Clay Heave Protection

Claymaster

Claymaster is an EPS compressible-fill material which can be used to prevent potential problems in foundations due to moisture movement in soils which contain a large proportion of mineral particles below 0.002mm ('clay heave'). The material can be used as permanent shuttering for cast in-situ reinforced concrete, reducing pressure on ground beams in piled foundations, and on the sides of trench fills.

Negligible compression during concrete casting

With a normal ground-beam depth up to 600mm, the initial compression of the material during casting can be disregarded.

Cost -effective

Claymaster provides a rapid, cost-effective solution to clay-heave problems, and no specialised trades or equipment are required.

Permanent

Claymaster is rot-proof and durable and will withstand the conditions encountered below ground. It will not degrade in the presence of high levels of ground water or precipitation.

Easy to handle

Claymaster is manufactured from expanded polystyrene (EPS), and is lightweight and easy to handle.

The use of Claymaster satisfies the recommendations of the Building Research Establishment (BRE), and the National House Building Council (NHBC) in using compressible materials to relieve clay-heave pressure.

Table 7. *Thickness of Claymaster to comply with NHBC requirements*

Soil heave potential	Underside of ground beam: NHBC void dimension (mm)	equivalent VR Claymaster (mm)	Against side of foundations and beams: NHBC void dimension (mm)	equivalent VR Claymaster (mm)
High	150	250	35	75
Medium	100	175	25	50
Low	50	100	0	0

MAIN DISTRIBUTOR

Claymaster is available through:
Cordek Limited,
Spring Copse Business Park,
Slinfold,
West Sussex RH13 0SZ
Tel: 01403 799600
Fax: 01403 791718

There are also approved specialist distributors throughout the UK.

APPROVALS

There are no specific requirements in the Building Regulations for the use of compressible-fill materials. However, there is a general requirement (Regulation A2) which states that 'buildings shall be constructed so that ground movement caused by swelling, (or) shrinkage ...of the subsoil... will not impair the stability of any part of the building'.

Claymaster has been assessed by the British Board of Agrément according to Regulation A2, and found to reduce the effects of the expansion of clay soils which might impair the stability of a building. It has been approved for use under ground beams and against the sides of deep-trench fill foundations; Certificate number 90/2543.

The NHBC Standards, Chapter 4.2, 'building near trees', states that low-density compressible polystyrene is a suitable proprietary material to alleviate ground pressures on foundations in shrinkable soils.

GRADE

Claymaster is a special low-density expanded polystyrene. It is coloured pink for ease of identification.

DIMENSIONS

Standard size,
1200 x 2400mm, and 600 x 2400mm.
Thickness, 50, 75, 100, 150 and 200mm.

Additional widths (eg, 400, 450 and 500mm) are also available.

SHAPE

Boards are normally rectangular and of uniform thickness, but special shapes are available to order including circular sections to fit around pile caps, and tapered boards.

ACCESSORIES

Spacing blocks to ensure correct cover to steel reinforcement must be of a type and quantity to prevent penetration into the surface of the Claymaster; the imposed pressure on the Claymaster should not exceed 15kN/m^2.

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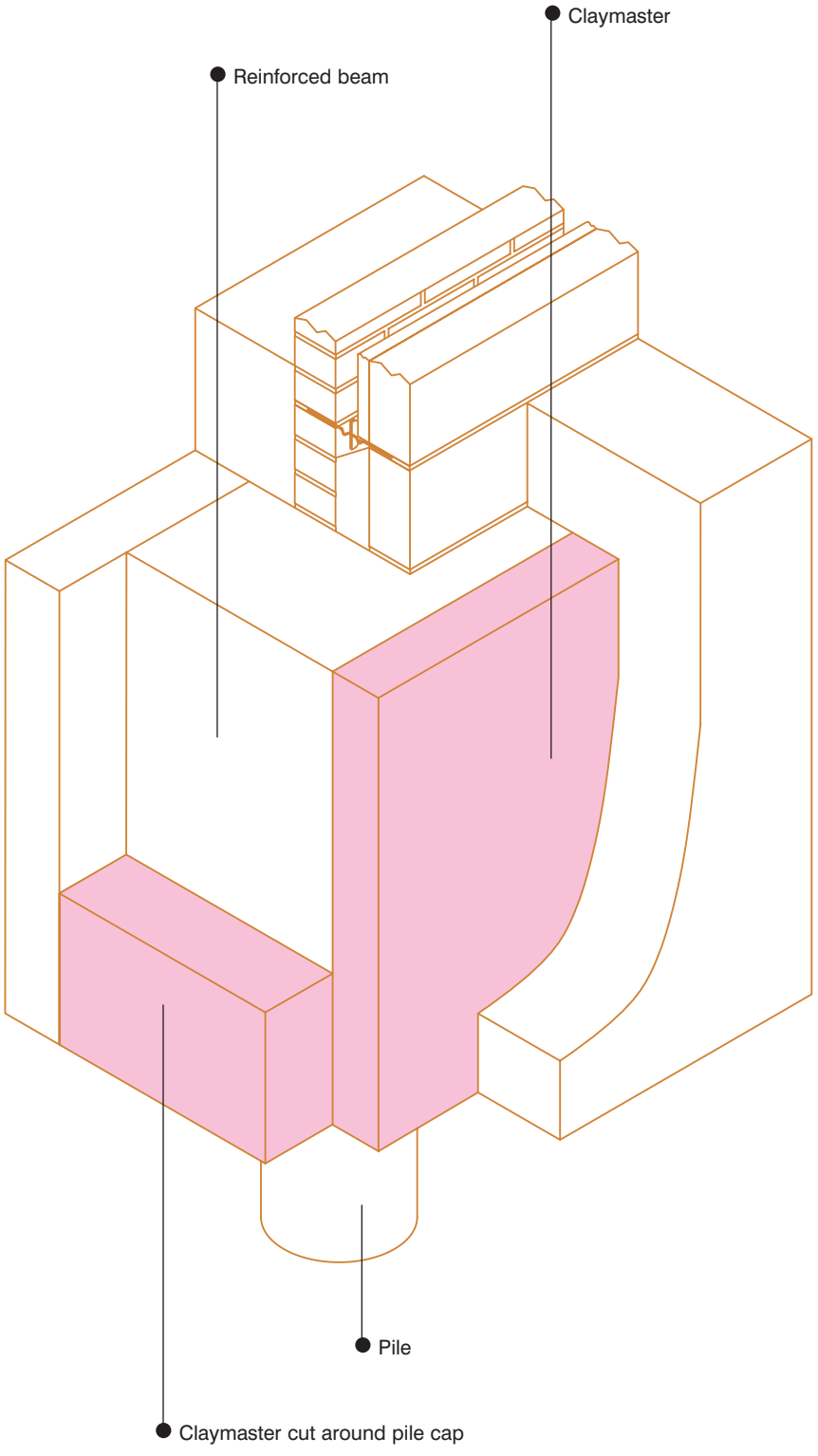
Figure 39.
Protection of piled ground beam



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FIRE
When properly installed, the EPS is fully protected by the concrete beam or foundations and will have no adverse effect on the fire performance of the structure.

MECHANICAL PROPERTIES
The expansion of clay soil is a long-term phenomenon and it is necessary for the compressible fill to react in the same timescale. Claymaster achieves this by creep deformation, reducing the induced pressures to safe levels.

DESIGN
In order for Vencel Resil to provide advice on the appropriate thickness of Claymaster for a given situation, the following information is required:

1. Maximum expected ground movement (H, mm).
2. Acceptable upthrust on the ground- beam foundation (P, kN/m^2) as used in the concrete design, or...
3. Maximum acceptable lateral thrust on the trench-fill foundation (W, kN/m^2); this value should not normally exceed 40kN/m^2.

The required thickness of Claymaster can be calculated by reference to Graph 1. as follows:

1. Read-off the value for percentage compressive strain (C, %) given by the maximum load, P or W.
2. Calculate the required thickness of material by the equation
$T = 100 \times H/C + 10$.

This value includes an allowance for instantaneous deflection of the Claymaster due to the wet concrete load.

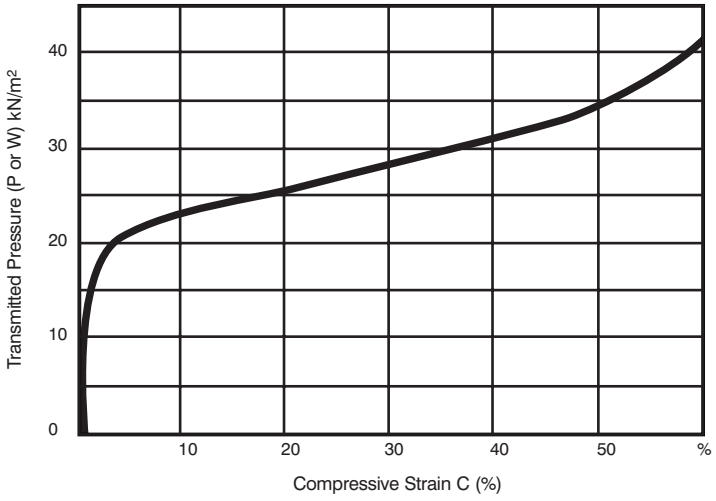
NHBC requirements
In order to comply with the NHBC requirements for building near trees, the thickness of Claymaster shown in Table 7 should be provided on the underside of ground beams or against foundations or beams which are likely to be subject to soil heave.

Claymaster is not designed for use directly below in-situ or suspended ground-floor slabs.

The design of beams, foundations and associated details should be in accordance with the requirements of the NHBC as set out in the relevant Standards.

When designing ground beams which will support the weight of the building, care should be taken in areas of low load, for example under patio doors, to prevent excessive local deflection of the beam. Claymaster must not be used under ground-floor slabs.

Graph 1. *Claymaster compression curve*



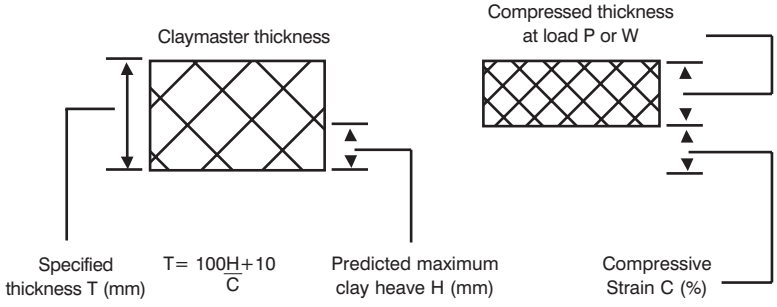


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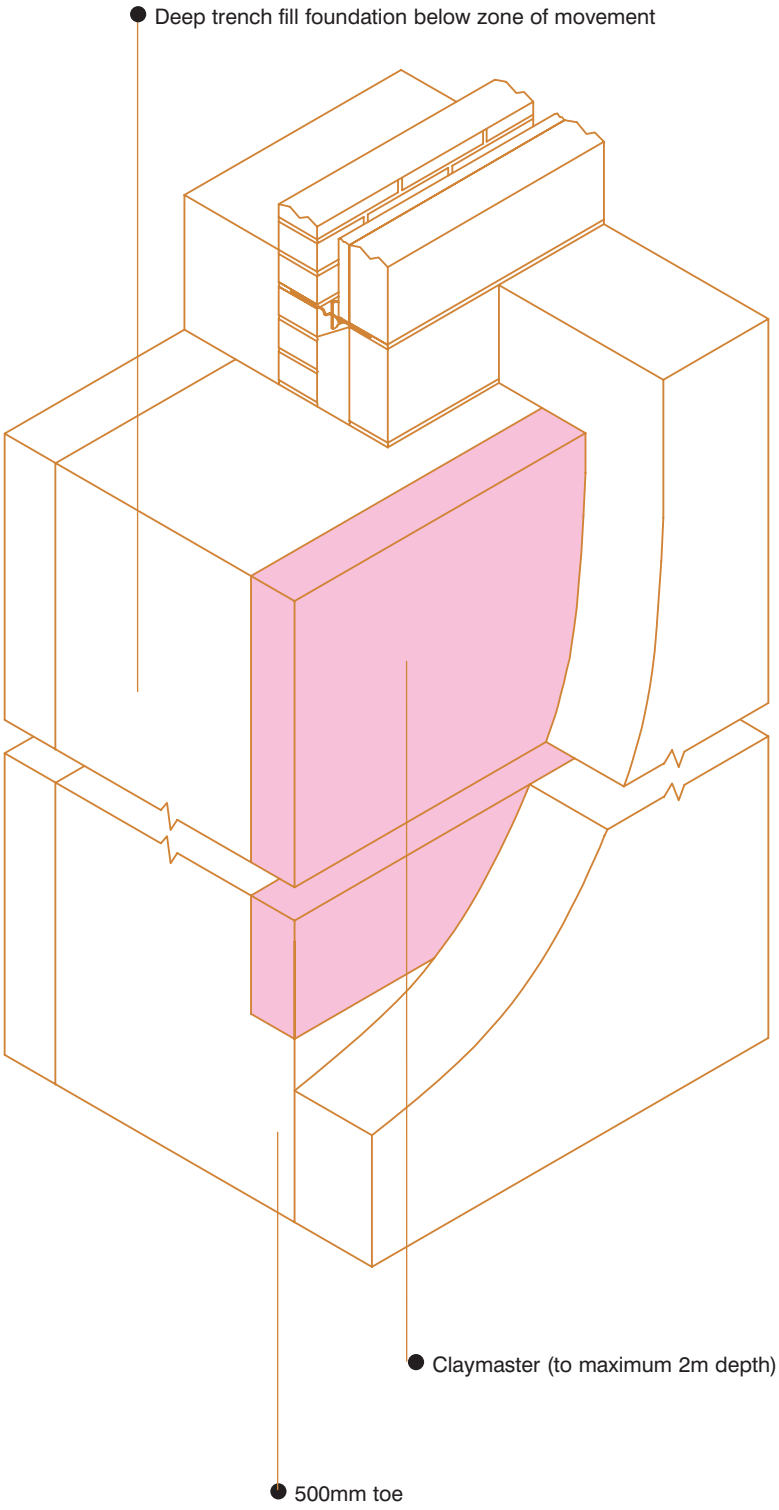
Figure 40.
Protection of deep trench fill



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Loads exerted by wet concrete for 600mm-deep ground beams will result in negligible compression of the Claymaster. For trench-fill applications, the concrete pour pressure should be limited to 36kN/m² to ensure that excessive initial compression does not occur; if necessary, this can be done by reducing the rate of pouring the concrete.

INSTALLATION

Piled ground beams

The trench should be excavated as normal but taking account of the thickness of Claymaster to be used. The bottom of the trench should be flat and even, and if necessary, be blinded with granular fill or concrete.

The Claymaster should be laid in the bottom of the trench, ensuring that the full width of the trench is lined and that the boards are butted tightly together.

Where concrete piles protrude into the trench, the Claymaster boards should be neatly cut to fit, or factory-cut sections should be employed.

The appropriate side of the ground beam, normally the inside face of an external wall, should be lined with Claymaster, ensuring that the material is fully supported to the required depth. The Claymaster must be adequately supported and restrained to prevent movement during concrete placement. Spacer blocks may be required at the sides to ensure the correct depth of concrete cover is obtained to the steel reinforcement ; see 'ACCESSORIES', above.

Alternatively, the vertical Claymaster boards may be positioned after the ground beam has been cast.

See Figure 42.

Vertical faces of trench fill

Care should be taken that the foundation bottom is below the zone of movement.

The appropriate side of the excavation, normally the inside face, should be lined with Claymaster, ensuring that the material is fully-supported to the required depth.

The NHBC requirements state that a 500mm-deep concrete toe, the same thickness as the compressible fill, should be created below the Claymaster boards.

Any internal support must be provided in the form of struts and spreader plates.

Claymaster must be adequately restrained to prevent uplift during concrete placement. In flint or boulder clay soils, plywood sheeting may be required to provide external support to the Claymaster.

Small pieces of Claymaster must be securely fixed prior to pouring.

See Figure 41.

Figure 41.
Installing Claymaster for piled ground beams

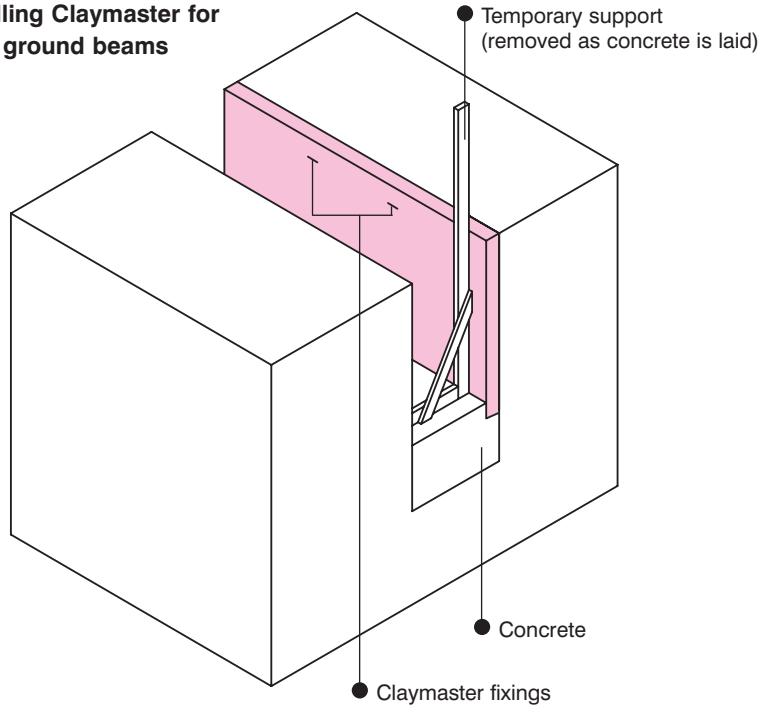

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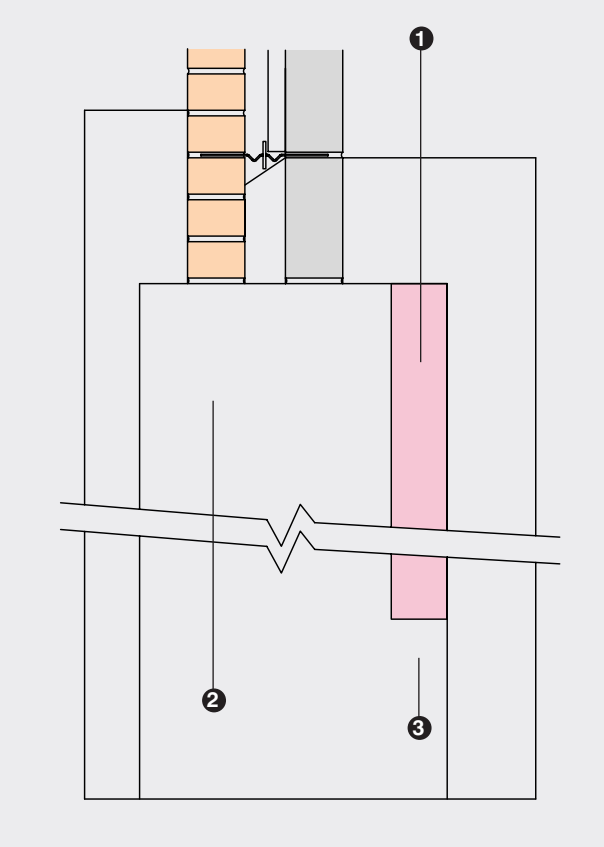
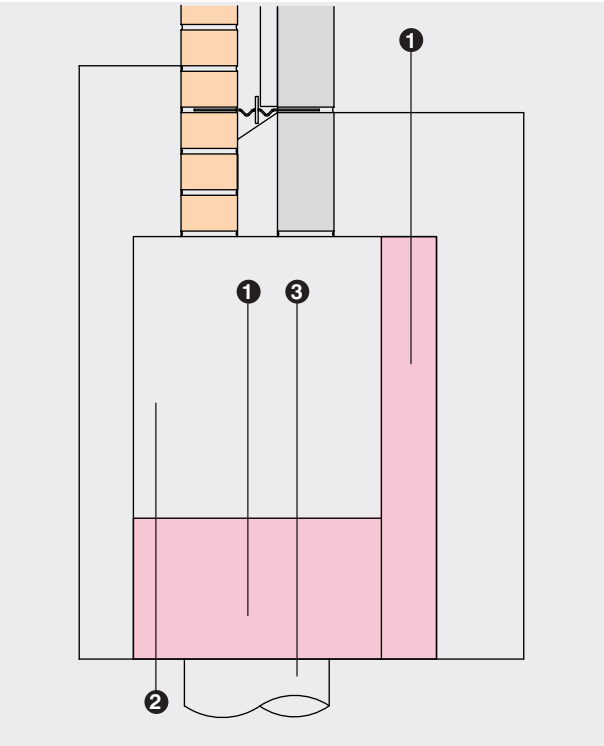
Figure 42.
Deep trench fill



1. Claymaster
2. Deep trench fill foundation below zone of movement
3. 500mm deep concrete toe

Figure 43.
Piled ground beam



1. Claymaster
2. Piled ground beam
3. Pile