Hyblock - Engineered Retaining Wall System

Technical Guide D15.7

Hyblock Engineered Retaining Wall System is an aesthetical precast big block system, suited for fast and cost effective retaining walls.

Applications

- Residential subdivision
- Commercial development
- Local Authority works
- Gravity & MSE wall applications

Product Attributes

- Simple and quick installation
- Made to order surface finish options available
- Robust and durable
- Voids can be utilised for excess site material* *site conditions dependant*
- 100 year design life (NZS 3101)
- Large face (2m^2) for quick and easy installation
- Available in Marine Grade

Sustainability

- Available in Hynds LC® low carbon concrete
- Verifiable carbon footprint data available
- Customisable for climate-resilient infrastructure

Quality/Environment/Health & Safety

- Hynds is certified to ISO 9001:2015, ISO 14001:2015 and ISO 45001:2018
- Manufactured to F3/F4 finish as detailed in NZS3114:1987

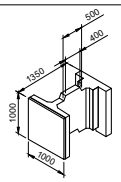
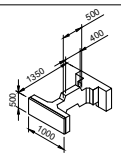
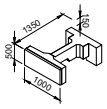
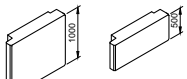
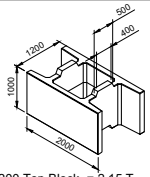
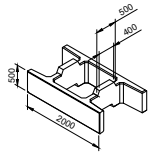
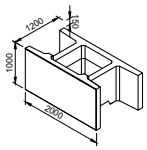
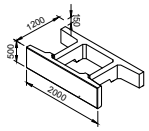
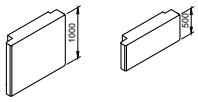
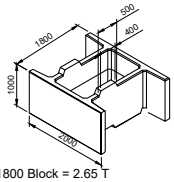
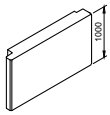
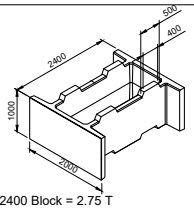
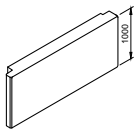
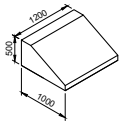
Approvals/Standards

- Purpose designed for various load configurations up to 12kpa Surcharge
- NZS 3101, Concrete Structures Standard
- NZS 3109, Concrete Construction

HYNDS PIPE SYSTEMS

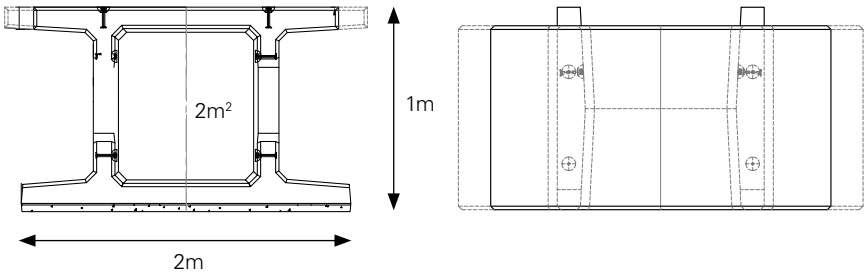
HyBlock Range

- Very cost effective retaining wall solution – easy to prepare; quick surface area construction to install; no specialised equipment needed
- A range of surface finishes are available. Our manufacturing technique also allows for customised finishes tailored to the wall owners vision
- Available throughout New Zealand supplied by Hynds nationwide Branches and delivery fleet
- Superior product quality manufactured in Hynds Precast facilities
- Up to 3 metres in height for standard gravity walls. For MSE wall configuration please contact your Hynds Rep

	1 Meter High Block	Half Height Block	1 Meter High Top Block	Half Height Top Block	End Panels 1m High 0.5m High
HyBlock - Half Width	 Half Width Block = 1.48 T	 Half Width Half Height Block = 1.03 T		 Half Width Top Block = 1.03 T	 Half Width Block End Walls 0.745 T 0.372 T
HyBlock - 1200	 1200 Top Block = 2.15 T	 1200 Half Block = 1.18	 1200 Top Block = 2.1 T	 1200 Half Top Block = 0.87 T	 1200 Block End Walls 0.700 T 0.350 T
HyBlock - 1800	 1800 Block = 2.65 T				 1800 Block End Wall = 1.073 T
HyBlock - 2400	 2400 Block = 2.75 T				 2400 Block End Wall = 1.44 T
HyBlock - Capping Block	 Taper Block Type 1 = 0.89 T	Please Note - 45 Deg and 90 Deg Corner Block s under development Bespoke Block types for Projects are possible - please discuss with Hynds Engineers			

Note:

Standard face profile

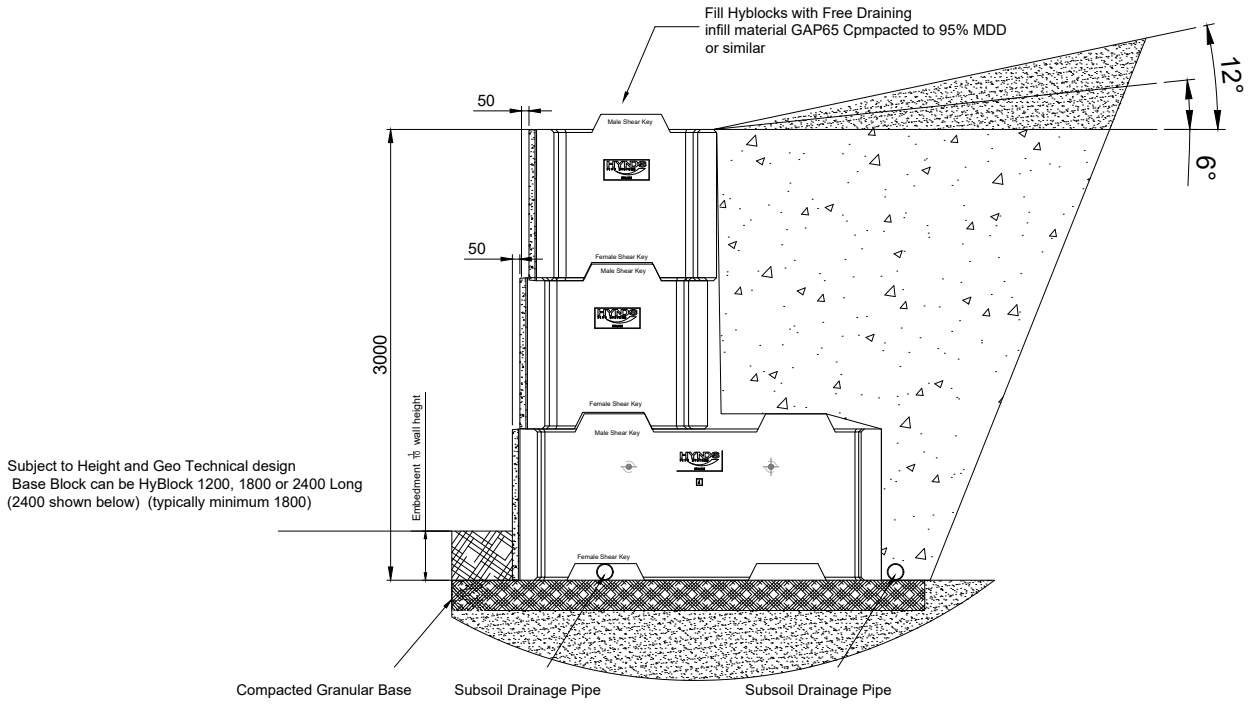


Design Options

- Suitable for gravity load cases: 0-3m
- Backslope – 0-26deg
- Toe embedment = 1/10 of Wall Height
- Local Consultant to confirm Site Specific Engineering parameters on all projects
- Bedding shall Good ground as define by NZS3604 (2011), Allowable Bearing capacity = 100Kpa, Ultimate Bearing capacity = 300kpa or as designed
- No watertable influence
- Site subsoil class C = Shallow soil sites
- Infill material compacted to 95% MDD
- Design scenarios available

1. Granular material, backslope angle = 0, Surcharge = 12Kpa
2. Granular material, backslope angle = 26, Surcharge = 5Kpa
3. Cohesive material, backslope angle = 0, Surcharge = 12Kpa
4. Cohesive material, backslope angle = 26, Surcharge = 5Kpa

FIG. 1 Cross section

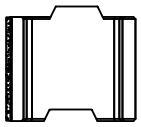
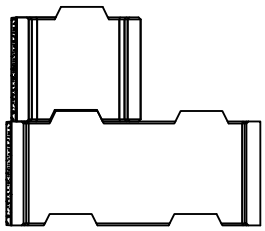
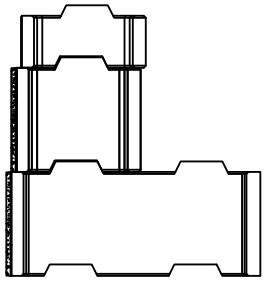
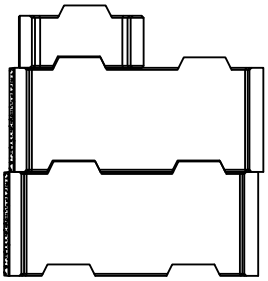
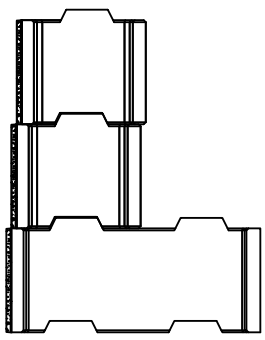
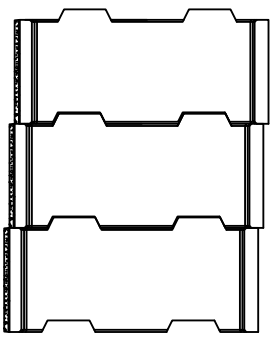


Section - Typical Vertical Installation

Section Information shown is provided as **guidance only** and should not be used for consenting or construction.
It is critical a site specific design and specification by a local Consulting Geotechnical Engineer is completed for each individual project .

Slope & Surcharge Scenarios

Standard options as shown below. Made to order special options are available upon request

Wall Height (m)	Type A	Type B
1m		
Design Senario	1, 2, 3, 4	
2m 1m		
Design Senario	1, 2, 3, 4	
2.5m 2m 1m		
Design Senario	1, 2, 3	4
3m 2m 1m		
Design Senario	1, 2	3, 4

Design Scenario

1. Cohesiveless backfill materials, backslope angle = 0°, Surcharge = 12kPa
2. Cohesiveless backfill materials, backslope angle = 12°, Surcharge = 5kPa
3. Cohesive backfill materials, backslope angle = 0°, Surcharge = 12kPa
4. Cohesive backfill materials, backslope angle = 12°, Surcharge = 5kPa

TABLE 1 Design Assumptions for Cohesiveless Soil

Soil-Wall Friction Angle, δ	=	19 Degree
Retained Soil Friction Angle, Φ	=	37 Degree
Retained Soil Cohesion, c	=	0 kPa
Retained Soil Unit Weight, γ	=	20 kN/m3
Granular Base Unit Weight, γ	=	20 kN/m3
Granular Base Friction Angle, Φ	=	37 Degree
Granular Base thickness	=	0.2 m
Foundation Soil Friction Angle, Φ	=	28 Degree
Foundation Soil Cohesion, c	=	5 kPa
Foundation Soil Unit Weight, γ	=	17.0 kN/m3
Foundation Soil Unit Weight, γ	=	7.2 kN/m3
Foundation Soil Ultimate Shear Strength, Su	=	60 kPa
Class C soil, Z value = 0.28, Importance Level 2 structure, 1:500 return period		
Horizontal earthquake accel factor, PGA, kh = 0.372 g		Design
Horizontal earthquake accel factor, PGA, kh = 0.168 g		Adopted (for 100mm allowable displacement)
Horizontal earthquake accel factor, PGA, kh= 0.157 g		Adopted (for 130mm allowable displacement)
Horizontal earthquake accel factor, PGA, kh= 0.152 g		Adopted (for 150mm allowable displacement)

TABLE 2 Design Assumptions for Cohesiveless Soil

Soil-Wall Friction Angle, δ	=	14 Degree
Retained Soil Friction Angle, Φ	=	28 Degree
Retained Soil Cohesion, c	=	2 kPa
Retained Soil Unit Weight, γ	=	17 kN/m3
Granular Base Unit Weight, γ	=	20 kN/m3
Granular Base Friction Angle, Φ	=	37 Degree
Granular Base thickness	=	0.2 m
Foundation Soil Friction Angle, Φ	=	28 Degree
Foundation Soil Cohesion, c	=	5 kPa
Foundation Soil Unit Weight, γ	=	17.0 kN/m3
Foundation Soil Unit Weight, γ	=	7.2 kN/m3
Foundation Soil Ultimate Shear Strength, Su =		60 kPa
Class C soil, Z value = 0.28, Importance Level 2 structure, 1:500 return period		
Horizontal earthquake accel factor, PGA, kh = 0.372 g Design		
Horizontal earthquake accel factor, PGA, kh = 0.168 g		Adopted (for 100mm allowable displacement)
Horizontal earthquake accel factor, PGA, kh = 0.157 g		Adopted (for 130mm allowable displacement)
Horizontal earthquake accel factor, PGA, kh = 0.152 g		Adopted (for 150mm allowable displacement)
Class C soil, Z value = 0.28, Importance Level 2 structure, 1:500 return period		

Table & Information shown is provided as a **guidance only** and should not be used for consenting or construction.
It is critical a site specific design and specification by a local Consulting Geotechnical Engineer is completed for each individual project .

Assembly - various options

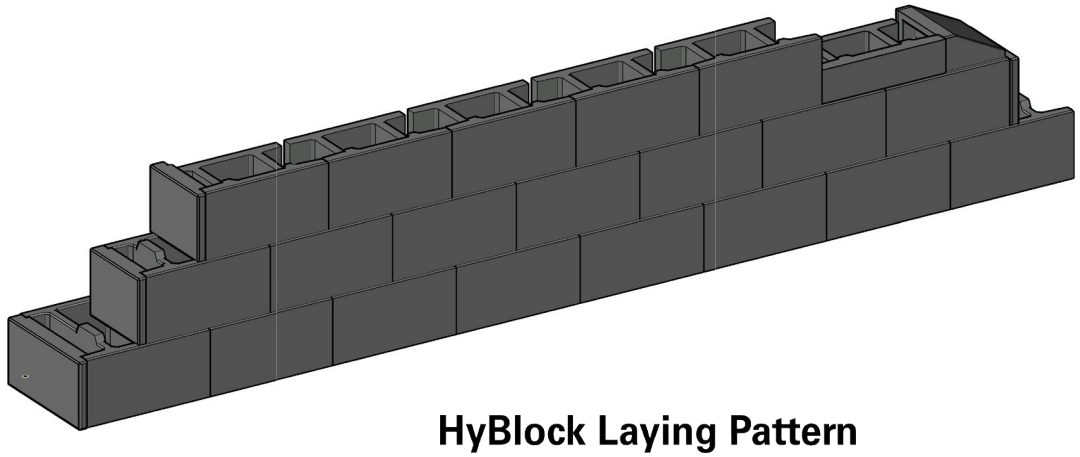


FIG. 2 HyBlock - Laying Pattern Standard Blocks

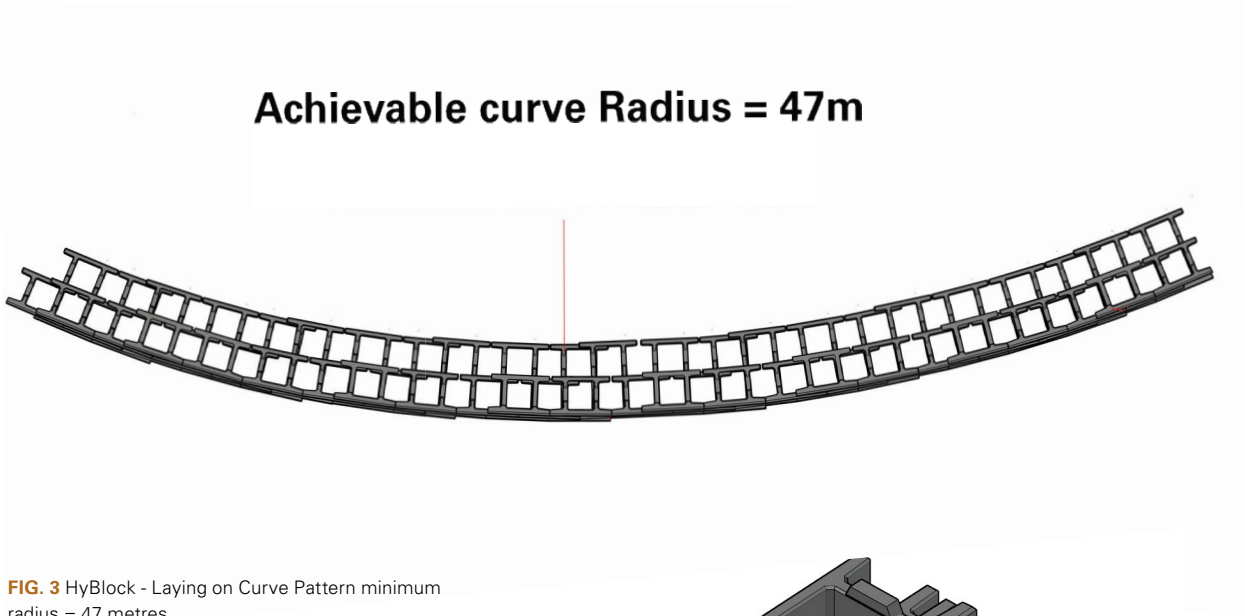


FIG. 3 HyBlock - Laying on Curve Pattern minimum radius = 47 metres

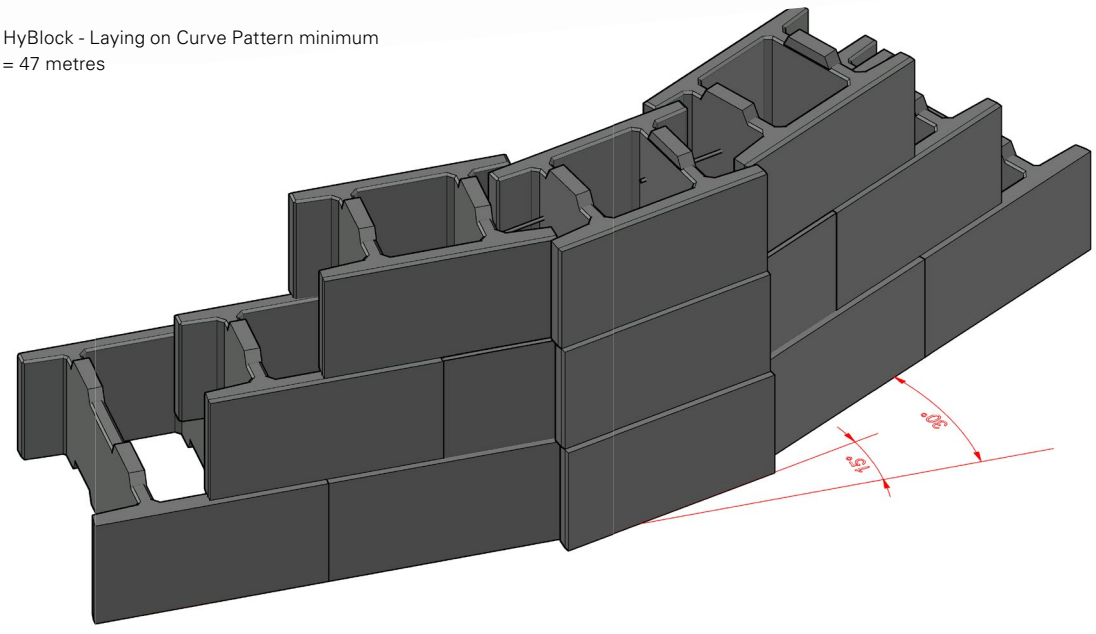


FIG. 4 *HyBlock - Laying on 15 / 30 Deg Angle Layout*

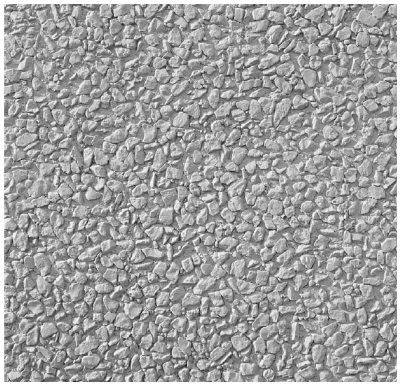
Facing Options Available

Standard options as shown below. Made to order special options are available upon request

Reckili liner pattern

2/41 Mosel

A rock pattern with small, flat rock arranged like a gravel bed.



Reckili liner pattern

Schist

Reckili liner pattern

Hynds Rock Large Stone

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Handling

Blocks are supplied with lifting anchors cast into the top of each unit. Appropriately rated chains must be used when handling the units. Lifting anchor positioning and lifting equipment specifications can be supplied upon request. All Blocks incorporate lifting anchors for safe lifting and must be used with the correct lifting clutch.

Hynds Pipe Systems has designed and manufactured the blocks with a minimum dynamic factor of 1.2. This dynamic factor requires that all the following conditions are observed when lifting, moving or placing the culverts: 1. Lifting with mobile plant (such as an excavator or similar) where equipment is specifically exempt from the requirements of the PECPR Regulations 1999, subject to the conditions outlined in the New Zealand Gazette, No. 104, September 2015 and 2. Lifting, travelling and placing over rough or uneven ground where anchor failure is not anticipated to cause harm or injury, by adopting procedures such as: a. Transporting the element as close as practical to ground level (300mm recommended) b. Establishing and maintaining exclusion zones c. Transporting only precast concrete elements that are unlikely to topple if they were to hit the ground d. Inspecting lifting anchors both after transportation and before final lifting into place Refer to "Safe work with precast concrete - Handling, transportation and erection of precast concrete elements" published by Worksafe New Zealand (October 2018) Shock loads resulting from travelling with suspended Blocks over rough terrain and uneven ground may exceed design, dynamic and safety factors of the lifting systems. It is essential that care is taken during lifting and transporting as additional stresses could result in anchor failure.

Disclaimer: While every effort has been made to ensure that the information in this document is correct and accurate, users of Hynds product or information within this document must make their own assessment of suitability for their particular application. Product dimensions are nominal only, and should be verified if critical to a particular installation. No warranty is either expressed, implied, or statutory made by Hynds unless expressly stated in any sale and purchase agreement entered into between Hynds and the user.