Draft

Dhaka Water Supply and Sewerage Authority

Financial and Capacity Building Consultancy
of
Dhaka Water Supply Sector Development Project

Maintenance Manual

Volume – 2

Reservoirs, Water Towers and Strategic Mains

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Schedule of maintenance activities are to assist the maintenance personnel of Dhaka WASA to conduct maintenance programs at definite intervals

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Instructions

Test results and maintenance activities carried out under monthly, quarterly, half yearly, yearly, and every two year must be recorded on the Job card, signed and dated by the maintenance supervisor. Date for the next activity must also be recorded on the Job card, which should be kept at the plant/equipment site and a copy with the maintenance personnel for follow up.

Ensure that all standard instructions of the manufacturer have been followed during every schedule of activity.

The personnel carrying out the maintenance work shall:

- Be competent and suitably qualified to carry out the work
- Be properly trained to complete the work to the required standard and in a safe manner
- Be equipped to carry out the work
- Be properly supervised

Before undertaking any maintenance work, the maintenance personnel shall:

- Inform their supervisors that the work is going ahead
- Before starting the work, lock off plant or equipment and ensure that the plant or equipment is safe to work on
- Post notices warning of works in progress

On completion of work, the maintenance personnel shall:

- Remove all tools and maintenance equipment
- Clean up and remove all rubbish from site to a point of safe disposal
- Test for correct operation of plant or equipment
- Remove warning notices

Job Card

Card No. : Date : …….

Site :…… Name of Installation : ……..……..….

Equipment to be worked on: …….

Routine Maintenance : ☐ Urgent Maintenance : ☐

Routine Maintenance Frequency :

Weekly	Monthly	Quarterly	Half yearly	Annual	Biannual

Requisitioned by:

Signature:……..

Date:……

Authorized by:

Signature:……..

Date:……..

Seal :

Activity Report

Work done :

(i) ……

(ii) ……

(iii) ……..……

Spare Parts used :

(i) ……..……

(ii) ……..……

(iii) ……..……

Control Settings/Meter Readings : ……..……

Tests conducted : ……..……

Work outstanding :

(i) ……..……

(ii) ……..……

Defects noted: ……...

Comments if any : ……..

Data computerized: Yes | No

Date of next maintenance : ☐

Maintenance Technician

Signature:……..

Date:……

Controlling Officer

Signature:……..

Date:……..…

Seal :

Reservoir and Water Towers

Full Inspections

Each reservoir should be inspected in full at least **every ten years**. The inspection shall involve draining the reservoir, or part of the reservoir where there are compartments, cleaning and flushing. The structure shall then be inspected by a competent and experienced Civil Engineer, in conjunction with representatives from Operations staff, particular attention being paid to construction joints, expansion joints, valves, ventilators and pipes passing through walls and floors. A water tightness test should be carried out prior to an inspection and on completion of any remedial work.

Intermediate Inspections

Intermediate inspections should be made on Service Reservoir and Water Towers **annually**. These intermediate inspections will not normally involve draining the reservoir or taking it out of service. They will cover examination of access covers, vent pipes, overflows and washout facilities, principally to ensure that there is no access for wildlife. An external inspection shall be made of the roof and/or roof covering to ensure that it is intact and watertight.

Register of Inspections

A register should be kept within the appropriate department/zonal office of DWASA. In this should be recorded the date of each reservoir inspection, both full and intermediate, a summary of the results of the inspection and any remedial works carried out and any other relevant comments.

New reservoirs should be entered in the register against the dates when they are sterilized and the dates when they are brought into service. The record should include General Information and Construction Details.

Service Reservoir and Water Towers - Draining and Refilling

Before taking any reservoir out of commission, alternative supplies to feed the reservoir zone should be checked to confirm that no operational changes have been made since the reservoir was last drained. A procedure sheet shall be issued to all key personnel involved with the draining down and cleaning works a week before the planned start.

Attached to the procedure sheet should be a location plan and an up-to-date working drawing of the reservoir pipework arrangements, indicating valves and their sequence of operation during the draining and cleaning programmes.

Safety

Safety should be a prime consideration. Therefore, tests should be carried out for oxygen deficiency and the presence of gases. Gas monitoring equipment and appropriate training will be necessary when this procedure is adopted.

Draining

Where possible the reservoir or water tower shall be drained into supply. The level shall be reduced to within 600 mm of the bottom or alternatively to a level preventing silt or debris entering the outlet main and outlet valve closed. The washout should then be opened and the reservoir or water tower drained leaving 150-200 mm of water. The remaining water should be used to wash out any silt formation on the bottom of the reservoir.

Refilling

Before refilling, the inside surfaces of the reservoir should be washed with chlorinated water to give a residual of not less than 20 mg/l free chlorine. When washing is complete the reservoir should be filled with water having a chlorine residual of not more than 0.5 mg/l free chlorine. After standing 24 hours, the water should be sampled for bacteriological examination and tested for taste, odour and other parameters relevant to the work carried out. It should only be returned to supply after satisfactory results have been obtained.

Strategic Mains

A strategic main can be defined as - *'A main conveying water in bulk to centers of population which have no other supply that can fully meet normal demand.'*

Vulnerable Lengths

A vulnerable length can be considered as - *'That part of a strategic main where by virtue of material, access, location or other reason and during normal seasonal weather conditions a repair to a burst might be expected to result in an interruption in supply exceeding 24 hours.'*

Strategic Mains Records

For the following should be prepared:-

- A key map(s) of strategic mains in Dhaka. (Scale 1:25,000)
- A schedule of strategic mains.
- Individual maps of strategic mains.

Vulnerable Length Records

For vulnerable lengths of mains the following should be prepared:

- A key map(s) identifying vulnerable lengths. (Scale 1:25,000)
- A schedule of vulnerable lengths.
- Individual maps of the vulnerable lengths.

Inspection of Mains

For strategic mains and vulnerable lengths the frequency of inspection and valve operation should be **annually**. An inspection record sheet should be drawn up for each strategic main and vulnerable length, to include the valve information as an appendix.

Repair Plans

For strategic mains and vulnerable lengths, the necessary information to effect rapid repairs should be prepared, be readily available, updated at change of circumstances and reviewed **biannually.** This should include a schedule of materials kept in the stores to effect rapid repair of the most common forms of failure.

Valve Exercising

One of the tasks to be undertaken **annually** is to ensure that the valves on the Strategic and Vulnerable Mains are exercised to ensure that they work should an emergency occur and their operation becomes critical. It also provides an opportunity to ensure that the valves are still visible and are accessible.

Mains Flushing

Mains flushing is a good method of maintaining water quality in the distribution system provided there is sufficient water and water pressure available. Mains flushing is an exercise that should be undertaken on a regular basis to clear out any detritus or build up of unwanted depositions in the distribution system. A planned flushing program should be designed based upon water quality data. A typical program would be to flush that part of the system supplied by tubewells **every 4** years and that supplied from a surface water treatment works **every 2 years**. This is due to the slightly increased risk of deposition from the surface water source.

The method of flushing would be to work gradually away from the DTW, or source, opening wash out hydrants fully, one at a time, allowing the water to flow until it runs clear, closing down the washout hydrant and moving along the distribution system until the last dead end is flushed. The program will depend upon the level of complaints and the quality parameters from sampling.