

NHBC Risk Guide

Heave precautions (Revised May 2020)

(Refer to BS 5837, NHBC Standards Chapters 4.2, 4.3, 4.4)

Site ref: Site manager: Inspector:

Date: Signature: Signature:

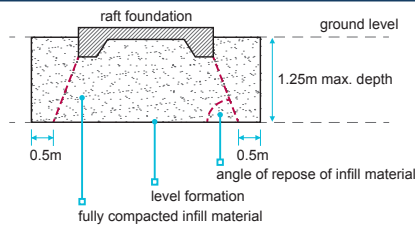
Provision of information	
It is essential that the following information is available on site:	
Site investigation report & vegetation survey (including soil volume change potential, tree species (existing or removed), original and final ground levels etc.)	
Full set of current drawings (including site layout, location of services, design of drainage system, vegetation planting schedule, position of existing drain and service trenches, the position of previous below ground structures on re-development sites etc.)	
Foundation details (including dimensions, type and depth of foundations, steps in foundations, ducts & services passing through the foundations, manufacturer's information etc.)	
Technical method statements, including critical sequences of construction	
If not available, request the information is provided.	
Does the information available on site match the information contained within the Technical Services summary sheet?	Yes / No

Ground conditions						
Are shrinkable soils present?	Yes / No					
What is the worst case volume change potential of the soil?	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>Low</td> <td></td> <td>Medium</td> <td></td> <td>High</td> </tr> </table>	Low		Medium		High
Low		Medium		High		
If unsure, check with NHBC surveyor / engineer for clarification						
Note: In Scotland & NI, by historic precedent, the provision of Chapter 4.2 has not been applied and shallow foundations have been traditionally accepted when near trees without consideration of the volume change potential of the soil.						
Identification of trees (the NHBC Depth Calculator app can be used for tree identification)						
Is/was there vegetation on and/or adjacent to the site that may affect the proposed foundations? (check getmapping.com)	Yes / No					
Are the proposed foundations within the zone of influence of trees, is the foundation depth greater than 1.5m based on the appropriate tree height, or are there any signs of root activity at foundation level?	Yes / No					
If yes, heave precautions will need to be considered (If unsure, check with NHBC surveyor / engineer for clarification)						
Are heave precautions and a suspended ground floor required?	Yes / No					

Please specify the type(s) of foundation required on site including plot numbers		
Type		Plots
Strip foundations	Yes / No	
Trench fill foundations	Yes / No	
Raft foundations	Yes / No	
Pier and beam foundations	Yes / No	
Pile foundations	Yes / No	
Note: Strip and trench fill foundations greater than 2.5m deep, raft foundations, pier and beam foundations, pile and beam foundations, and foundations not covered in the above are to be Engineer designed.		

When heave precautions are required on foundations to be used	
Trench fill foundations	
	Check that the proposed foundation depths and heave precautions are adequate (see NHBC Foundation Depth Calculator app).
	Strip and trench fill foundations greater than 2.5m deep will only be acceptable where they are designed by an engineer.
	It is essential that compressible material is provided to the entire area shown, and the foundation excavation has a vertical face.
	It is essential that where the excavation is battered or if there is over break or concrete over spill an engineer is consulted.
	The minimum compressible materials and voids should be as per those noted in the general requirements table.

Raft foundations



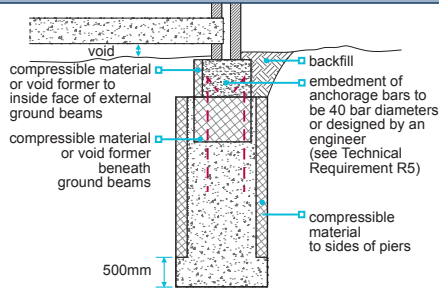
Raft foundations should be designed by an engineer.

Raft foundations are only acceptable where the foundation depth is 2.5m or less and the raft is founded on granular infill placed and fully compacted in layers in accordance with the Engineer's specification.

The infill should not be less than 50% of the foundation depth and should not exceed 1.25m.

Site inspections by the Engineer may be required to verify the compaction of the fill.

Pier and beam foundations



Pier and beam foundations should be designed by an engineer.

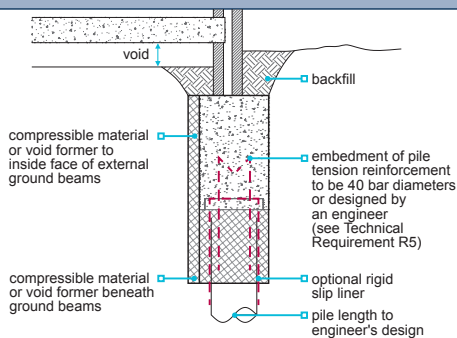
It is essential that heave material is provided to the entire areas shown.

Particular care should be taken to ensure that the full width of the ground beam is protected.

The minimum compressible materials and voids should be as per those noted in the general requirements table.

Special consideration should be given to preventing ingress of concrete into ground beam heave precautions which will result in hard spots.

Pile and beam foundations



Pile and beam foundations should be designed by an engineer.

It is essential that heave material is provided to the entire areas shown and particular care should be taken to ensure that the full width of the ground beam is protected.

The minimum compressible materials and voids should be as per those noted in the general requirements table.

Piles should be designed with an adequate factor of safety to resist uplift forces on the shaft due to heave.

Slip liners may be used to reduce the uplift.

Note: The heave precaution details show the minimum requirements for common foundation types. They apply to all foundations within the zone of influence of trees which are to remain or be removed.

Special consideration should be given to preventing ingress of concrete into ground beam heave precautions, especially at pile head location.

How is the heave precaution going to be sealed around the pile heads? (note: sand is not appropriate)

General Requirements

Minimum void dimensions (mm)

Potential Volume Change	High	Medium	Low
Under ground beams and suspended in-situ concrete floors	150	100	50
Under suspended timber and precast concrete floors	300	250	200
Against the side of ground beams or foundations	35	25	0

Note: The void dimension measurement for suspended timber and precast concrete floors is from the underside of beam or joist to ground level and includes 150mm ventilation allowance. Note: For compressible material the void dimension is the amount the material should be able to compress to accommodate heave. The actual thickness of compressible material required should be established from the manufacturer. For void formers the void dimension is the remaining void after collapse. The actual thickness of void former required should be established from the manufacturer's guidance.

Heave precautions for drainage

Shrinkage and heave of clay soils can affect pipelines.

To protect against the effects of heave, drainage should be designed:

- To take account of potential ground movement as shown in the table below, including where pipes and services pass through substructure walls or foundations
- With gradients which may need to be greater than those in Chapter 5.3 Drainage below ground, as these do not account for possible ground movement
- To use alternative means of catering for the movement when sufficient falls cannot be provided, for example by deepening the excavation and laying pipework on a granular bedding of suitable thickness to reduce the extent of potential movement.

*For guidance on drainage below ground please see NHBC Standards Chapter 5.3 'Drainage below ground'

Volume change potential	High	Medium	Low
Potential ground movement	150mm	100mm	50mm

Existing land drains should be maintained or diverted. Where the void beneath suspended floors is liable to flooding, drainage should be provided.

Other general considerations

Drives and pathways should be designed and detailed to cater for the likely ground movement.

