



BSc(Hons) Built Environment

Construction & Civil Engineering Technology III

Tutorial - Basement Construction

1. The Building Regulations defines a basement storey whose floor is at some point below the adjacent finished ground level.

Broadly speaking, basement construction may be classified as being:

- (i) shallow - up to 1.50 m deep.
- (ii) medium - 1.50 to 3.00 m deep, and
- (iii) over 3.00 m deep.

The purpose of this tutorial is to examine suitable questions related to basement construction.

2. Discuss and make notes by answering the following questions related to basement construction.
 - (a) Identify the possible environmental conditions that have to be endured by underground structures.
 - (b) Explain the performance requirements and standards that need to be considered for basement walls and floors.
 - (c) Consider the strength and stability performance requirement by:
 - (i) identifying the nature of forces which act on basement walls and floors, and
 - (ii) the possible modes of failure they may create.
 - (d) Outline, in principle, possible solutions to overcome those forces mentioned in (c) for various depths and soil. Consider in this discussion the relationship between a basement floor and the foundations.
 - (e) Identify the materials which could be used for (d) and discuss the solutions on the attached sheet with regard to the performance requirements stated in (b). Consider in the discussion the limitations of each solution.

- (f) Consider the waterproof performance requirements and develop in principle how this may be achieved bearing in mind the nature of materials selected for the structure.
- (g) Identify the materials and components which could be used for (f), and consider those parts of the basement construction where possible leakage may occur, i.e. at joints. Discuss the solutions on the attached sheets by identifying the measures that have been taken to ensure a waterproof basement.
- (h) Discuss the problems caused by movement and cracking in materials with regard to the above solutions, and the need to establish high standards of quality control during the production stages. Consider in the discussion the measures that need to be taken when long concrete pour lengths are required.
- (j) Examine the use of ground anchors as added supports to deep basements. Consider the different soil conditions and how they can affect the technology used.
- (k) Evaluate the different technologies used for providing perimeter construction for deep basements. All these methods will involve operations that require the services of specialist subcontractors. Discuss the environmental challenges that the construction manager will need to consider.

Further Reading

Tomlinson	<i>Foundation Design & Construction</i>
BS8102 (1990)	<i>Code of Practice for Protection of Structures Against Water from the Ground</i>
CIRIA Report 139	<i>Water-Resisting Basement Construction - A Guide - Safeguarding New and Existing Basements against Water and Dampness.</i>
Cement & Concrete Industry (2012)	<i>Guidance on the Design & Construction of in-situ Concrete Basement Structures</i>