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GEOTECH
SOIL AND FOUNDATION ENGINEERING

# geoBLOCK®

## Lighten your load on your next Project **Austrotherm geoBLOCK® !**


Austrotherm **geoBLOCK®** (EPS) is the solution for constructing highway embankments, national and county roads on easily compressible terrains, and embankments over underground utility networks.

## 2.1 Highway Embankments

Highway embankments constructed on soft soil sites may cause excessive differential and total settlements therefore, they require special geotechnical engineering solutions. The stability of the highway embankments constructed on soft soil sites both during and after construction is an important design consideration. Considering the allowable total and differential settlements, bearing capacity and stability criteria, geotechnical engineers traditionally design appropriate soil improvement solution based on the local subsurface conditions. Afterwards, embankments and bridge approach embankments consisting of compacted earth fill are constructed on the improved subsoil profile. Traditional soil improvement techniques such as stone columns, drilled shafts, jet grout columns, rammed aggregate piers, prefabricated vertical drains (PVD), surcharge, deep mixing, vacuum consolidation and similar technologies are widely utilized by geotechnical engineers. However, the completion time of the project by implementing soil improvement can cause significant delay in opening the roadway to the traffic. Furthermore, if the subsurface soil conditions to be improved against bearing capacity and settlement failures extended down to the deep layers, the initial construction costs significantly increase.

As an alternative to constructing conventional compacted earth fill on mechanically improved subsurface profiles, embankments on soft soil sites can be constructed with geofoam blocks, which are 50 - 100 times lighter than the compacted earth fill, without the need for any soil improvement. Geofoam blocks were first used by the Norwegian Highways Administration (NPRA) in 1972 (Aabøe et al., 2019) for the approach embankment of the Flom Bridge located on Highway 159, near Oslo, for preventing the total settlements. Upon the construction of this first application and with the spread of geofoam technology, a design specification was published by the Norwegian Road Research Laboratory (NRRL) for the use of geofoam blocks in highway construction (NRRL, 1992).

After successful applications of the geofoam technology in Norway, Japanese EPS industry representatives established the Expanded Polystyrene Construction and Development Organization of Japan (EDO) and geofoam technology was implemented in 1985 by EDO in Japan (Tsukamoto, 2011).

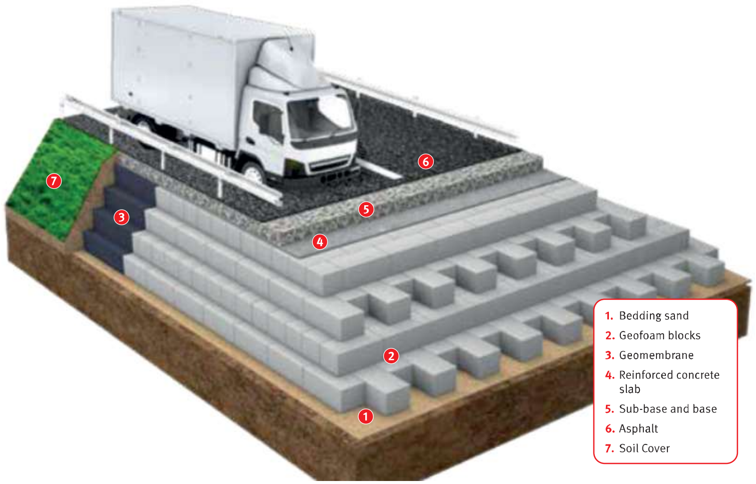


**Figure 2.1** Traditional trapezoidal geofoam embankment

The first geofoam application in the United States was completed in 1989 in Highway 160, Colorado. Geofoam technology played a major role in the I-15 highway expansion and reconstruction project constructed between 1998 and 2001 (Bartlett et al., 2000). A design specification for geofoam block highway embankments has been prepared by a study funded by The National Cooperative Highway Research Program (NCHRP) (Stark et al., 2004 a; 2004 b).

After the implementation of geofoam blocks as a geotechnology in Norway, the use of geofoam blocks in highway projects has been implemented in the Netherlands (Duškov & Nijhuis, 2011), Germany (Beinbrech & Hillmann, 1997), France (Perrier, 1997), England (Thompsett et al., 1995), Czech Republic (Herle, 2011), Greece (Papacharalampous & Sotiropoulos, 2011), Finland (Saarelainen & Kangas, 2001) and Serbia (Spasojević et al., 2011). Construction of geofoam embankments gained momentum recently in Turkey (Özer et al., 2017; Özer & Akınay, 2017; Özer et al., 2018; Özer & Akınay, 2019; Özer 2020).

With the spread of geofoam applications in Europe, the European Manufacturers of Expanded Polystyrene (EUMEPS) has established the design standard as well as the material standard for the mechanical and physical properties of geofoam blocks (EUMEPS, 2014). The geofoam technology was also implemented in Russia,

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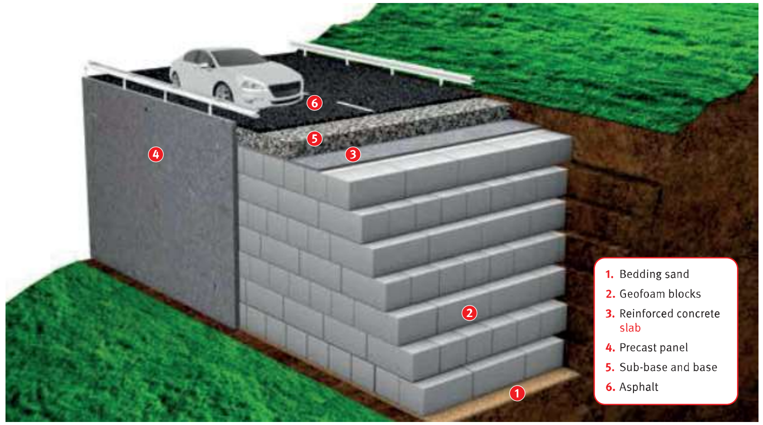


**Figure 2.2** Geofoam block embankment with vertical sides

China, South Korea and Taiwan (Aabøe et al., 2019). In addition to the short project completion time of geofoam highway embankment construction, the initial project investment cost (depending on the depth of the soil to be improved) may be less than that of the soil improvement application and subsequent conventional compacted earth fill construction (Duškov & Waarts, 2011; Özer et al., 2012). Since it is an effective solution against total and different settlements, the geofoam block technology ensures minimum maintenance costs throughout the service life of the project.

Geofoam block highway embankments can be built both with slope (trapezoidal, Figure 2.1) or vertical sides (Figure 2.2 and Figure 2.3). In addition, both application techniques can be utilized in combination where necessary (Figure 2.4).

Construction steps of traditional geofoam block embankments can be listed as; (1) placement of the bedding sand (2) placement of geofoam blocks based on block placement plan (3) casting reinforced concrete load distribution slab (4) placement of geomembrane and soil cover on the side slopes of geofoam embankment (5) sub-base, base and asphalt placement (Figure 2.1).

**Figure 2.3 Geofoam block embankment with vertical sides: A76 Motorway** (Near Kerensheide, The Netherlands), (Duškov et al., 2019)

The construction procedure of the first geofoam block of embankment in Turkey (Figure 2.4) is explained in detail by Özer & Akınay (2017). When a geofoam block highway embankment is built with vertical sides, precast panels are placed on a concrete foundation and anchored to the load distribution slab (Figure 2.2). Geofoam block placement plan is prepared in orienting the longitudinal axes of the blocks in a given layer perpendicular to the longitudinal axes of the blocks in the adjacent layers. Construction practices of geofoam embankments are discussed in detail in the fourth chapter of the book.

**Figure 2.4 The use of both trapezoidal and vertical sides geofoam block configurations in the same project** (Acıbadem – Üsküdar/Istanbul), (Özer & Akınay, 2017).

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## 2.2 Embankment Widening

Lane expansion solutions are often used to meet the increasing traffic needs (Ludlow et al., 1993; Serridge & Synac, 2007; Kim et al., 2010) and to build safer approach and exit lanes (Deschamps et al., 1999). Embankment widening construction to the existing highway route creates an engineering problem requiring consideration of total settlement in both the existing embankment and the widened portion of the embankment (Han et al., 2007; 2013). In addition, differential settlement needs to be considered between the embankment widening and existing embankment (Han et al., 2007; 2013). Lightweight fill materials, geosynthetics, piles, pre-loading, stone columns, prefabricated vertical drains and similar techniques are used to prevent total and different settlement issues (Han et al., 2006; Serridge & Synac, 2007). Using geofoam blocks as a lightweight material in embankment widening projects prevents the total and differential settlements.

Using geofoam technology in embankment widening projects not only provides an economical alternative but also saves significant time in project completion when compared to that of traditional soil improvement techniques. 47.5% of the 5.3 million-$m^3$ geofoam block was used in civil engineering applications in Japan between 1985 and 2010 in embankment widening projects (Kubota, 2011). Like traditional geofoam block embankments, geofoam block embankment widening can also be constructed with both slope (trapezoidal) side (Figure 2.5 and Figure 2.6) as well as vertical side (Figure 2.7).

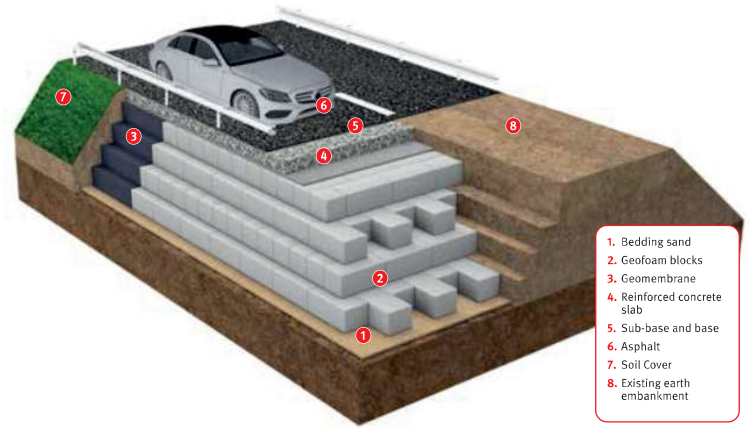


**Figure 2.5 Geofoam block embankment widening with slope side**

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The construction phases for geofoam block embankment widening applications are the same as the construction steps of the traditional geofoam highway embankments. For the construction of geofoam block embankment widening, the slope of the existing embankment must be stable (Figure 2.6). If the existing slope is not stable, the necessary slope rehabilitation needs to be completed prior to block placement (Figure 2.7).


**Figure 2.6** **Geofoam block embankment widening as a side-hill fill adjacent to a stable slope of existing embankment: E6/E18 Motorway** (Vinterbro/Ås/Akershus/Norveç), (Damtew vd., 2011)


**Figure 2.7** **Geofoam block embankment widening with vertical side constructed as side-hill fill adjacent to existing roadway embankment, geofoam block placement started after slope rehabilitation with soil nailing and shotcrete completed in existing embankment slope** (Second Mesa/Arizona/USA), (Photograph: S. F. Bartlett)

## 2.3 Bridge Approach Embankments

Construction of bridge approach embankments on soft soil sites requires special solutions. Traditionally, bridge abutments on soft soil sites are built on pile foundations to prevent total settlements and bearing capacity failures. In this case, if traditional ground improvement application in the foundation of the approach embankment is not implemented, differential settlements occur between the bridge abutment and the approach embankment. This differential settlement increases the maintenance costs and can also go as far as jeopardizing the stability of both the embankment and the bridge abutment. Bridge approach embankments can be constructed with geofoam blocks to prevent differential settlements and loss of stability.


**Figure 2.8** **Geofoam block bridge approach embankment**

Similar to that of the traditional geofoam block highway embankments, bridge approach embankments can also be constructed with both slope (Figures 2.8 and 2.9) and vertical sides (Figures 2.10 and 2.11). In addition to preventing differential settlements, the construction of bridge approach embankments with geofoam blocks provides an economic design alternative in the total cost of the bridge abutment by reducing the lateral pressures acting on the abutment to negligible levels compared to the traditional compacted earth fill.

In addition to constructing the entire bridge approach embankment with geofoam blocks, a partial geofoam block configuration (Figure 2.12) can also be utilized. This block placement plan is preferred in order to design a more economical bridge abutment under both static and dynamic loads when total and different settlements are within the allowable limits along the approach embankment alignment.

Figure 2.9 **Geofoam block bridge approach embankment** (Norway), (EUMEPS, 2010)

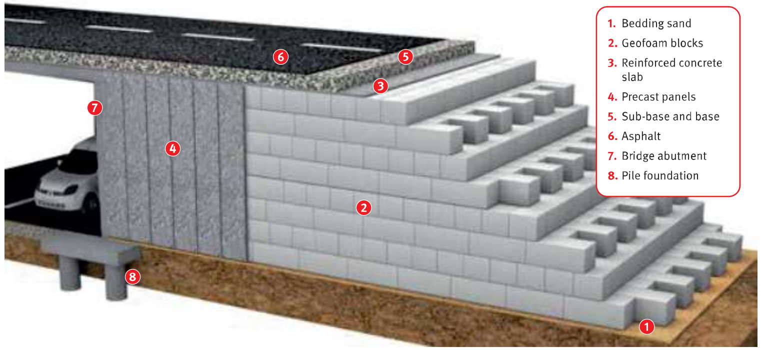


Figure 2.10 **Geofoam block bridge approach embankment with vertical sides**

Figure 2.11 **Geofoam block bridge approach embankment: I-15 Highway**
(Salt Lake City/ Utah/USA) (Photograph: S. F. Bartlett)

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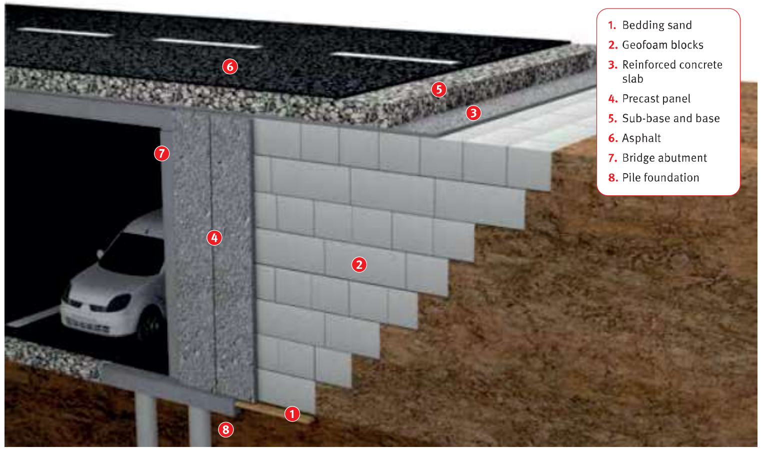


Figure 2.12 **Geofoam block bridge approach embankment: Partial block placement plan**

## 2.4. Culverts and Buried Pipelines

### 2.4.1 Using Geofoam Blocks as Lightweight Fill atop Culverts

A culvert is a structure which allows water flow, vehicle and pedestrian crossing under a roadway. (Figure 2.13) Culverts are constructed from concrete, reinforced concrete (cast-in-place or precast), steel or polymer-based materials (HDPE, PVC, PP etc.). Culverts come in various sizes and shapes (box-shape, round, elliptical, etc.).

Figure 2.13 **A reinforced concrete box culvert with dual cell serving as a bridge**
(Source: http://www.hudsoncivil.com.au)

Earth fills of various thicknesses can be built atop the culverts to create a roadway embankment. When the earth fill thickness atop a culvert is relatively small, motor vehicle axle loads is an important design parameter (Figure 2.13). By contrast, when the earth fill thickness increases, the stress increase due to the motor vehicle axle loads decreases, however, the dead weight of the earth fill increases (Figure 2.14). When culverts are designed under relatively thick earth fills, the structural components of a culvert can be quite large to satisfy the design criteria. This naturally causes an increase in the initial investment costs of the project.

**Figure 2.14 Relatively thick earth fill constructed atop a dual cell reinforced concrete box culvert** (Source: http://www.hudsoncivil.com.au)

When a thick fill is built atop an existing culvert, the geofoam block technology provides a viable alternative for preventing possible structural damage (Figure 2.15) without strengthening and can lead to an economical design alternative.

**Figure 2.15 Geofoam block fill constructed atop a triple cell reinforced concrete culvert: Constructing the roadway fill atop the culvert using geofoam technology significantly reduced induced stresses to the culvert** (Alton/Iowa/U.S.A.) (Source: https://www.achfoam.com/)

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Embankment widening for highway and railway embankments constructed on soft soil sites requires special solutions for the structural stability of the existing culverts. When these embankments are constructed using conventional earth fill, primary consolidation may cause structural damage to existing culverts. Soil improvement practices extend the construction period and increase the total costs of the project depending on the local soil profile. Possible structural damages in the existing culverts can be prevented by constructing the embankment widening using the geofoam blocks (Figure 2.16).

**Figure 2.16 An application where geofoam block fill constructed atop a single cell reinforced concrete culvert: The railway embankment widening was constructed using geofoam blocks to prevent differential settlements which may cause structural damage in the culvert.** (Draper/Utah/A.B.D.), (Bartlett et al., 2015)

Construction of rock fall protection galleries are also considered as a viable alternative when the protection area is narrow (Figure 2.44). Traditional soil backfill above protection galleries has limited energy absorption capacity. However, adding layers of geofoam blocks under soil backfill can greatly enhance the performance of protection structure (Figure 2.44) due to high energy absorption capacity of geofoam blocks as they deform as a result of the impact of falling rock.

Geofoam block application in the rockfall protection structure at the Adana - Pozantı Motorway between Çiftehan – Pozantı, Turkey can be given as a typical example (Figure 2.45).

**Figure 2.45 Geofoam block application in rock fall protection galleries: A rockfall protection tunnel was built on the Ankara - Pozantı Highway, Çiftehan - Pozantı Section in 2014. Geofoam blocks are placed on this protection tunnel under the soil cover for energy absorption** (Source: EPSDER)

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**Figure 5.7 The first geofoam block roadway embankment of Turkey** (Acıbadem-Uskudar/Istanbul) (Özer & Akınay, 2017)


**Figure 5.8 Location of water mains (Acıbadem-Uskudar/Istanbul)** (Özer & Akınay, 2017)

An instrumentation program has been prepared to monitor the performance of the embankment not only during the construction but also for the post construction period under service loads. For this reason, an instrumentation array consisting of magnet settlement plates were installed in the geofoam embankment and deformation recordings were taken (Figure 5.9). The settlement at the end of construction was recorded lower than the allowable elastic limit strain (1%) of the geofoam embankment (Özer & Akınay, 2017; 2019). In addition, the projected long-term settlement value, estimated based on the settlement recordings since opening of the roadway to traffic, indicated the expected total settlement (post construction settlement plus long term creep deformation) would be below the allowable limit (2%) (Figure 5.10) (Özer & Akınay, 2019).

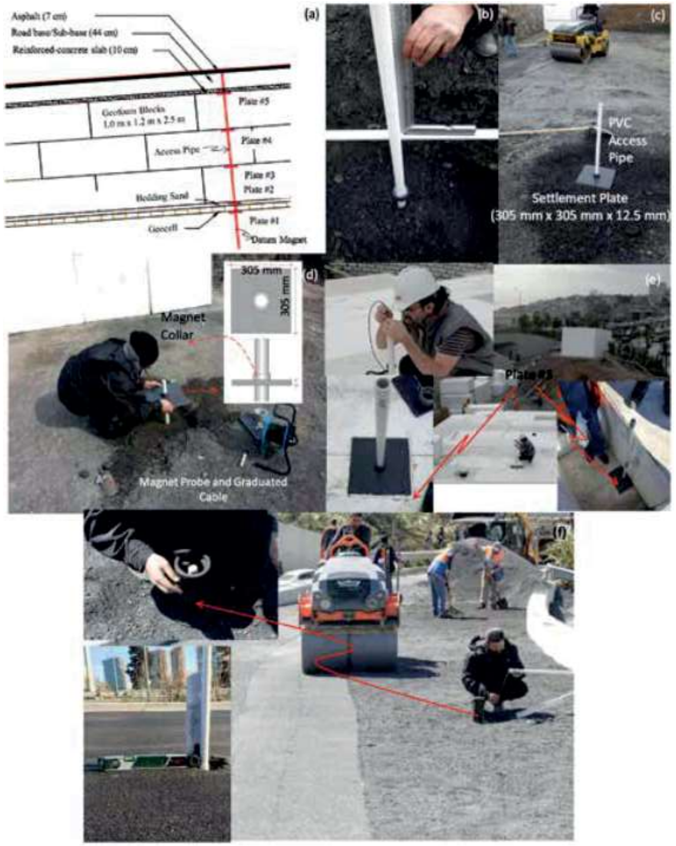


**Figure 5.9** **Installation stages of plate magnet array for long-term monitoring**
(Özer & Akınay, 2017; 2019)

**Figure 5.14.** **Geofoam block application in a deep excavation project**
(Place: Atakoy-Ikitelli Subway Bahariye Station, Bahariye-Ikitelli/Kucukcekmece, Istanbul, Date: 10.22.2018)

Architects might design additional fills to create terraces and platforms due to the functional changes in the existing structures. These additional vertical loads, which were not considered in the original design as a part of service loads, might put the structural system at risk. Geofoam blocks can be used for fill applications in the existing structures without imposing additional loads on the existing structural frame (Figures 2.29, 2.30 and 5.6). Geofoam blocks were used to raise the elevation in order to alleviate the design loads on the emergency service access ramp slab during the construction of Eskişehir City Hospital (Figure 5.15). A similar application is encountered in the construction of the ramp located between the terminal building and the pier at the Kabatas Seagull Project ferry pier renovation as a part of the Kabatas Square project (Figure 5.16).

**Figure 5.15** **Geofoam block lightweight fill for the emergency service access ramp**
(Place: Eskişehir City Hospital, Odunpazari/Eskisehir, Date: 03.05.2018)

**Figure 5.16.** **Geofoam block lightweight fill for the service vehicles access ramp**
(Place: Kabatas Seagull Project, Kabatas Square and Ferry Trasfer Center, Date: 27.11.2018)

improvement (Figure 5.25). One of the most important advantages of the geofoam technology in this project was the completion time that has been significantly shortened when compared to that of traditional soil improvement techniques.


**Figure 5.25.** **Construction stages of geofoam bridge approach embankments – Aerial photos:** (a) **08.08.2019** (b) **23.08.2019** (c) **28.08.2019** (d) **05.09.2019** (e) **11.09.2019** (f) **27.11.2019** (g) **2.11.2019** (h) **4.11.2019** (i) **15.11.2019** (j) **Opening the approach ramps to traffic on 19.11.2019** (Place: Bogazkopru-Kocasinan/Kayseri, Date: 08.08.2019 – 19.11.2019)

Figure 5.25. (Continued)

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Geofoam block bridge approach embankment construction sequence involved placement of the free draining bedding sand, placement of geofoam blocks based on block placement plans, casting the reinforced concrete slab atop the geofoam block assemblage, placement of plant-mix sub-base and base atop the concrete slab, construction of wearing course and placement of precast panels to protect the blocks against UV degradation and external factors. Geofoam blocks, which comply with EN 14933 Standard, were mobilized to the field (Figure 5.26).

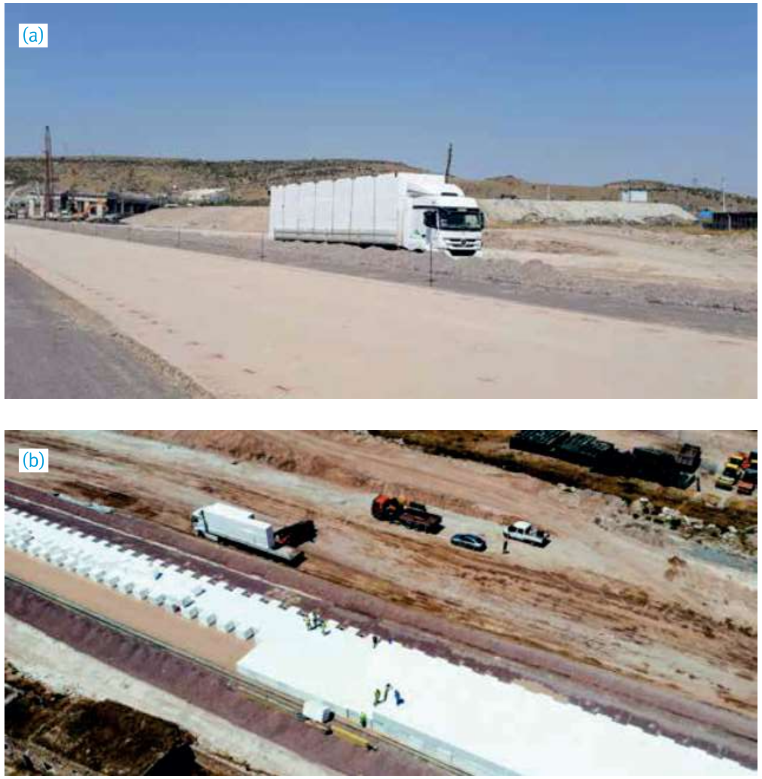

**Figure 5.26.** **Transportation of geofoam blocks:** (a) **The first geofoam blocks arrived at the site** (b) **Ongoing block shipments while the block placement continues** (Place: Bogazkopru-Kocasinan/Kayseri, Date: 02.08.2019 – 08.08.2019)

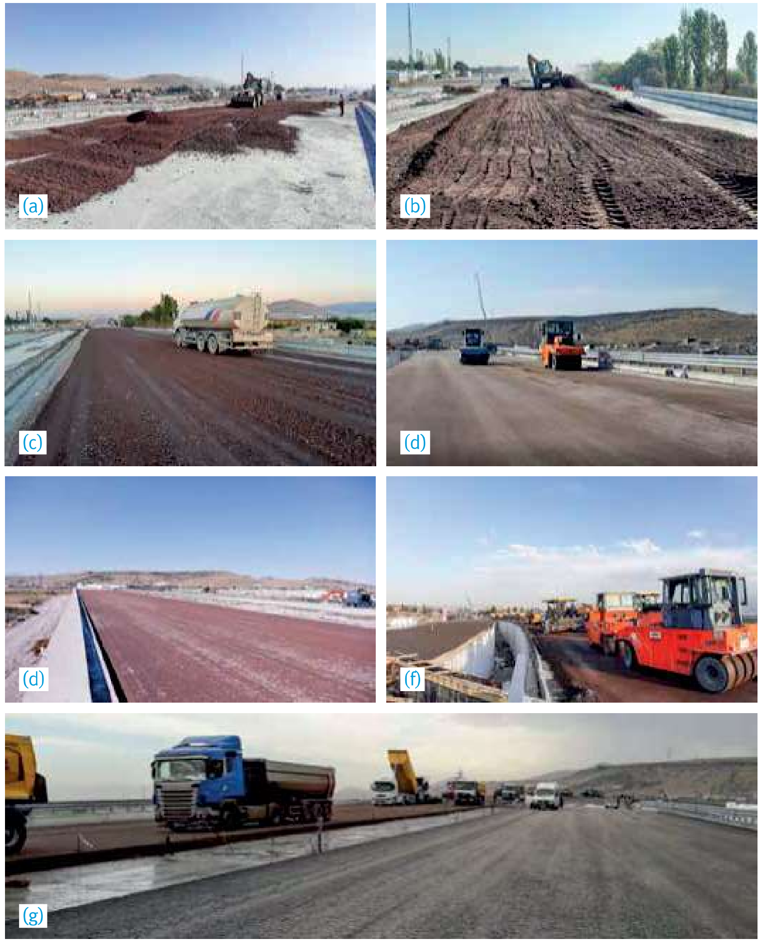


**Figure 5.34.** **Subbase and base course placement:** (a-b) **Subbase laid on reinforced concrete slab** (c) **Adding water to bring the moisture content of subbase within ±2% of the optimum moisture content** (d) **Compaction of base course using rollers** (e) **Placement of subbase and base courses were completed** (f) **Placement of base course using a road paving equipment** (g) **Placement of the binder course in one of the bridge approach embankments while laying-watering-compaction of base course continues in the other approach embankment** (Place: Bogazkopru-Kocasinan/Kayseri, Date: 01.09.2019 – 16.10.2019)

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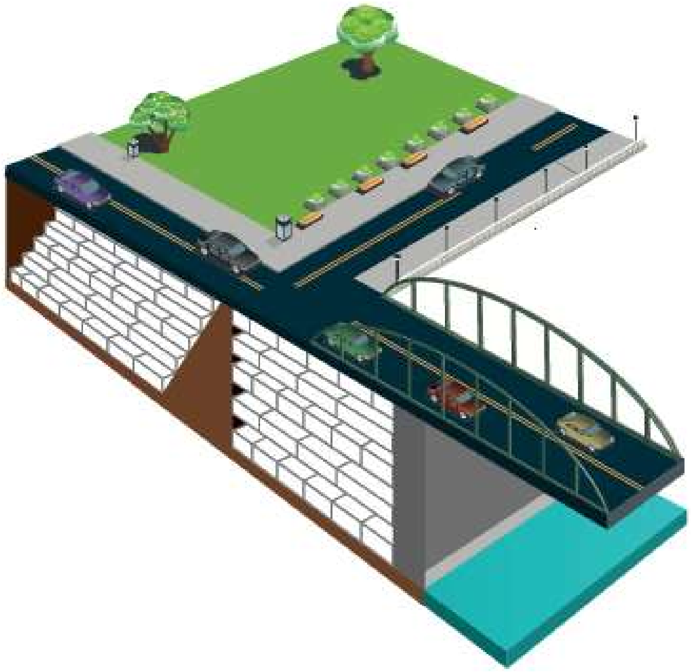
The reinforced concrete slab and pavement layers (subbase, base and bituminous courses) were placed simultaneously in the sections where the block assemblage was completed (Figure 5.35). Simultaneous execution of the construction accelerated the project completion time.


**Figure 5.35** **Simultaneous execution of the construction stages of geofoam bridge approach embankments** (Place: Bogazkopru-Kocasinan/Kayseri, Date: 28.08.2019 – 15.10.2019)



Austrotherm a lansat produsul geoBLOCK pe piața din România, un produs revoluționar cu numeroase aplicații în domeniul ingineriei geotehnice. Dezvoltat de specialiștii Austrotherm, geoBLOCK poate fi utilizat cu succes în lucrările de infrastructură.

În România, geoBLOCK va genera cea mai mare eficiență din punct de vedere constructiv și economic în domeniul umplerii terasamentelor pe teren moale, foarte compresibil.

Blocul de polistiren expandat geoBLOCK este un produs geosintetic ușor și cu structură închisă, folosit în aplicații de inginerie geotehnică (ASTM D4439, 2018). Blocul de EPS este un material cu un raport ridicat de rezistență la compresiune vs. densitate (ASTM D6817, 2017), produs cu densități cuprinse între 11.2 kg/m³ și 45.7 kg/m³.

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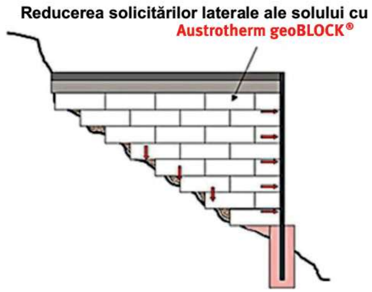
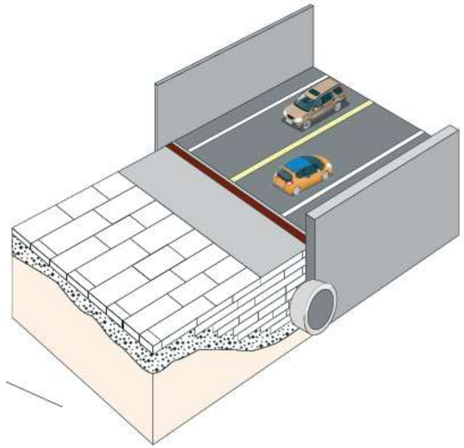
**Austrotherm geoBLOCK® este utilizat cu succes în aplicații de inginerie geotehnică. Zonele de utilizare ale Austrotherm geoBLOCK® includ:**

- Material ușor de umplutură care nu exercită o presiune suplimentară asupra zidurilor de sprijin;
- Terasamente construite peste șanțuri;
- Umpluturi ușoare peste tunele;
- Lucrări de terasament peste rețele subterane de utilități și infrastructură;
- Reabilitare și stabilizare a versanților;
- Rampe rutiere de acces pentru poduri si autostrăzi;
- Lărgirea terasamentelor autostrăzilor;
- Sistem de distribuție la zidurile de sprijin;



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## Primul proiect Austrotherm geoBLOCK® din România
## Rampa rutieră care traversează conducta municipală, 2023

**Date generale pentru proiectul Austrotherm geoBLOCK® din România:**

- Volum livrat: 915 metri cubi
- Timp de implementare: 4 zile;
- Lungime terasament: 50 de metri / Lățime: 12 metri;
- Înălțime maximă a terasamentului: 5 metri

**geoBLOCK®** este unul dintre cele mai versatile materiale ușoare disponibile;

**geoBLOCK®** maximizează eficiența instalării la fața locului;

**geoBLOCK®** sosește la șantier pregătit pentru a fi amplasat;

**În urma analizelor tehnice, am constatat că principalele zone de utilizare în România pot fi construcția de terasamente pentru autostrăzi, drumuri naționale și județene proiectate pe teren compresibil (reducând semnificativ volumul de material de umplutură care trebuie să fie excavat, transportat, stocat, compactat corespunzător și, în cele din urmă, tratat cu var și/sau ciment).**

Necesitatea construirii de drumuri noi devine din ce în ce mai evidentă în multe cazuri, cu construcții pe soluri moi sau slabe care nu pot suporta încărcări suplimentare. Proiectanții trebuie să identifice materiale și tehnici de construcție inovatoare pentru a rezolva problema construirii pe astfel de soluri sau în zone unde există utilități edilitare.

Produsul nostru Austrotherm **geoBLOCK**® EPS poate fi folosit pentru înlocuirea solurilor compresibile sau în locul materialelor grele de umplutură pentru a preveni supraîncărcarea amplasamentului.

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O altă motivație pentru utilizarea acestui produs este economisirea de timp. Produsul este ușor de manipulat, fără necesitatea echipamentelor speciale.

Deoarece Austrotherm **geoBLOCK**® EPS este un produs proiectat, ajunge pe șantier după verificări riguroase, spre deosebire de alte umpluturi care necesită teste QA/QC.

Înaltă rezistență la compresiune a produsului EPS îl face capabil să susțină adecvat încărcările de trafic asociate cu autostrăzi, drumuri europene sau naționale.



Austrotherm **geoBLOCK**® EPS permite inginerilor, arhitecților și constructorilor să proiecteze pentru funcțiile cheie ale geosinteticelor și să aleagă cea mai bună combinație de produse pentru a atinge obiectivele proiectului. Cu o rezistență și flexibilitate fără precedent, geoBLOCK EPS oferă, de asemenea, soluții inovatoare pentru o serie de probleme, inclusiv protecția împotriva șocurilor seismice și zgomotului, precum și amortizarea vibrațiilor.

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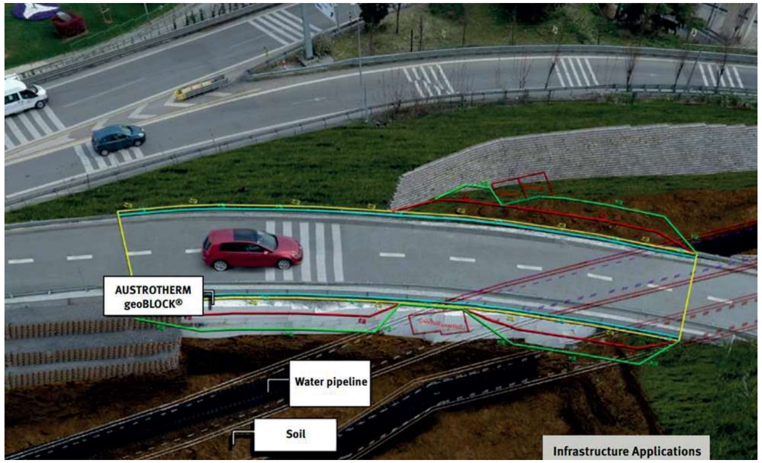
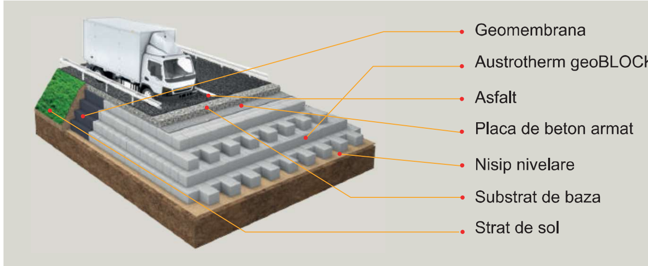
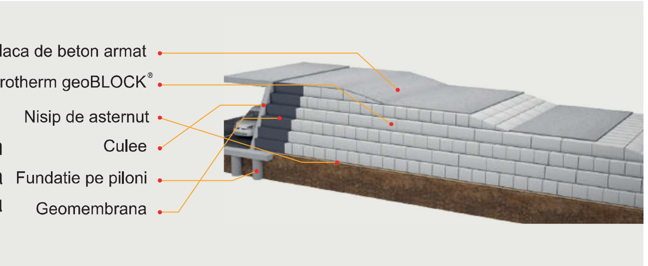
Primele utilizări de succes ale produsului în proiecte importante din Turcia au obținut aprecieri pozitive din partea experților în domeniul construcțiilor, iar utilizarea blocurilor de polistiren expandat în locul soluțiilor convenționale a confirmat avantajele tehnice, dar și cele legate de calitatea lucrărilor, reducerea timpului de punere în funcțiune și implicit costurile de execuție în cazul soluției Austrotherm **geBLOCK®**

Primele aplicații ale blocurilor de polistiren Austrotherm **geoBLOCK®** din Turcia au fost inspectate în cadrul unei vizite tehnice la fața locului de către EPSDER și Austrotherm Turcia. Aproximativ 50 de participanți, alcătuiți din oficiali ai Ministerului Transporturilor din Turcia, cadre didactice și ingineri civili, au apreciat proiectul.



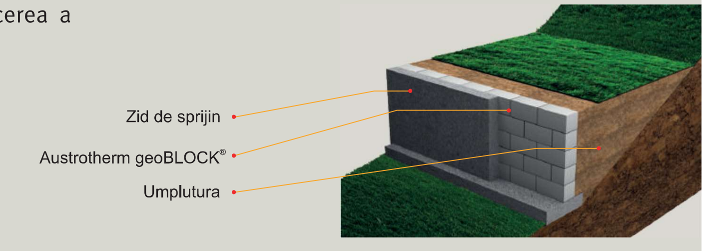



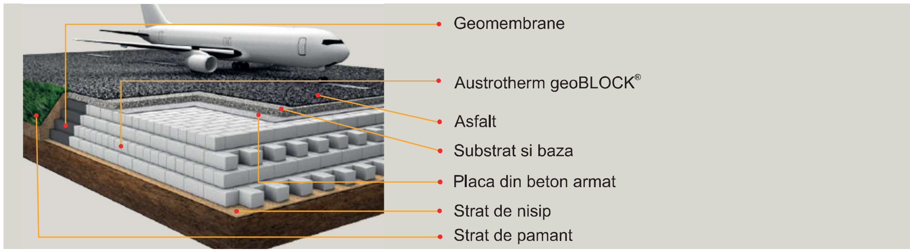

Utilizarea Austrotherm **geoBLOCK®** in constructia de autostrazi




Utilizarea Austrotherm **geoBLOCK®** in constructia de terasamnete pentru abordarea podurilor

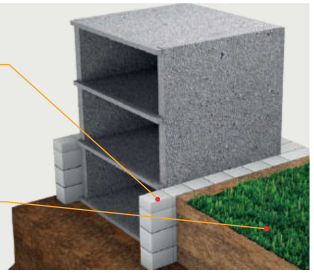
Conceptul de reducerea a presiunii solului

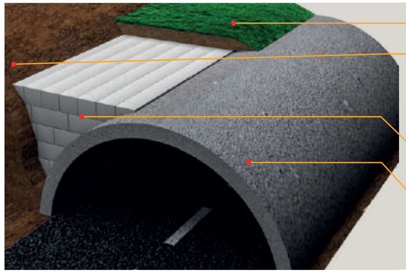


Utilizarea Austrotherm **geoBLOCK®** în solutii antiseismice.

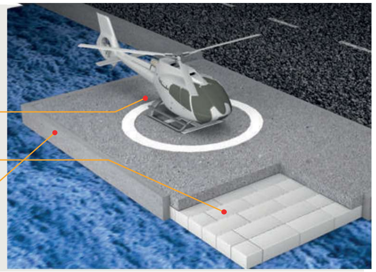
Peretii subsolului




Utilizarea Austrotherm **geoBLOCK®** în structurile de protecție împotriva căderii de stânci

Utilizarea Austrotherm **geoBLOCK®** în construcția unei insule plutitoare sau a unui heliport plutitor.





Utilizarea Austrotherm **geoBLOCK®** în construcția barierelor fonoabsorbante

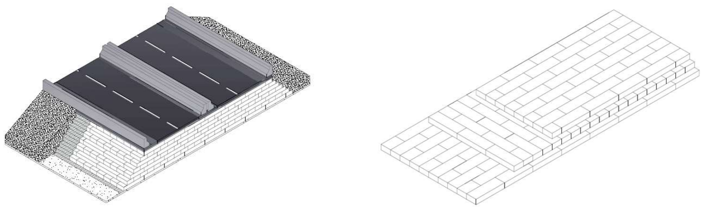
## Blocurile de polistiren expandat Austrotherm geoBLOCK® sunt utilizate în Proiecte de Inginerie Civilă pentru:

- Construirea terasamentelor pentru autostrăzi și căi ferate, rampele de acces ale podurilor pe terenuri cu sol moale;
- Prevenirea daunelor structurale pentru conducte și cămine de beton adânc îngropate, furnizând în același timp proiecte mai economice pentru aceste structuri;
- Creșterea stabilității versanților;
- Reducerea încărcărilor laterale statice care acționează asupra zidurilor de sprijin, pereților structurali pentru subsoluri și a culeelor de pod;
- Utilizarea ca tampon seismic;

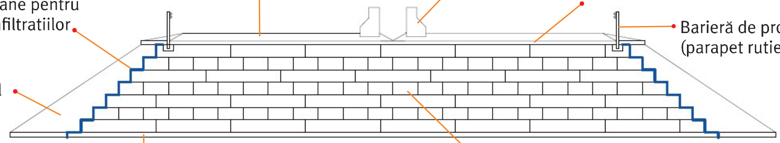
Blocurile de polistiren expandat (EPS) utilizate în proiectele de inginerie civilă sunt în general:

- **100 – 120 cm** în lățime
- **200 – 500 cm** în lungime
- **50 – 60 cm** în înălțime
- **12 – 46 kg/m³** densitate

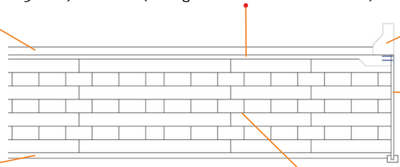
## Detalii ale unui terasament de drum cu blocuri de polistiren expandat în formă de trapez.



## Detalii ale unui terasament rutier cu blocuri EPS trapezoidale.




## Detalii ale unui terasament rutier cu blocuri EPS cu fața verticală.

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nZEB = nearly Zero-Energy Building

Tehnologia Geofoam a fost folosită pentru prima dată de Administrația Rutieră Norvegiană (NPRA) în 1972 pentru a preveni consolidările totale în construcțiile de terasamente pe terenuri slabe de fundare. Tehnologia Geofoam s-a dovedit a fi o alternativă geotehnică la construcția.

**Blocurile de Geofoam sunt utilizate în:**

- Construcția de terasamente pentru autostrăzi și poduri,
- Construcția de terasamente pentru căi ferate și sisteme de transport ușor,
- Construcția de umpluturi pentru ziduri de sprijin,
- Construcția de terasamente deasupra conductelor și umpleri pentru conducte îngropate,
- Aplicații de stabilizare a versanților,
- Acoperișuri verzi și aplicații peisagistice,
- Construcția de terasamente pentru căile de rulare și piste de aterizare ale aeroporturilor,
- Izolare seismică / Aplicații de amortizare a vibrațiilor,
- Structuri de protecție împotriva căderiilor de stânci,
- Construcția de insule plutitoare,
- Construcția de bariere fonoabsorbante. O soluție rapidă și economică în comparație cu metodele tradiționale.

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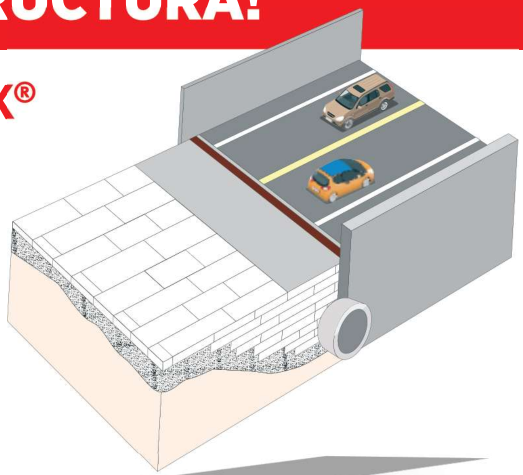
## AUSTROTHERM geoBLOCK®
**Polistiren expandat (EPS) Block**




- **Realizarea rampelor de acces la poduri/viaducte și podețe;**
- **Terasamente peste rețele edilitare subterane și infrastructură;**
- **Terasamente la autostrăzi și rampe de acces la poduri;**
- **Reabilitarea și stabilizarea pantelor;**
- **Sistem de distribuție la zidurile de sprijin;**

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