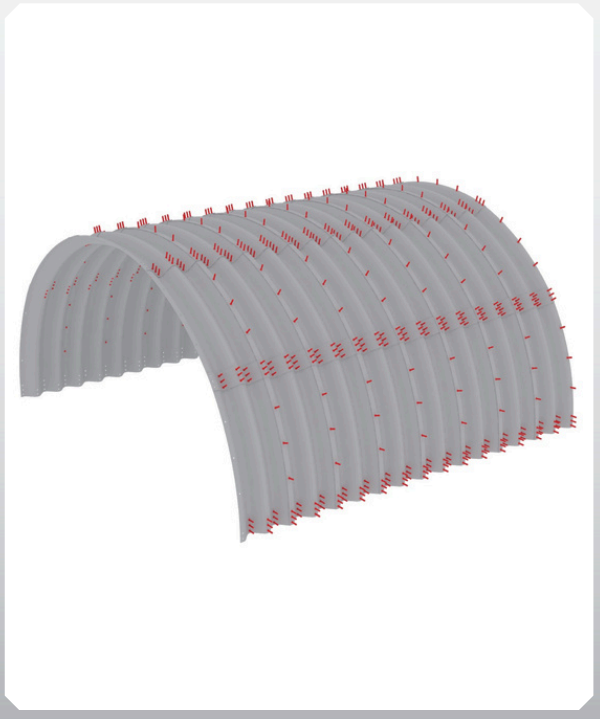
▶Corrugated steel plate dimensions

REX-B381

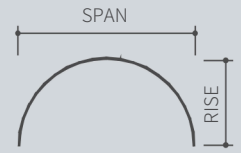
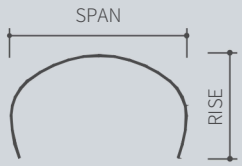
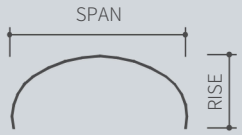
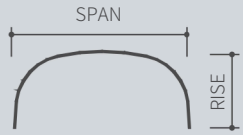
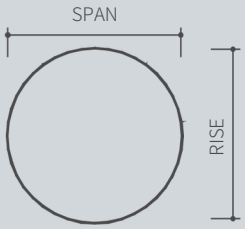
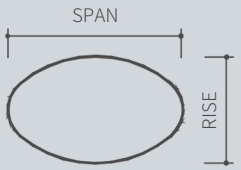
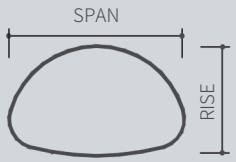
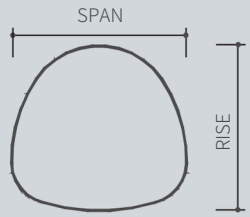


S (406.4mm)	NET WIDTH (mm)	WIDTH (mm)
3	1219.2	1447.2
4	1625.6	1853.6
5	2032.0	2260.0
15	6096.0	6324.0
16	6502.4	6730.4
17	6908.8	7136.8

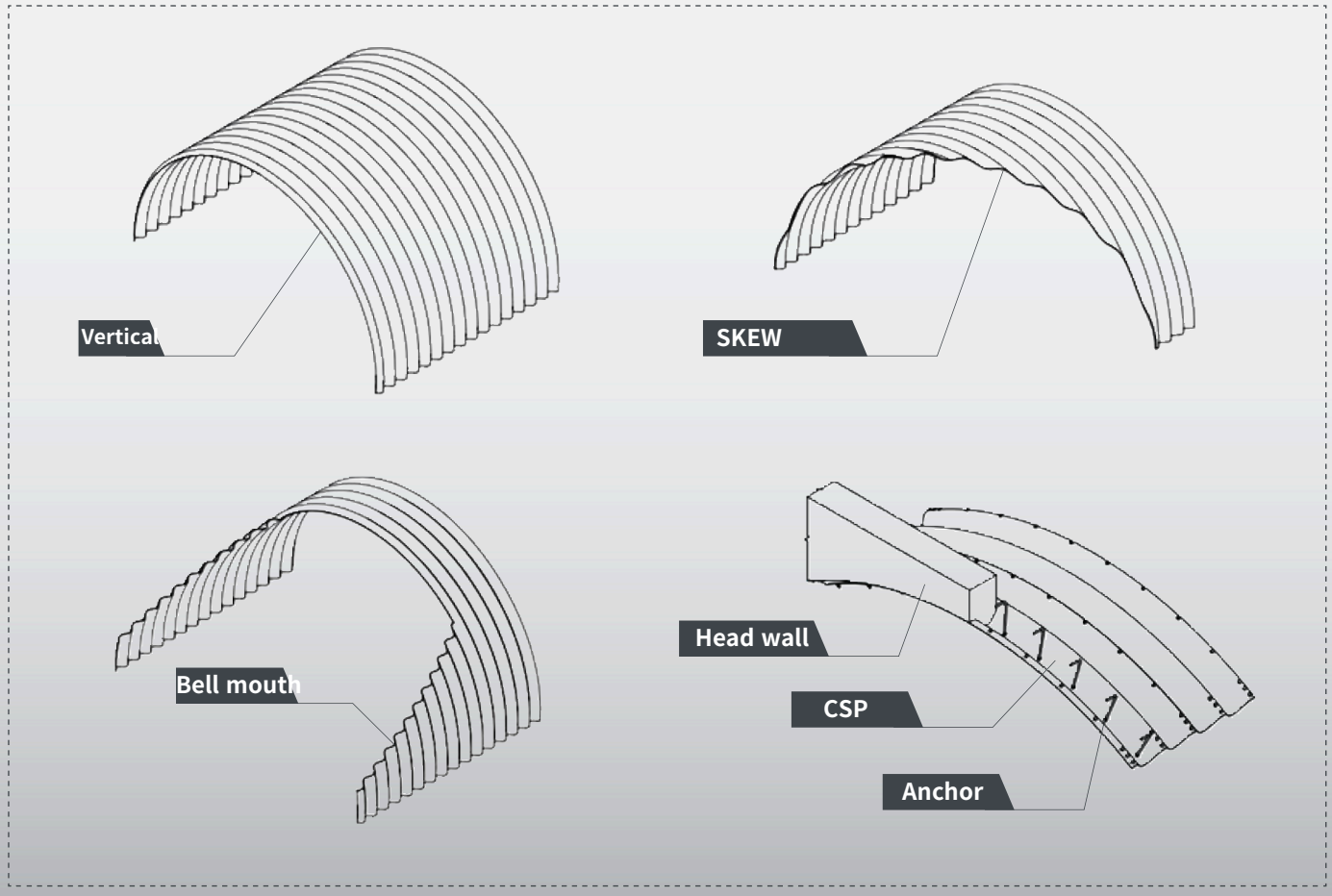
3D Modeling & Construction photos



▶ Cross-sectional shape

Semicircular arch	High arch	Low arch	Box Type
			
Circular	**Horizontal ellipse**	**Pipe Arch**	**Underpass**
			

▶ End finish treatment



▶Mechanical properties

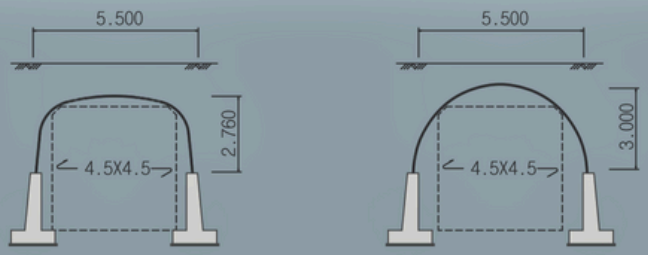
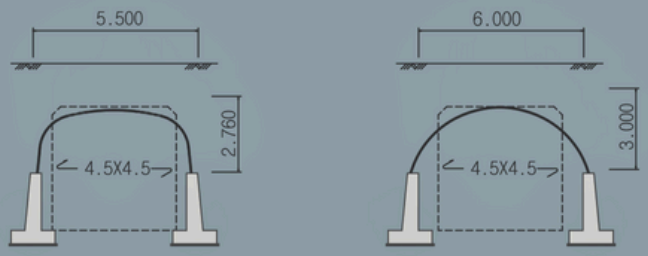
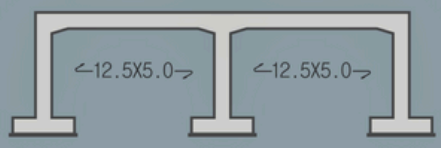
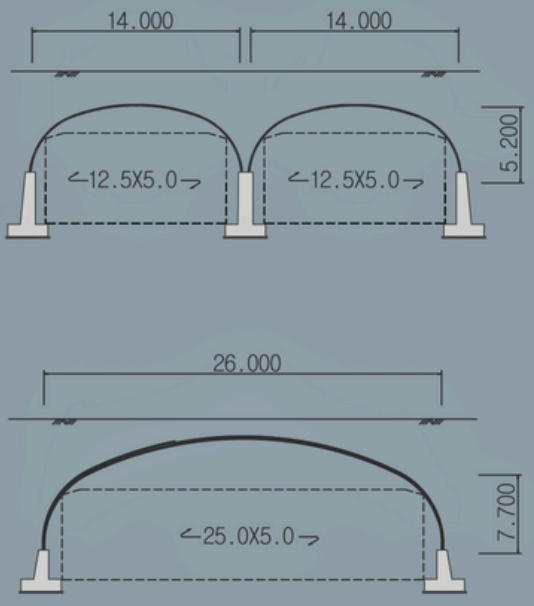
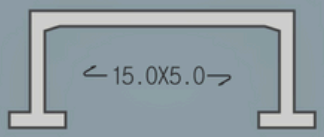
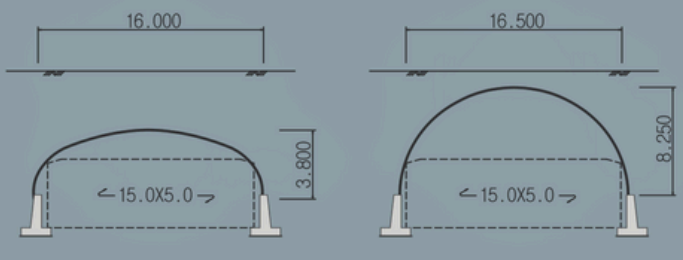
When vertical earth pressure from a load occurs on the top of a corrugated steel plate structure, the lateral earth pressure resists it. At this point, the vertical and lateral earth pressures form a stable and uniform load distribution. This type of load distribution (hoop compression effect) suppresses the bending moment and has the structural characteristic of being subject to compressive forces.

▶Raw material requirements for corrugated steel plate (KS D 3503, 3506)

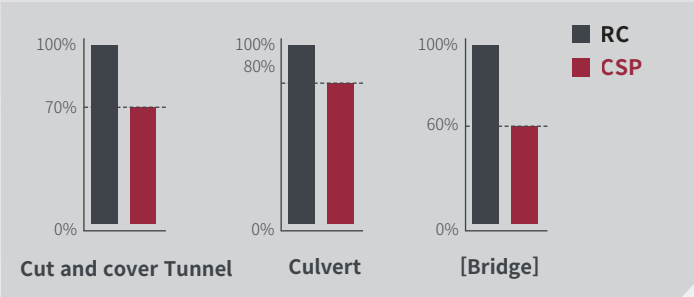
Type Symbol	Chemical composition					Mechanical properties				
	C(%)	Si(%)	Mn(%)	P(%)	S(%)	Zinc coating (g/m^2)	Yield (MPa)	Tensile (Mpa)	Elongation(%) t≤0.05	Elongation(%) 5 < t≤16
SS275	≤0.25	≤0.45	≤1.40	≤0.050	≤0.050	900≤	275≤	410~550	21≤	18≤
SS315	≤0.28	≤0.50	≤1.50	≤0.050	≤0.050	900≤	315≤	490~630	19≤	16≤
SS410	≤0.30	≤0.55	≤1.60	≤0.040	≤0.040	900≤	410≤	540≤	16≤	14≤
SS450	≤0.30	≤0.55	≤1.80	≤0.040	≤0.040	900≤	450≤	590≤	14≤	12≤

Zinc coating Based on both sides of the steel plate
This strength value is to be applied during design (test values may be applied if separate test results are available)

▶ Applicable cross-section

Reinforced concrete structure	Corrugated steel plate structure
Passageway 	
Waterway 	
Cut-and-cover tunnel 	
Bridge 	

03 Product excellence

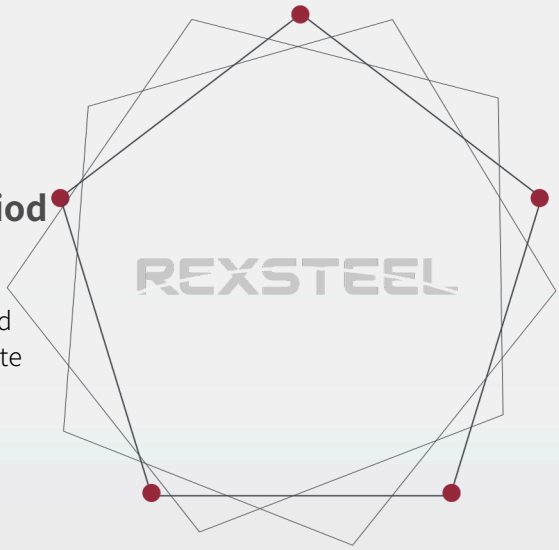


Cost-effectiveness

Compared to reinforced concrete structures, corrugated steel plate structures are economical, saving time and reducing construction costs by 15-30%.

Reduced construction period

Corrugated steel plate structures are less affected by seasonal changes and their construction is carried out on-site using bolt assembly.



Uniform quality

As a product manufactured through a uniform process, its quality is consistent, which makes structure construction easy and provides excellent durability.

Construction possible under traffic

Vehicle traffic is possible during construction, and after the temporary assembly of the entire structure, it is advantageous for emergency restoration work. Furthermore, a separate detour road is not required, which reduces the potential for public complaints.

Eco-friendliness

By minimizing the use of concrete and due to the nature of steel, it is 100% recyclable, which gives it eco-friendly properties.

04 Characteristics of Electro-Deposition Coating (E-Coating)

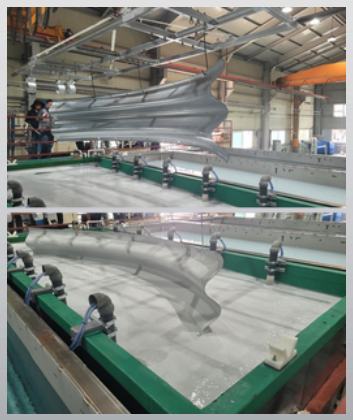
▶ Service life with Electro-deposition coating based on external environmental conditions

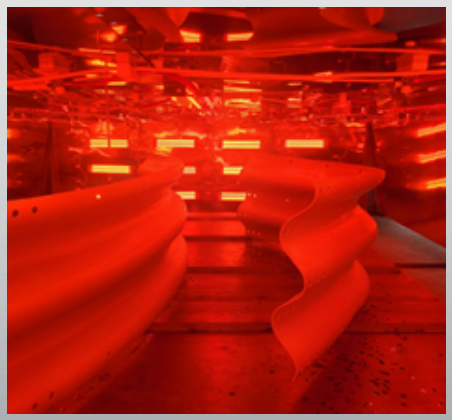
In salt-damaged and industrial areas, the service life can be improved by applying an **electro-deposition coating**, considering the environment.

Hot-Dip galvanization

Classification	Service life 900g/m² Both sides (yr)
Aggressive industrial & marine environments	7~15
Industrial & coastal zones	15~30
Light industrial zones	30~90

ISO 9223: Atmospheric Corrosivity





Ensuring additional durability for over 30 years

05 I Design

Conventional, standards-based design

National and international design standards

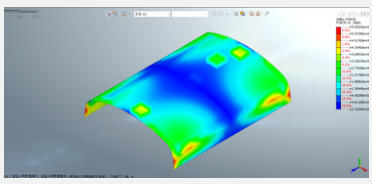
- Ministry of Land, Infrastructure and Transport, Standard Specifications for Ground Work KCS 11 40 10:2019
- Korean Society of Civil Engineers, Design Standards for Corrugated Steel Plate Buried Structures 2007
- Korea Expressway Corporation, Expert Specifications for Expressway Construction - Corrugated Steel Plate Culvert EXCS 11 40 10:2018
- Korea National Railway, Railway Design Handbook (Civil Engineering Volume) III, Old Bridges and Drainage Facilities
- KS Standard: KS D 3503 Rolled Steel for General Structures
- AASHTO_LRFD
- CHBDC(Canadian Highway Bridge Design Code)
- AS/NZ 2041

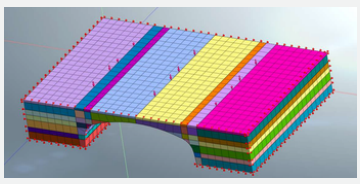
Perform finite element analysis

When finite element analysis is required

- When an unbalanced load occurs on the structure due to eccentric earth pressure
- In cases of long spans or high fills
- When an unbalanced load occurs on the structure due to differential settlement
- When a design with less than the minimum soil cover is required
- When a special load occurs on the top of the structure · When the structure has an excessive skew
- In a multi-span structure when various cross-sections are used

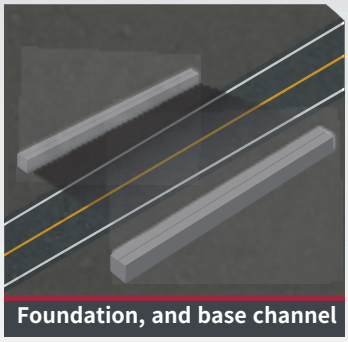
Software Used: MIDAS CIVIL, GTS-NX, MIDAS FEA NX



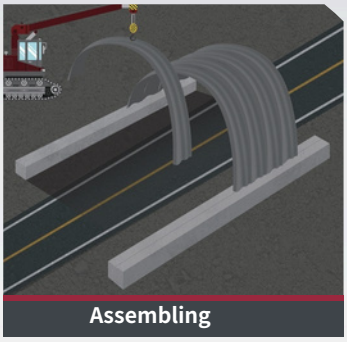


06 Construction

▶ Construction sequence


Foundation, and base channel


Delivery


Assembling

⚠ Notes for construction

Site preparation

Plan construction and deformation measurements.
Secure site for materials and equipment access.
Verify foundation height and curing status per design.
Inspect, clean, and verify base channel layout.

Material Inspection

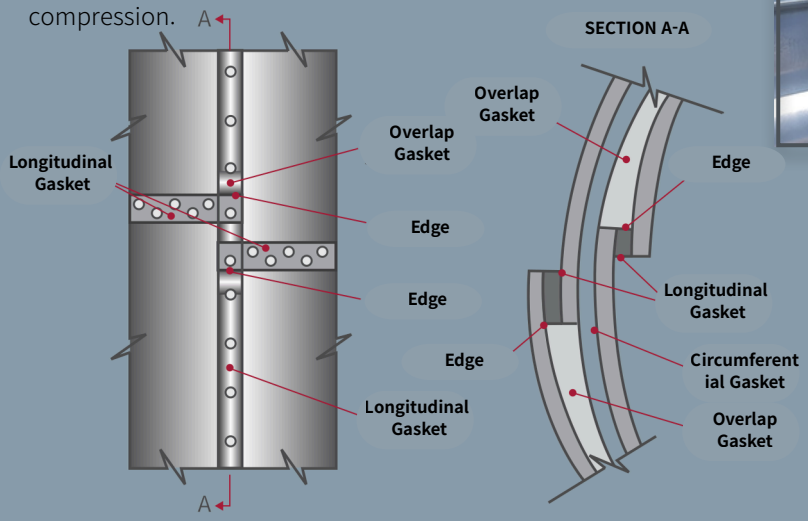
Mechanical Properties Test (Tensile Strength, Yield, Elongation)
Coating Weight Inspection (≥ 900 g/m²)
Corrugation Depth Inspection
Plate Thickness Inspection
Quantity Verification vs. Design Drawings (Plates, Bolts, Nuts)

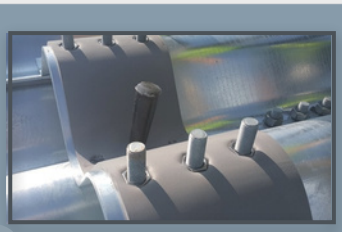
Waterproofing & Drainage

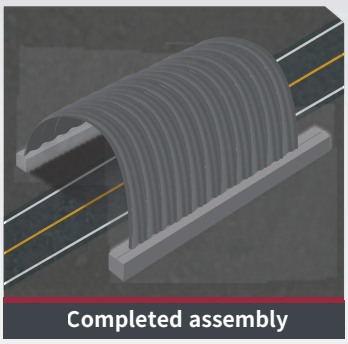
Apply gasket waterproofing for joints, urethane sealant, and rubber caps to prevent water infiltration through steel plate seams or bolt holes.
If necessary, install a waterproof membrane in the embankment and backfill areas.

Primary Gasket Waterproofing

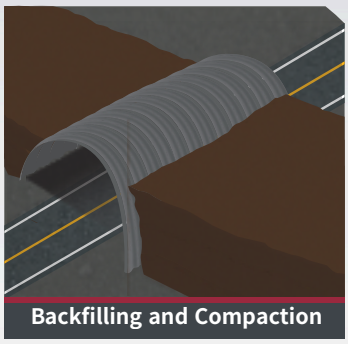
A rubber gasket is placed between the corrugated steel plates and secured by bolting, which creates a watertight seal through compression.







Completed assembly

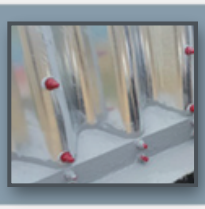


Backfilling and Compaction

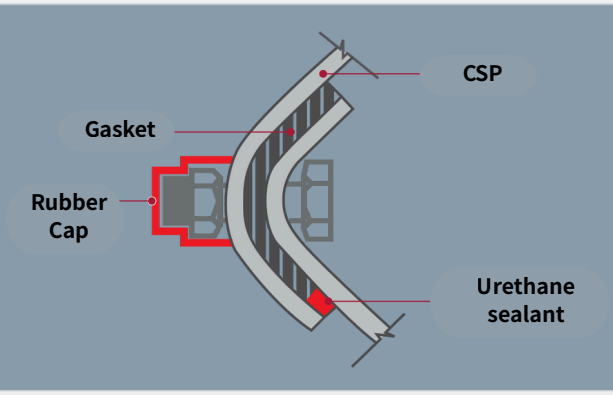
Construction Complete

Urethane sealant and rubber cap waterproofing

Apply urethane sealant to corrugated plate overlap corners and cure urethane-filled rubber caps over joint bolts for secondary waterproofing.



Schematic of secondary waterproofing at overlaps



Cross-sectional deformation monitoring

Corrugated steel plate structures measure the change in cross-sectional shape and size ① immediately after assembly, ② during backfilling (including the soil cover section), and ③ immediately after construction is complete.

Before backfilling, if the measured cross-section deviates from the design shape by more than 5%, loosen the bolts, adjust the shape, and reassemble.

During and after each construction phase, the cross-sectional size must be reviewed by measuring at three or more locations. If the deformation exceeds the permissible range, construction must be stopped, the cause must be identified, and reinforcement measures must be devised to reduce the deformation to within the standard.

Construction deformation tolerance

Classification	Allowable cross-sectional deformation
standard-type	Within 5% of the structure's height (rise, R)
deep-corrugation-type	Within 2% of the structure's height (rise, R)

Backfill

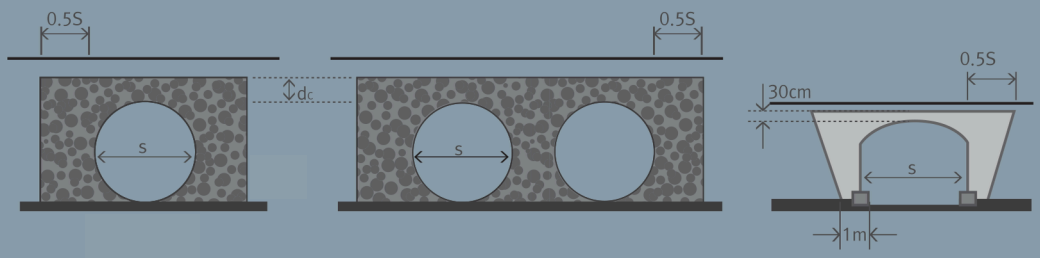
Backfilling must be uniformly compacted using a granular material with low compressibility or a material with good particle size distribution. To ensure uniform earth pressure around the structure, the foundation soil and backfill material must be the same or have minimal heterogeneity.

The backfill for a buried steel plate structure is divided into a structural backfill and a general backfill located outside of it.
Structural backfill material: A material or mixture with low compressibility and excellent durability (subgrade level or higher, sub-base course level SB-1, 2)
General backfill material: Apply local site materials in areas other than the structural backfill zone, in accordance with the design.

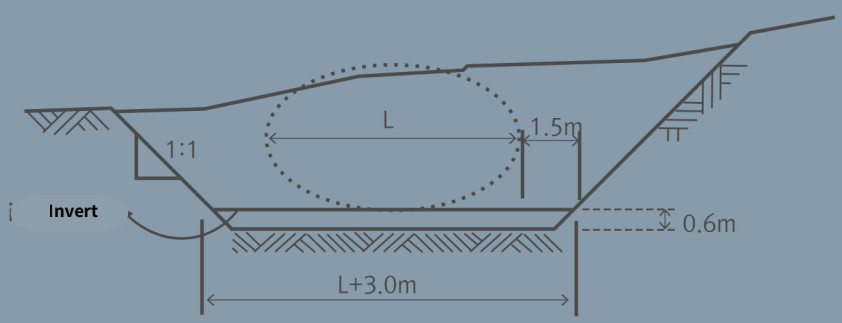
The compaction thickness difference on both sides of a buried steel plate structure should be 20cm or less. If structural deformation occurs, part of the backfill must be removed to readjust the cross-sectional shape before backfilling is performed again.

During the compaction of the structural backfill, the movement of heavy and transport equipment must be controlled within 60cm of the steel plate wall, excluding compaction equipment.

Installation in embankment



Excavated foundation structural backfill



07 Application Cases & Site Photos

Underpass



Waterway, Multi-Span



Cut and Cover and Overpass Bridge





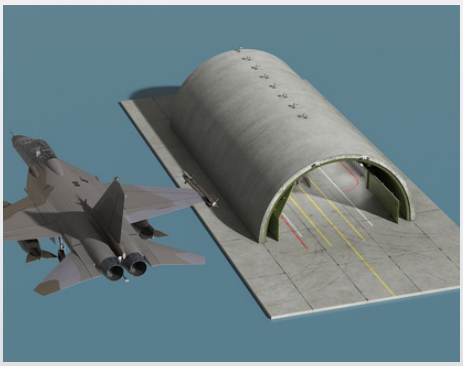

07 Application Cases & Site Photos

Reinforcement






Hardened Aircraft Shelter(HAS)





Other Productions(600x355): Rexteel's Wonder Arch Panel

Mining






Small Bridge



Elbow(Curved structure)



07 Application Cases & Site Photos

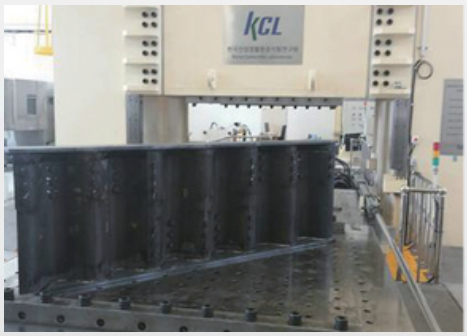
During construction (EC Rib concrete)



Drainage work



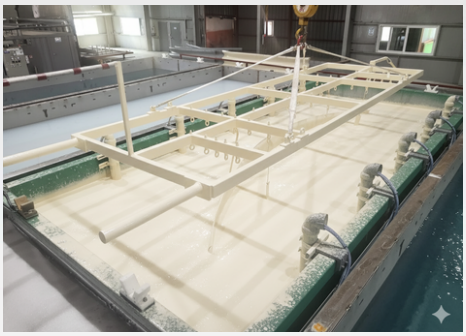
Compression and bending tests

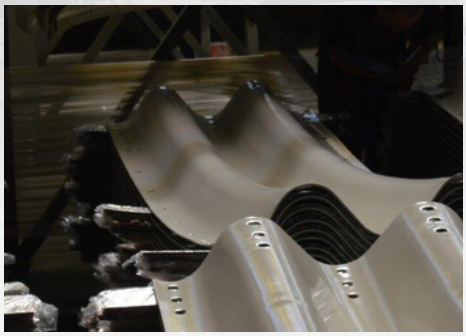


Rib joint (15-bolt fastening)



Electro-deposition coating





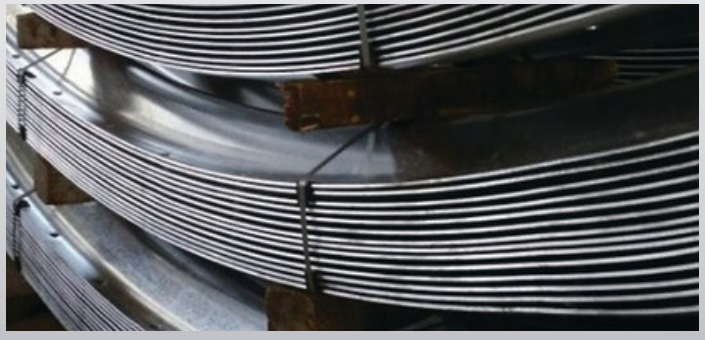
No traffic control



Corrugated steel plate inspection



Export, Shipping & Loading

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