REINFORCED FILL PRODUCT DESIGN DATA SHEET No. RF 1/2026 For BOSTD E′GRID

Date Issued: 22 June 2026
Valid Until: 21 June 2028

Reinforced Fill Products:	E′GRID50R, E′GRID60R, E′GRID70R, E′GRID80R, E′GRID95R, E′GRID105R, E′GRID120R, E′GRID125R, E′GRID145R, E′GRID160R, E′GRID170R, and E′GRID180R
Manufacturer:	BOSTD Geosynthetics Qingdao Ltd. Qingda Industrial Park, Chengyang District, Qingdao, Shandong, China
Product distributor:	BOSTD Geosynthetics Qingdao Ltd. Qingda Industrial Park, Chengyang District, Qingdao, Shandong, China

Important Notice and Disclaimer

This Design Data Sheet is intended for geotechnical professionals designing with BOSTD E′GRID for application in Hong Kong only. Users are solely responsible for (1) selecting the appropriate BOSTD E′GRID for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and other safety, regulatory or other requirements. Civil Engineering and Development Department of HKSAR Government makes no representation as to the presence or absence of patent rights subsisting in the product and/or as to the legal right of the manufacturer and product distributor to market, install or maintain the product.

Where the BOSTD E′GRID are used in permanent reinforced fill structures in Hong Kong, the design tensile strengths of the product shall comply with the values specified in Tables 3 to 9 of this Design Data Sheet, and the design shall be in accordance with Geoguide 6 – Guide to Reinforced Fill Structure and Slope Design (GEO, 2022).

This Design Data Sheet shall cease to be valid if the product data or specifications are withdrawn or re-issued in an amended form by the manufacturer. Applications for amendment to this Design Data Sheet shall be made to the Deputy Head of Geotechnical Engineering Office (Planning and Testing) of the Civil Engineering and Development Department by the manufacturer for all cases of changes in the products, the manufacturing details or the conditions of use, or of changes of the product distributor.

This Design Data Sheet is subject to change without notice. Users of this Design Data Sheet are advised to check the prevailing requirements as stipulated in the latest version of the Design Data Sheet by referring to the Civil Engineering and Development Department's website at https://www.cedd.gov.hk/eng/public-services-forms/geotechnical/reinforced/index.html.

BOSTD E′GRID geogrids

BOSTD E′GRID are manufactured by punching holes in a sheet of polyethylene, which is then stretched under temperature-controlled conditions to the shape and form. The geogrids are made of co-polymer high density polyethylene (HDPE) of class ASTM D1248-16, Type III, Class A, Category 5. The density of the polymer is from 0.950 to 0.960 g/cm^3 when determined by ISO 1183-1:2012 and the melt index of the polymer is 0.20 ± 0.1 g/10 min when determined by ISO1133-1:2011. Carbon black with content not less than 2% is used as a stabilizer for protection against UV degradation, and no recycled polymer content.

The geometric view of the product is shown in Figure 1 below. The typical dimensions, mass and identification of the products are given in Table 1.

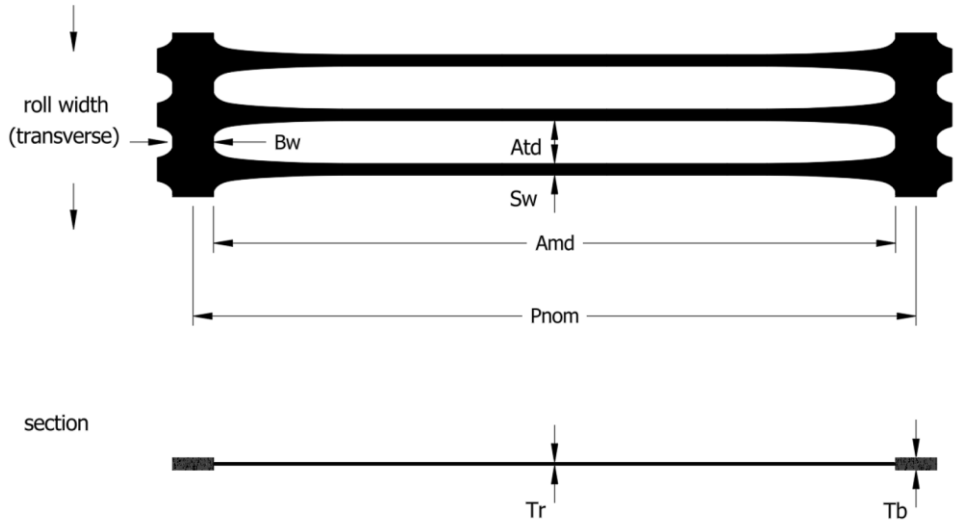


Figure 1 – Geometric view of BOSTD E′GRID

Product	A_{td} (mm)	B_w (mm)	S_w (mm)	T_b (mm)	T_r (mm)	P_{nom} (mm)	Standard roll sizes*	Mass per unit area
E′GRID50R	16	18	5.5	2.1	0.6	235	50m^2 (1.0x50m)	300
E′GRID60R	16	18	5.5	2.8	0.7	245	50m^2 (1.0x50m)	320
E′GRID70R	16	18	5.5	2.9	0.8	245	50m^2 (1.0x50m)	380
E′GRID80R	16	18	5.5	3.4	0.9	255	50m^2 (1.0x50m)	420
E′GRID95R	16	18	5.5	4.1	1.1	260	50m^2 (1.0x50m)	490
E′GRID105R	16	18	5.5	4.5	1.2	260	50m^2 (1.0x50m)	580
E′GRID120R	16	18	5.5	5.2	1.3	260	50m^2 (1.0x50m)	680
E′GRID125R	16	18	5.5	5.3	1.4	260	50m^2 (1.0x50m)	720
E′GRID145R	16	18	5.5	5.7	1.6	260	50m^2 (1.0x50m)	840
E′GRID160R	16	18	5.5	6.7	1.8	260	50m^2 (1.0x50m)	930
E′GRID170R	16	18	5.5	7.8	2.0	260	50m^2 (1.0x50m)	1000
E′GRID180R	16	18	5.5	8.0	2.3	260	50m^2 (1.0x50m)	1070

* Roll widths up to 1.3m

Table 1 – Dimensions, mass and identification of BOSTD E′GRID (E′GRID50R to E′GRID180R)

Tensile strength and load-strain properties

Quality control tensile tests are performed on specimens in accordance with BS EN ISO 10319:2015 at 21±1°C (BSI, 2015) and calculated as the 95% lower confidence limit in accordance with BS 2846-2:1981 and ISO 2602:1980. The characteristic short-term tensile strengths in the geogrids guaranteed by BOSTD are provided in Table 2. The load-strain properties of BOSTD E′GRID are shown in Figure 2. The actual strain at peak load is approximately 11±3 %.

Product	Short-term tensile strength (kN/m)
E′GRID50R	50
E′GRID60R	60
E′GRID70R	70
E′GRID80R	80
E′GRID95R	95.7
E′GRID105R	105
E′GRID120R	120
E′GRID125R	127.2
E′GRID145R	147
E′GRID160R	160
E′GRID170R	170
E′GRID180R	180

Table 2 – Characteristic short-term tensile strength

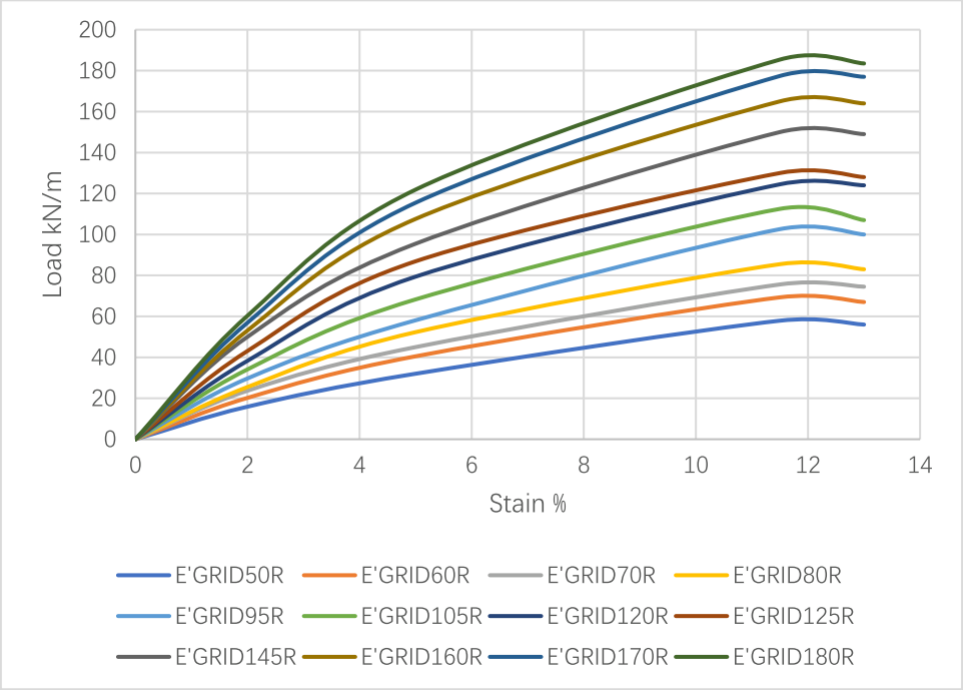


Figure 2 – Typical short-term load-strain properties

Quality assurance

E′GRID supplied to Hong Kong are manufactured by BOSTD Geosynthetics Qingdao Ltd. in Shandong, the Chinese Mainland. The BOSTD E′GRID geogrids E′GRID50R, E′GRID60R, E′GRID70R, E′GRID80R, E′GRID95R, E′GRID105R, E′GRID120R, E′GRID125R, E′GRID145R, E′GRID160R, E′GRID170R, and E′GRID180R are manufactured in a facility with ISO 9001 Quality Assurance Certificate. The testing laboratory is accredited with ISO/IEC 17025:2017 and Geosynthetic Accreditation Institute – Laboratory Accreditation Program (GAI-LAP).

Identification

BOSTD E′GRID geogrids are imported into Hong Kong from the Chinese Mainland. Each roll of BOSTD E′GRID geogrids is packaged by rolling and securing with polyethylene tape clearly designating the product type. A label identifying the product, lot and roll number and other key information is affixed to the tape.

Design Aspects

Design tensile strength

According to Geoguide 6 – Guide to Reinforced Fill Structure and Slope Design (GEO, 2022), the design tensile strength, T_D, per unit width of reinforcement is:

$$T_D = \frac{T_{ult}}{\gamma_m \gamma_n}$$

where T_{ult} = characteristic short-term tensile strength guaranteed by BOSTD E′GRID (see Table 2)

γ_m = partial material factor on tensile strength of geogrids

γ_n = partial consequence factor to account for consequence of failure

The design tensile strength values of the BOSTD E′GRID geogrids given in Tables 3 to 14, which have been agreed with BOSTD, shall be used.

Particle size of fill material (mm)	γm	Design tensile strength (kN/m)	
		γn = 1.0	γn = 1.1
$D_{85} \leq 10$	2.57	19.5	17.7
$10 < D_{85} \leq 25$	2.69	18.6	16.9
$25 < D_{85} \leq 40$	2.72	18.4	16.7
$40 < D_{85} \leq 50$	2.74	18.2	16.6

Table 3 – Design tensile strengths of BOSTD E′GRID geogrids E′GRID50R

Particle size of fill material (mm)	γm	Design tensile strength (kN/m)	
		γn = 1.0	γn = 1.1
$D_{85} \leq 10$	2.57	23.4	21.3
$10 < D_{85} \leq 25$	2.72	22.1	20.1
$25 < D_{85} \leq 40$	2.62	22.9	20.9
$40 < D_{85} \leq 50$	2.92	20.5	18.7

Table 4 – Design tensile strengths of BOSTD E′GRID geogrids E′GRID60R

Particle size of fill material (mm)	γm	Design tensile strength (kN/m)	
		γn = 1.0	γn = 1.1
$D_{85} \leq 10$	2.57	27.3	24.8
$10 < D_{85} \leq 25$	2.74	25.5	23.2
$25 < D_{85} \leq 40$	2.62	26.8	24.3
$40 < D_{85} \leq 50$	2.92	24.0	21.8

Table 5 – Design tensile strengths of BOSTD E′GRID geogrids E′GRID70R

Particle size of fill material (mm)	γm	Design tensile strength (kN/m)	
		γn = 1.0	γn = 1.1
$D_{85} \leq 10$	2.57	31.2	28.4
$10 < D_{85} \leq 25$	2.77	28.9	26.3
$25 < D_{85} \leq 40$	2.84	28.1	25.6
$40 < D_{85} \leq 50$	2.92	27.4	24.9

Table 6 – Design tensile strengths of BOSTD E′GRID geogrids E′GRID80R

Particle size of fill material (mm)	γm	Design tensile strength (kN/m)	
		γn = 1.0	γn = 1.1
$D_{85} \leq 10$	2.57	37.3	33.9
$10 < D_{85} \leq 25$	2.77	34.6	31.4
$25 < D_{85} \leq 40$	2.84	33.6	30.6
$40 < D_{85} \leq 50$	2.92	32.8	29.8

Table 7 – Design tensile strengths of BOSTD E′GRID geogrids E′GRID95R

Particle size of fill material (mm)	γm	Design tensile strength (kN/m)	
		γn = 1.0	γn = 1.1
$D_{85} \leq 10$	2.57	40.9	37.2
$10 < D_{85} \leq 25$	2.77	37.9	34.5
$25 < D_{85} \leq 40$	2.84	36.9	33.6
$40 < D_{85} \leq 50$	2.92	35.9	32.7

Table 8 – Design tensile strengths of BOSTD E′GRID geogrids E′GRID105R

Particle size of fill material (mm)	γ_m	Design tensile strength (kN/m)	
		$\gamma_n = 1.0$	$\gamma_n = 1.1$
$D_{85} \leq 10$	2.57	46.8	42.5
$10 < D_{85} \leq 25$	2.77	43.3	39.4
$25 < D_{85} \leq 40$	2.84	42.2	38.4
$40 < D_{85} \leq 50$	2.92	41.1	37.4

Table 9 – Design tensile strengths of BOSTD E′GRID geogrids E′GRID120R

Particle size of fill material (mm)	γ_m	Design tensile strength (kN/m)	
		$\gamma_n = 1.0$	$\gamma_n = 1.1$
$D_{85} \leq 10$	2.57	49.6	45.1
$10 < D_{85} \leq 25$	2.67	47.7	43.4
$25 < D_{85} \leq 40$	2.72	46.8	42.6
$40 < D_{85} \leq 50$	2.79	45.5	41.4

Table 10 – Design tensile strengths of BOSTD E′GRID geogrids E′GRID125R

Particle size of fill material (mm)	γ_m	Design tensile strength (kN/m)	
		$\gamma_n = 1.0$	$\gamma_n = 1.1$
$D_{85} \leq 10$	2.57	57.3	52.1
$10 < D_{85} \leq 25$	2.67	55.1	50.1
$25 < D_{85} \leq 40$	2.72	54.1	49.2
$40 < D_{85} \leq 50$	2.79	52.6	47.8

Table 11 – Design tensile strengths of BOSTD E′GRID geogrids E′GRID145R

Particle size of fill material (mm)	γ_m	Design tensile strength (kN/m)	
		$\gamma_n = 1.0$	$\gamma_n = 1.1$
$D_{85} \leq 10$	2.57	62.4	56.7
$10 < D_{85} \leq 25$	2.67	60.0	54.5
$25 < D_{85} \leq 40$	2.72	58.9	53.5
$40 < D_{85} \leq 50$	2.79	57.3	52.1

Table 12 – Design tensile strengths of BOSTD E′GRID geogrids E′GRID160R

Particle size of fill material (mm)	γ_m	Design tensile strength (kN/m)	
		$\gamma_n = 1.0$	$\gamma_n = 1.1$
$D_{85} \leq 10$	2.57	66.3	60.2
$10 < D_{85} \leq 25$	2.69	63.1	57.4
$25 < D_{85} \leq 40$	2.72	62.6	56.9
$40 < D_{85} \leq 50$	2.74	62.0	56.3

Table 13 – Design tensile strengths of BOSTD E′GRID geogrids E′GRID170R

Particle size of fill material (mm)	γ_m	Design tensile strength (kN/m)	
		$\gamma_n = 1.0$	$\gamma_n = 1.1$
$D_{85} \leq 10$	2.57	70.2	63.8
$10 < D_{85} \leq 25$	2.69	66.9	60.8
$25 < D_{85} \leq 40$	2.72	66.2	60.2
$40 < D_{85} \leq 50$	2.74	65.6	59.7

Table 14 – Design tensile strengths of BOSTD E′GRID geogrids E′GRID180R

The following notes apply to Tables 3 to 14:

(a) The design tensile strengths given in Tables 3 to 14 are in kN per meter width of geogrid.

(b) The roll widths up to 1.3m are available

(c) D_{85} is the particle size corresponding to 85 % by weight of particles passing in a grading test.

(d) The partial material factor, γ_m, applies to the tensile strength of the individual grades of BOSTD E′GRID geogrids. It has taken into account the environmental effects on material durability, construction damage and other special factors including hydrolysis, creep and stress rupture for a 120-year design life at a design temperature of 30°C.

(e) The fill material used within the reinforced fill block shall comply with the requirements specified in Geoguide 6 (GEO, 2022). In addition, the maximum particle size and the D_{85} value of the fill material shall not exceed 150 mm and 50 mm respectively.

Fill-to-reinforcement interaction

According to Geoguide 6 (GEO, 2022), the design coefficients of fill-to-reinforcement interaction μ_{dsD} and μ_{pD} relating to direct sliding resistance and pullout resistance respectively are:

$$\mu_{dsD} = \frac{\alpha_{ds} \tan \phi'}{\gamma_m \gamma_n}$$

$$\mu_{pD} = \frac{\alpha_p \tan \phi'}{\gamma_m \gamma_n}$$

where μ_{dsD} = design coefficient of interaction against direct sliding
μ_{pD} = design coefficient of interaction against pullout
γ_m = partial material factor for fill-to-reinforcement interaction
γ_n = partial consequence factor to account for consequence of failure
α_{ds} = direct sliding coefficient
α_p = pullout coefficient

In preliminary design, the direct sliding coefficient, α_{ds} and the pullout coefficient, α_p given in Table 15 below, which have been agreed with BOSTD E′GRID, may be used. The partial material factor, γ_m, for fill-to-reinforcement interaction shall be taken as 1.2.

Interaction coefficient	Fill material	
	Type 1 fill	Type 2 fill
Direct sliding coefficient α_{ds}	0.84	0.64
Pullout coefficient α_p	0.90	0.90

Table 15 – Direct sliding and pullout coefficients

The design coefficients of fill-to-reinforcement interaction should be verified by tests in accordance with the requirements of Clause A.61 and Clause A.62 given in the Appendix A of Geoguide 6 (GEO, 2022).

Facings

The typical facing types recommended by BOSTD E′GRID for the construction of reinforced fill structures using BOSTD E′GRID geogrids are presented in Appendix A and B respectively. The suitability of these facing types should be carefully assessed by the designer and suitably modified to suit the individual design situations and contract requirements. The various design situations that need to be considered in the design of reinforced fill structures are discussed in Geoguide 6 (GEO, 2022).

Compliance Testing

The materials used for the construction of the reinforced fill structures should be inspected and tested on a regular basis during construction. Testing is required to ensure that the materials conform to the specification. Particular attention should be given to materials which can change properties; these include reinforcing elements and fill. Fill from different sources may have different material parameters and should be checked for compliance. Each main delivery of reinforcement should be sampled, tested and properly labelled.

The requirements for the testing of materials are recommended in the Appendix A of Geoguide 6 (GEO, 2022).

References

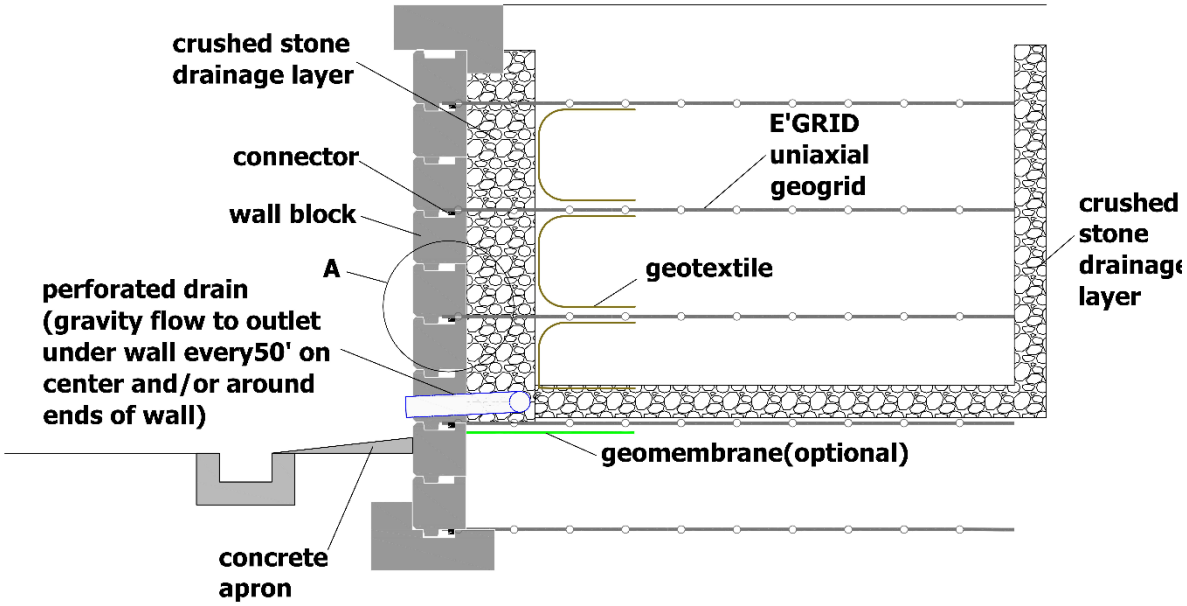
BSI (2015). Geotextiles – Wide width tensile test (BS EN ISO 10319:2015). British Standards Institution, London.

GEO (2022). Guide to Reinforced Fill Structure and Slope Design (Geoguide 6) (Continuously Updated E-Version released on 27 October 2022). Geotechnical Engineering Office, Civil Engineering and Development Department, HKSAR Government, 218 p.

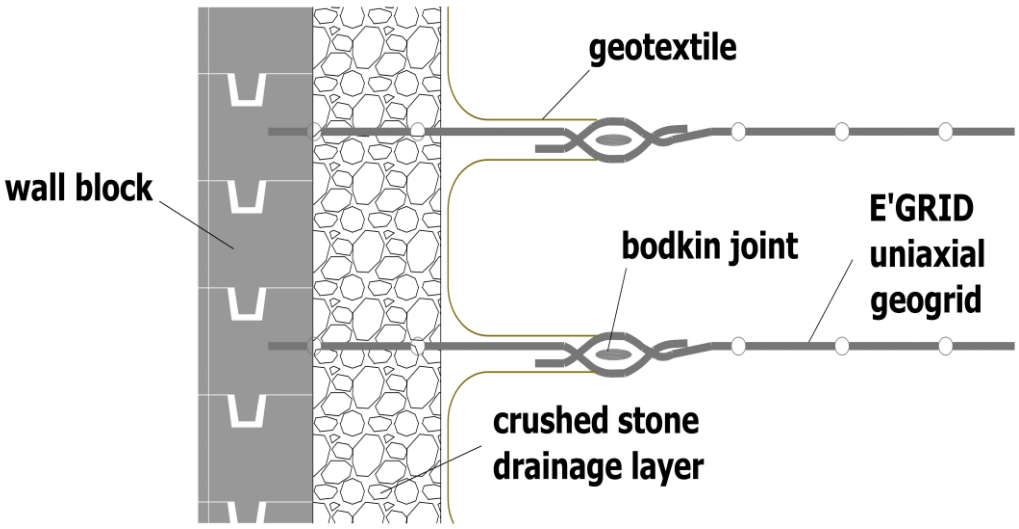
Geotechnical Engineering Office
Civil Engineering and Development Department
June 2026

Appendix A

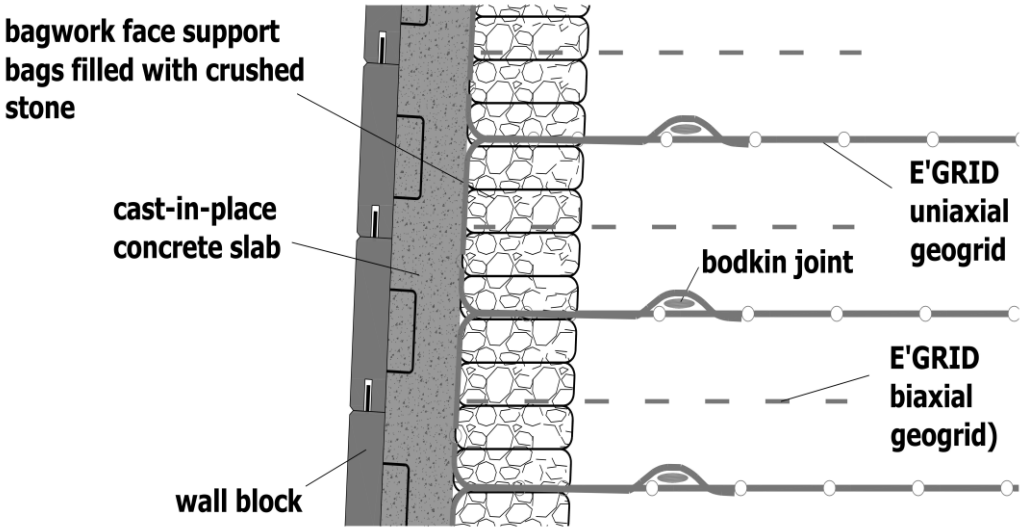
Arrangement of Mechanically Stabilized Earth Wall



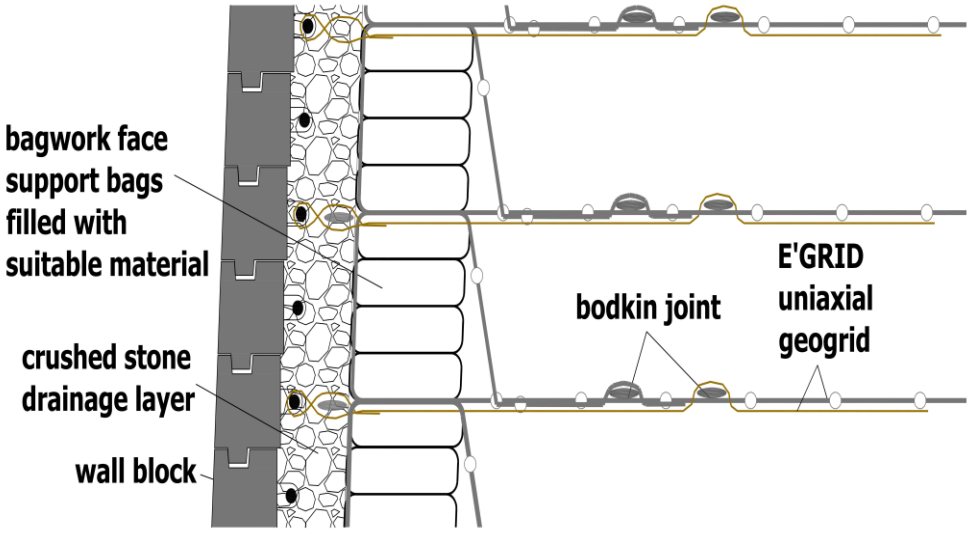
Typical Cross Section of Mechanically Stabilized Earth Wall with Block and Connector



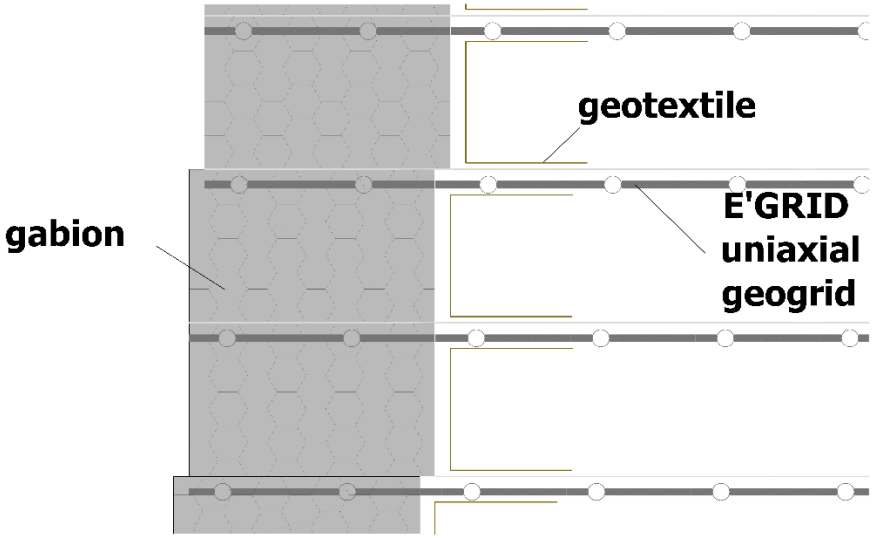
Detail 'A' for Precast Block Face



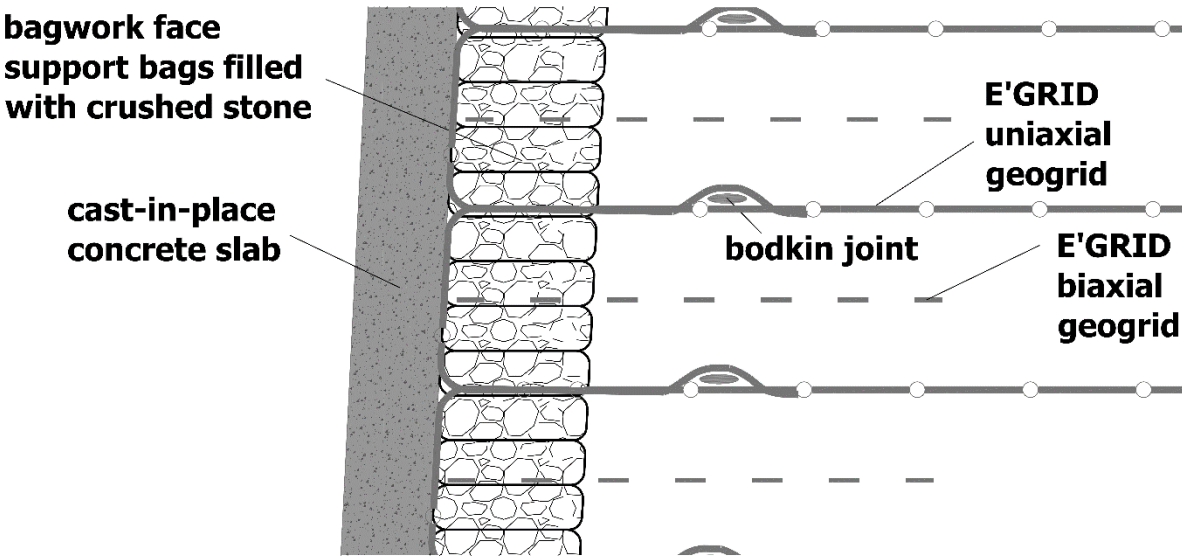
Detail 'A' for Combined Wall cast on sight between thin Slab Face with wrap around Wall



Detail 'A' for Block Face combined with wrap around Wall



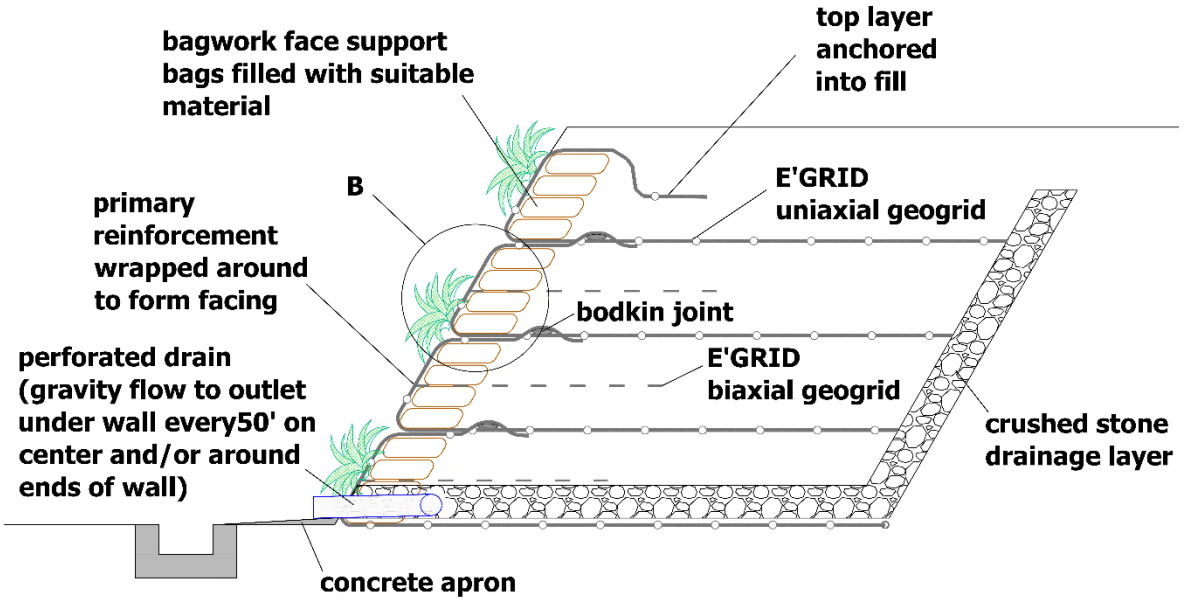
Detail 'A' for Gabion Face



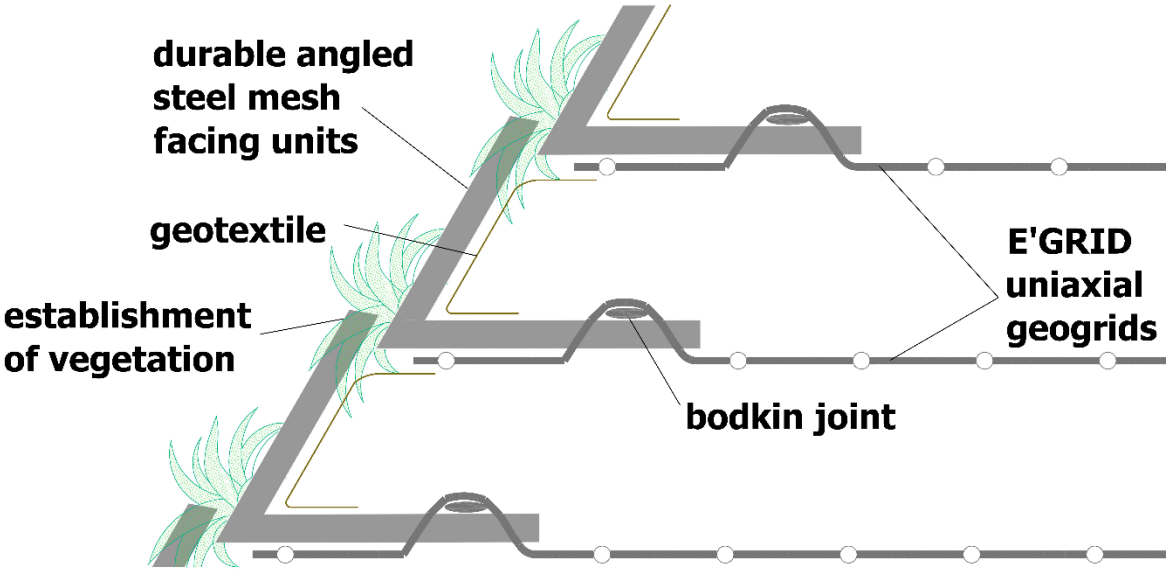
Detail ‘A’ for Precast Slab Face combined with wrap around Wall

Appendix B

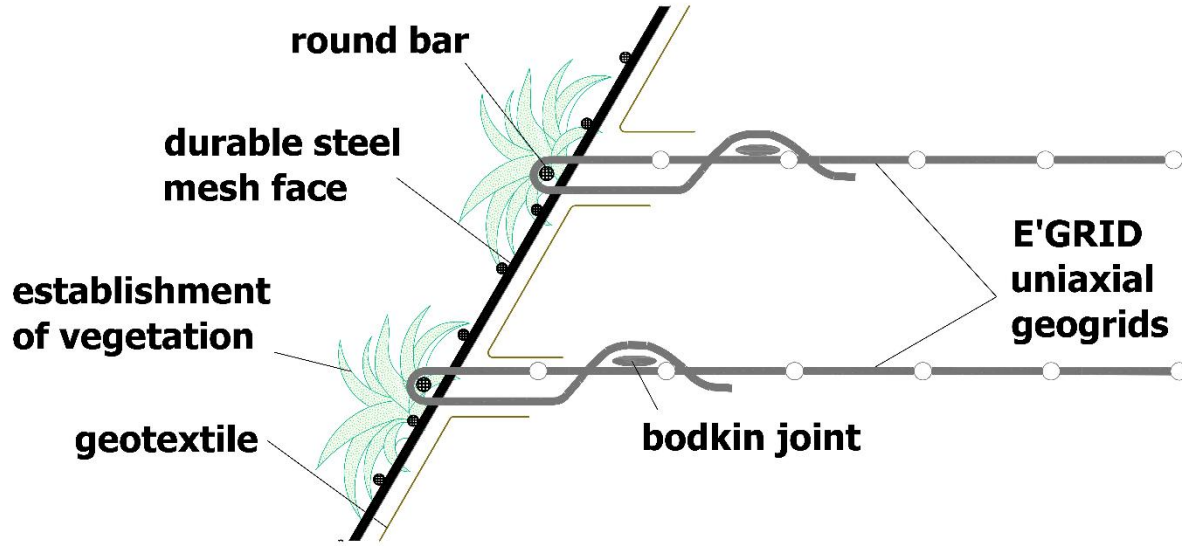
Arrangement of Reinforced Fill Slope



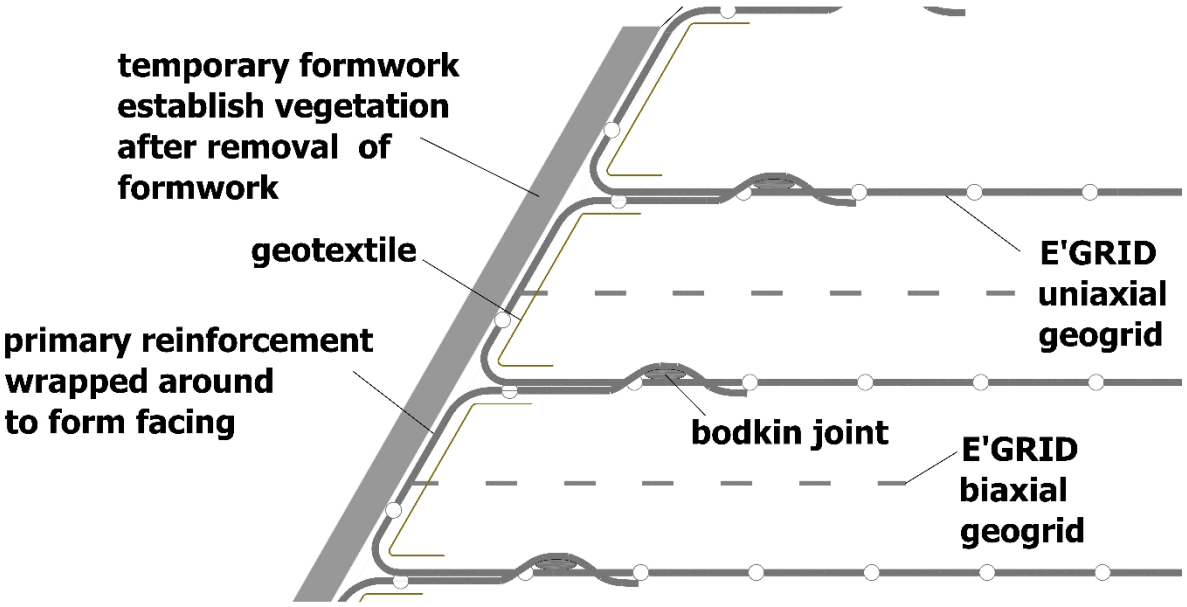
Typical Cross Section of Reinforced Fill Slope



Detail 'B' of L-shape Steel Mesh Face



Detail 'B' of Steel Mesh Face with Round Bar



Detail 'B' of Temporary Form Works with wrap around Slope