

L DIREKTOR

A STANDARD DESIGN MANUAL FOR RURAL WATER SUPPLY IN A DEVELOPING COUNTRY

Introduction

It is now generally accepted that the health of the general population is very much bound up with the availability of a wholesome water supply.

Since the declaration of the "World Water Decade" which we have now entered, pressure has been created to produce schemes which will bring acceptable quality water to the rural population and to the urban poor. The other aspect of the purpose of the Decade, running parallel with bringing water to the people, is to provide satisfactory sanitation facilities. The two, taken together, it is hoped will lead to a general improvement in health of the population - providing other criteria, such as a minimum standard of nutrition, are also maintained.

The Project

In 1975, TAHAL was commissioned by the World Health Organisation, acting within the framework of the United Nations Development Programme, to undertake a study of Rural Water Supply and Environmental Health covering six of the nine representative regions of the Republic of Ghana - representing some 80% of the country's area. The project area had a 1970 census population of over six million people.

After three years of intensive work the seven volume Report was presented. A description of the work done for the Report - geological, hydrological, engineering and financial analysis, would in itself require a whole paper, but the scope of the work can perhaps be seen from the titles given to the seven volumes, occupying some 180mm of shelf space:

- Volume 1 - Summary
- Volume 2 - Development Programme
- Volume 3 - First Stage Programme
- Volume 4 - Management and Organisation
- Volume 5 - Report on Training
- Volume 6 - Standard Design Manual (accompanied by a set of Standard Drawings)
- Volume 7 - Supporting Studies and Appendices

The Design Manual

For the purposes of this presentation, attention will be restricted to the "Standard Design Manual". The object of the Design Manual was to provide a guide book for the local designer in a developing country, to the decision processes and design criteria to be adopted in designing a simple rural water supply scheme, and in getting it out to tender. Part of the Manual's purpose was also to point out the limitations of its use - ie to make the designer aware of those items where it is better to seek more experienced advice, as well as providing a uniform basis for design to assist in checking and approval procedures.

The contents of the Manual were based not only on TAHAL's wide experience in West Africa, but also on the special Immediate Implementation Programme which was initiated and constructed simultaneously with the preparation of the Report.

Analysis of the situation in the rural villages, defined as concentrations of population of less than 5000 persons, showed that a degree of standardization can be effected in the type of water supply scheme which can be adopted, according to the following criteria:

1. Communities of between 200 and 2000 inhabitants would be supplied by non-piped sources.
2. Communities of between 2000 and 5000 inhabitants would be supplied by piped systems feeding one or more public water points.
3. If groundwater was available the smaller schemes would consist of individual tube-wells equipped with hand-pumps, and the larger schemes of one or more deep boreholes with diesel generator operated submersible pumps, elevated water tank etc. These larger schemes were sub-divided into two types depending on whether borehole yields were fair or low.
4. If surface water only was available the smaller scheme would be of an impounded reservoir, sedimentation basin and slow sand

filter, with an adjacent water delivery stand consisting of a storage reservoir with water delivery hand-pumps. For the larger type of scheme both low lift and high lift pumping stages might be necessary.

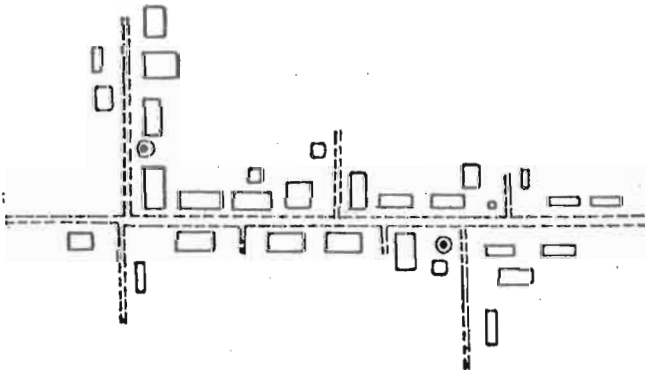
5. The projected water demand was taken as 22.5 litres/capita/day for the smaller schemes (ie population less than 2000) and 52.5 litres/capita/day for the larger schemes.

Figures 1 to 3 illustrate the basic schemes which were developed:

FIG.1
"HP" MODEL SCHEME
(non-pipe-borne water supply category)

This Model Scheme is intended for: Communities numbering 200 to 2000 (1500 in the Northern Region) inhabitants. Locations where groundwater is available. Projected per capita water demand of 22.5 lpcd. Total average daily water demand range of 4.5 to 45 cubic metres (about 1000 to 10000 gpd).

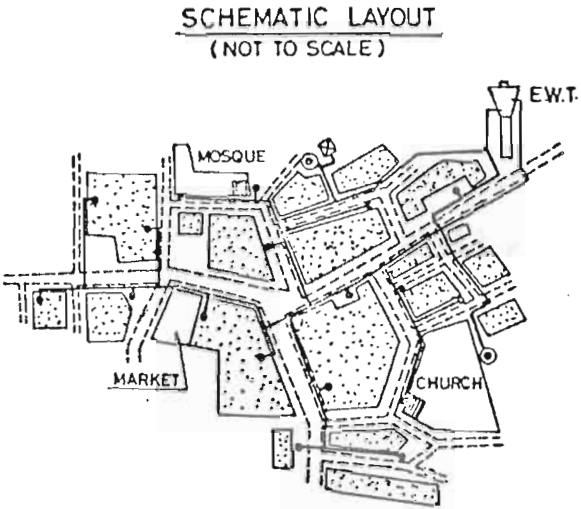
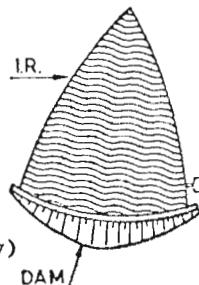
SCHMATIC LAYOUT
(NOT TO SCALE)



- LEGEND
- ROAD
 - DWELLING
 - SHALLOW BOREHOLE EQUIPPED WITH HAND PUMP

FIG.2
"GWA" OR "GWB" MODEL SCHEME
(pipe-borne water supply category)

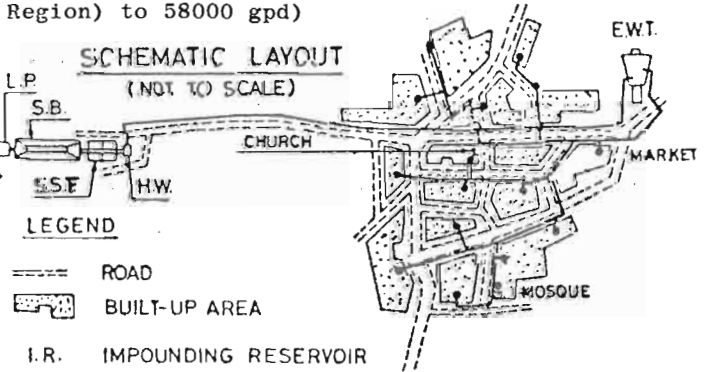
This Model Scheme is intended for: Communities numbering 2000 (1500 in the Northern Region) inhabitants. Locations where groundwater is available: "GWA" designated where borehole yields are fair, "GWB" designated where borehole yields are low. Projected per capita water demand for the year 1992: 52.5 lpcd. Total average daily water demand range of 105 (78.75 in the Northern Region) to 262.5 cubic metres (about 23000 (17500 in the Northern Region) to 58000 gpd)



- LEGEND
- ROAD
 - BUILT-UP AREA
 - DEEP BOREHOLE EQUIPPED WITH MECHANICALLY OPERATED PUMP
 - ⊠ HEADWORKS INCL. CHLORINATION FACILITIES
 - E.W.T. ELEVATED WATER TANK
 - ⌋ PIPELINE WITH PUBLIC WATER POINT

FIG.3
"SW" MODEL SCHEME
(pipe-borne water supply category)

This Model Scheme is intended for: Communities numbering 2000 (1500 in the Northern Region) to 5000 inhabitants. Locations where no groundwater is available and surface water is to be used. Projected per capita water demand for the year 1992 of 52.5 lpcd. Total average daily water demand range of 105 (78.75 in the Northern Region) to 262.5 cubic metres (about 23000 (17500 in the Northern Region) to 58000 gpd)



- LEGEND
- ROAD
 - BUILT-UP AREA
 - I.R. IMPOUNDING RESERVOIR
 - L.P. LOW LIFT PUMPING STATION
 - S.B. SEDIMENTATION BASIN
 - S.S.F. SLOW SAND FILTERS
 - H.W. HEADWORKS CONSISTING OF CHLORINATION FACILITIES AND HIGH LIFT PUMPING STATION
 - E.W.T. ELEVATED WATER TANK
 - ⌋ PIPELINE WITH PUBLIC WATER POINT