# International Labour Office Training Programmes
# Occupational Safety & Health for the Construction Industry

## Construction OS&H

***For design and project management teams***

## PROJECT

### PURPOSE, AIMS AND OBJECTIVES

A modular programme gives great flexibility in the ways in which a course can be presented and updated, but one of the difficulties created is that the information is presented in a series of distinct blocks, whereas in real life many issues and facts have to be taken into account together. Therefore, this project is a concluding assignment which aims to integrate some of the main aspects of the course, while at the same time allowing course participants to apply the knowledge that they have gained in the course to a realistic project. This should also provoke some good discussion between the participants and the Tutor.

In addition, the participants' work can serve as an indication of the effectiveness of the course.

# DESCRIPTION OF THE CONSTRUCTION PROJECT

## LUFBRA RESERVOIR

### Introduction to the project

The reservoir to be constructed is shown in Drawings R/01/36/1 to R/01/36/4 It is a rectangular reinforced concrete box, with a central dividing wall to facilitate cleaning and repairs while in use. It will be constructed on Beacon Hill, near the market and university town of Lufbra. The estimator's report of his site visit is reproduced below, and an extract from the instructions to tenderers on the following page.

WINDMILL CONSTRUCTION

INTERNAL MEMORANDUM

ESTIMATOR'S REPORT ON LUFBRA RESERVOIR

Lufbra Reservoir is described in Drawings R/01/36/1 (Location Plan); R/01=36/2 (Site Plan); and R/01/36/3 (General Arrangement). The client is the Burleigh Brook Water Authority, whose engineer is well-known for his strict enforcement of the contract documents, and the R.E. is expected to be Mr. E.R. Stephenson, who is known to us as a hard but fair man.

The site is at Beacon Hill, in attractive countryside. The existing access track is adequate for most forms of transport, but large or heavy vehicles may have some difficulties. Water and electricity supplies may be easily obtained. The first two metres of excavation (below top soil) will be in boulder clay, the remainder in weathered and heavily fissured granite. The contractors who built a neighbouring reservoir found that "the rock could be loosened by powerful ripping equipment - just", according to the engineer. All excavated material may be incorporated into the site landscaping. The underfloor drain is a simple 150 mm dia. drainage pipe surrounded by no-fines concrete.

The walls are of constant height, both floor and roof having a similar plan shape. Details of the valve chamber are given in Drawing R/01/36/4. There are no restrictions on the dimensions or volumes of concrete pours, although the engineer has indicated possible pours, as a guide only.

Construction methods are shown on our drawings WC/90/16/1 - and useful production information has been obtained from the records of Woodhouse and Thorpe Acre Reservoirs.

Site investigation shows that there are no water problems on this site.

The power line across the site can be isolated for a period not exceeding 6 months.

There is a reasonable supply of labour in Lufbra, five miles away.

The contract duration is 12 months, starting on 1st April 1990; I think we can complete this project in 9 months, so saving 3 months' overheads.

F.M. Phillipson

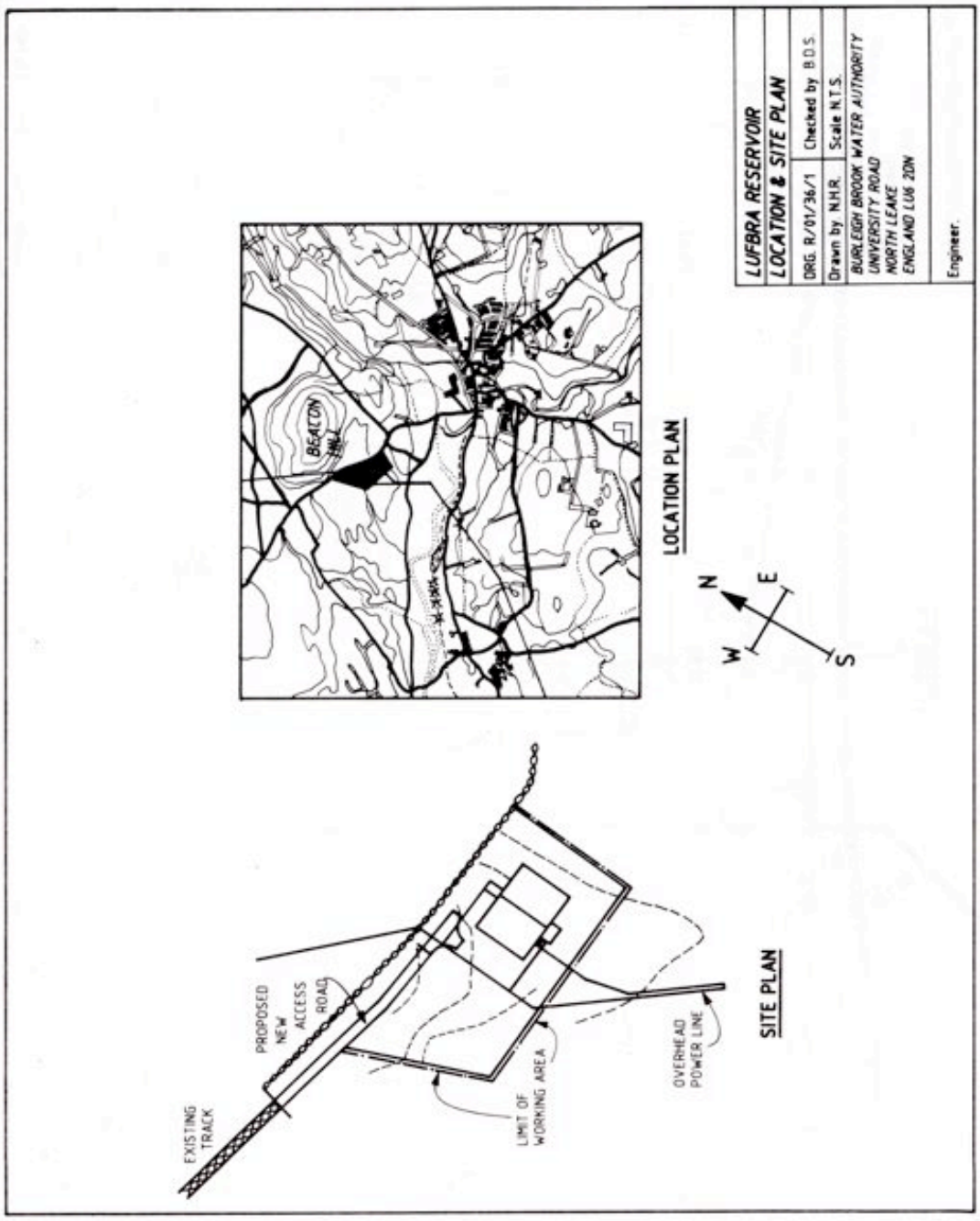
F.M. Phillipson
Chief Estimator

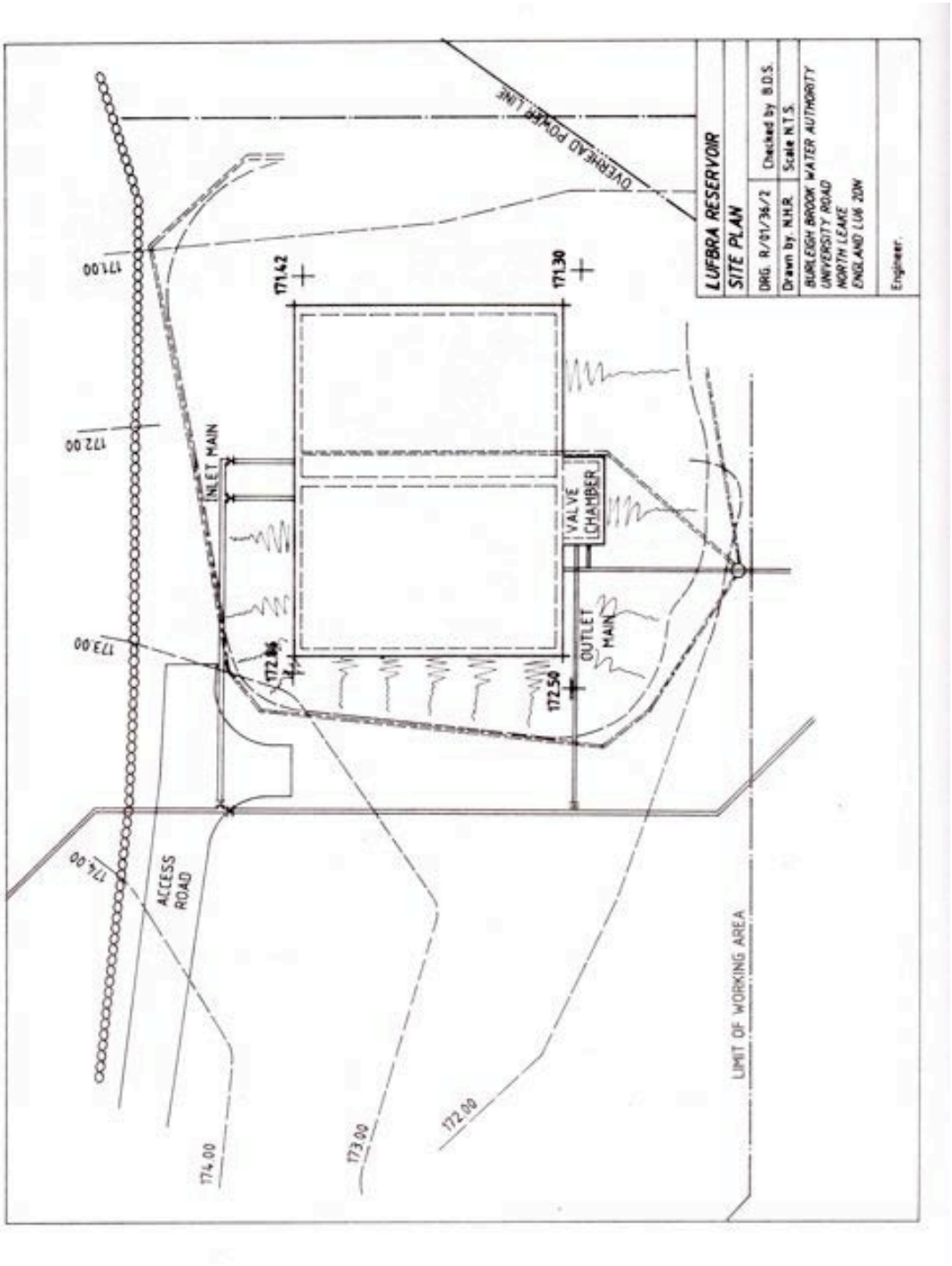
2nd February 1990

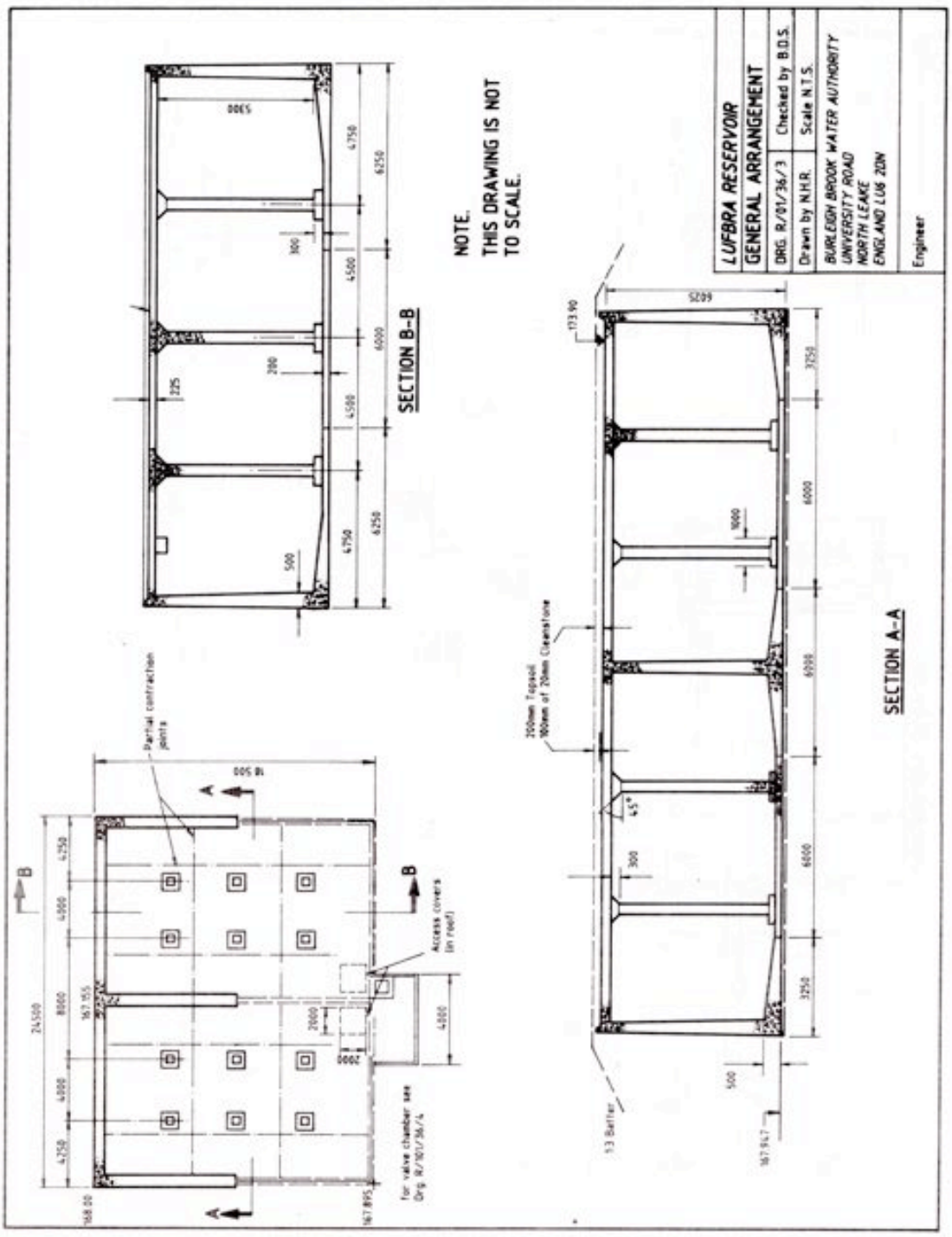
**Author's note:**

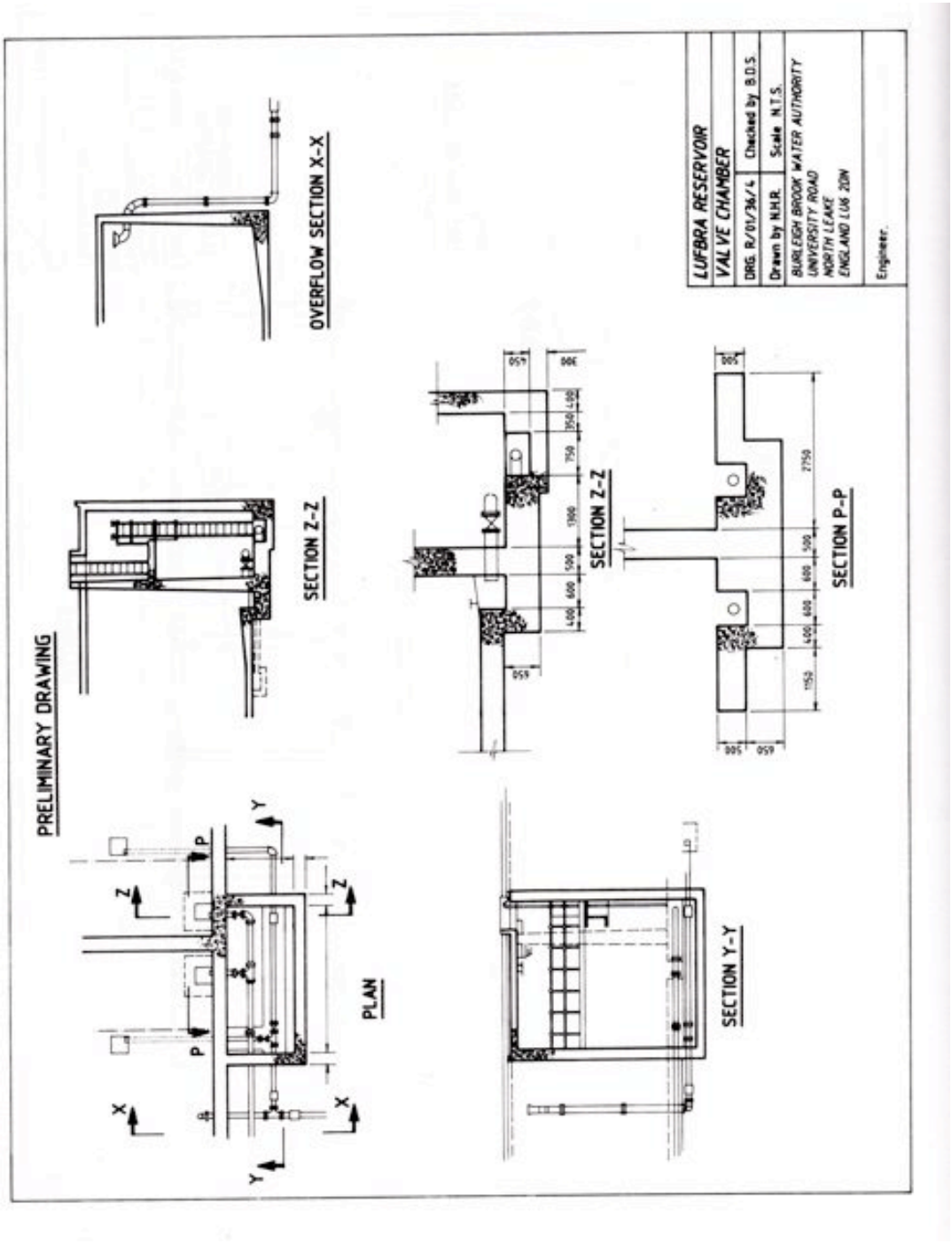
**RE:** "In the form of contract used for this project, an 'Engineer' was appointed by the client to have overall responsibility for the investigation and design of the project, and to supervise its construction. The Resident Engineer represents the Engineer on the site of the works."

**No fines concrete**: "This is a form of lightweight concrete obtained when fine aggregate is omitted, i.e. consisting of cement, water and coarse aggregate only" (A. M. Neville: *Properties of concrete*, p. 544. Pitman, London, 1977).


LUFBRA RESERVOIR
LOCATION & SITE PLAN
DRG. R/01/36/1
Checked by B.D.S
Drawn by N.H.R.
Scale N.T.S.
BURLEIGH BROOK WATER AUTHORITY
UNIVERSITY ROAD
NORTH LEAKE
ENGLAND LU6 2DN
Engineer.
LOCATION PLAN
BEACON HILL
N
E
W
S
SITE PLAN
EXISTING TRACK
PROPOSED NEW ACCESS ROAD
LIMIT OF WORKING AREA
OVERHEAD POWER LINE


LUFBRA RESERVOIR
SITE PLAN
DRG. R/91/34/2
Checked by B.D.S.
Drawn by N.H.R.
Scale N.T.S.
BURLEIGH BROOK WATER AUTHORITY
UNIVERSITY ROAD
NORTH LEAKE
ENGLAND LU6 2DN
Engineer.
OVERHEAD POWER LINE
171.42
171.30
172.50
INLET MAIN
VALVE CHAMBER
OUTLET MAIN
ACCESS ROAD
LIMIT OF WORKING AREA
171.00
172.00
173.00
174.00
172.00
173.00
174.00


LUFBRA RESERVOIR
GENERAL ARRANGEMENT
DRG. R/91/36/3
Checked by B.D.S.
Drawn by N.H.R.
Scale N.T.S.
BURLEIGH BROOK WATER AUTHORITY
UNIVERSITY ROAD
NORTH LEAKE
ENGLAND LU6 2DN
Engineer
NOTE.
THIS DRAWING IS NOT
TO SCALE.
SECTION B-B
SECTION A-A
Partial contraction joints
Access covers (in roof)
For valve chamber see Drg R/361/36/4
200mm Topsoil
100mm of 20mm Clarestone
13 Buffer
45°


PRELIMINARY DRAWING
OVERFLOW SECTION X-X
SECTION Z-Z
SECTION Z-Z
SECTION P-P
PLAN
SECTION Y-Y
LUFBRA RESERVOIR
VALVE CHAMBER
DRG. R/01/36/4
Checked by B.D.S.
Drawn by N.H.R.
Scale N.T.S.
BURLEIGH BROOK WATER AUTHORITY
UNIVERSITY ROAD
NORTH LEAKE
ENGLAND LU6 2DN
Engineer.

## CONSTRUCTION PROJECT AND CONTRACT ORGANISATION

### Client
The Burleigh Brook Water Company is a regional water company based entirely in the catchment of a major river. It serves 6 million people.

### Contract
A 'traditional' contract, in which the Client engaged a Designer and let the contract to a main contractor on a fixed price but re-measured for the actual work done.

### Contractor
SafeWork Construction is a medium sized construction company that specialises in high quality concrete work. It is based in the same region as the Client. It employs 40 people in its Head Office and about 40 project management staff on its various sites. Almost all the work is sub-contracted but because SafeWork is a specialist in high quality concrete work it employs 30 highly skilled concrete workers directly on permanent contracts.

### Subcontractors for this project
These include:

- Diversion of the electricity line by the authorised authority
- Site facilities, including catering and welfare
- Permanent and temporary fencing
- Excavation, general groundwork and landscaping
- Roadworks
- Pipework and drainage
- Steel reinforcement
- Concrete formwork
- Control equipment

### Employment of the workforce
Apart from the project management team and the specialist concrete workers, all the workforce will be employed by the sub-contractors, most of whom will in turn employ most of their workers on a contract basis rather than by direct employment.

### Suppliers for this project
These include:

- Pipework from a company nominated by the Client.
- Control equipment from a company nominated by the Client.
- All plant and equipment used by the main contractor will be hired.
- The sub-contractors will supply their own materials, plant and equipment.

## COURSE PARTICIPANTS' TASKS

### Assignment

Course participants will work in groups of three or four during the periods shown in the course timetable. Their tasks are described below:

- Write an OS&H Policy for the Client's organisation as a whole.
- Identify the major hazards and risks that my arise from this project.
- Write a specific OS&H Policy for this project.
- Write Client's contract clauses for effective OH&S for the project.
- Write a management guide for the organisation and implementation of these OS&H requirements.
- Conduct a 'prevention through design' analysis of the design of the reservoir.
- Make a draft, outline plan for the site layout and welfare facilities.

### Reporting and recording

- Each group will nominate a reporter who will present the work of the group.
- The presentations will be followed by discussion leading to clear conclusions and recommendations.
- Each group will write a succinct, illustrated report on their work, which will be copied for all participants and retained by the Tutor.
- The Tutor will summarise the conclusions and recommendations and provide each participant with a copy.

The reporting and recording documents from the above will be used by the Tutor to assess the learning of the participants against the information taught during the course and this will form an element of the evaluation of its effectiveness.