

Draft

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

Maintenance Manual

Volume - 4

Sewer Cleaning

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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
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Requisitioned by: _____ Authorized by: _____
Signature:..... Signature:.....
Date:..... 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
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 Date of next maintenance :

Maintenance Technician _____ Controlling Officer _____
Signature:..... Signature:.....
Date:..... Date:.....
Seal :

Sewer Cleaning

Following problems are faced in the sewerage system:

- a) Sedimentation
- b) Intrusion of tree roots
- c) Blockages
- d) Intruding connections or laterals
- e) Intrusion of Street rubbish
- f) Sewer Collapse
- g) Infiltration/Exfiltration
- h) Entry of Industrial Flows

Methods of Cleaning Sewers

There are many ways in which sewer cleaning can be undertaken. However, the key is to find the one most suited to the area in question and the availability of equipment. This section will consider cleaning for rehabilitation works using the most likely methods to be appropriate to Dhaka initially to be followed by other suggestions for the future.

Sewer cleaning methods for non-man entry sewers include:

- ❖ Using split bamboo canes fixed together for rodding the sewer to reach as far as possible using man power.
- ❖ Using steel or similar rods for the above purpose
- ❖ Using power rodding machines
- ❖ Using Pull throughs (Figure – 1) and retractable rakes (Figure -2) pulled through the sewer using man power
- ❖ Using sewer cleaning machines (Figure -3)
- ❖ Using all the above in conjunction with sewer “puncturing”
- ❖ Using jetting cum sucking machines
- ❖ Flushing

All debris removed from sewer must be taken off site and disposed to a safe point as soon as possible.

For all these cleaning systems it may be necessary to overpump the sewage, especially for jetting procedure as the energy of the jetting head is soon dissipated if the sewer is full of sewage.

Sewer cleaning should usually start at the bottom of the sewer system and work upstream, cleaning each length in turn until the upstream end is reached. Each length should be cleaned working with the flow and great care should be taken to prevent silt being washed down into already “cleaned” lengths. Stanking boards will assist in this matter.

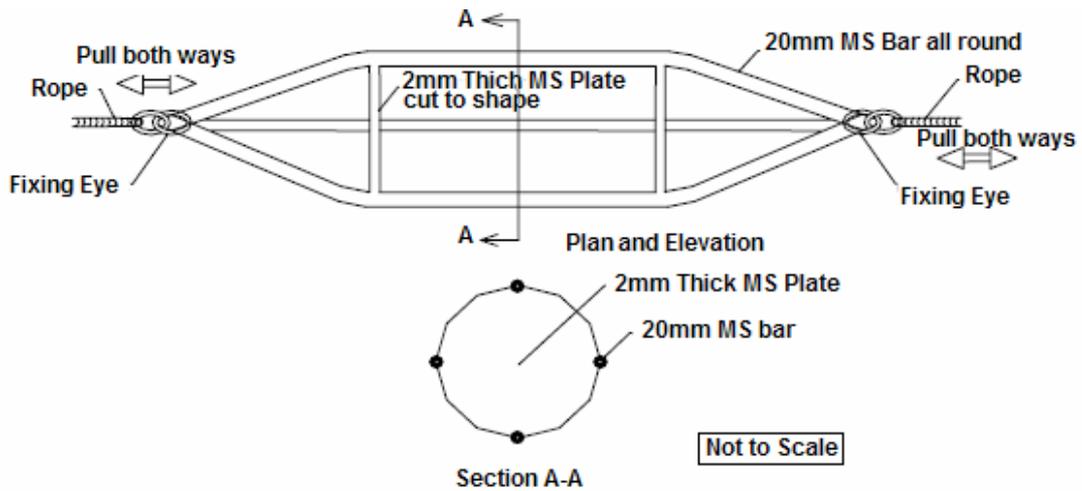


Figure – 1 : Sewer Pull Through

A Sewer Pull Through is pulled by gangs of men through a part of the sewer using ropes tied to both ends passing through manholes. By pulling back and forth the sewer is cleaned

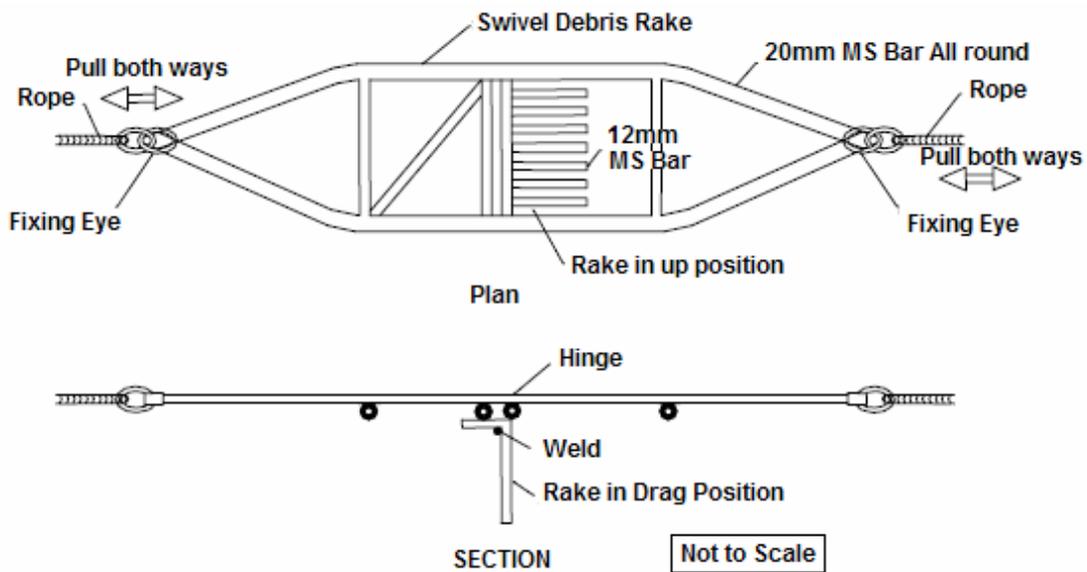


Figure – 2 : Sewer Rake

A Sewer Rake is pulled by gangs of men through a part of the sewer using ropes tied to its both ends passing through manholes. By pulling back and forth the sewer is cleaned. The rake acts like a flap, aligns with the frame during back motion and swivels to vertical during forward motion to clear the debris.

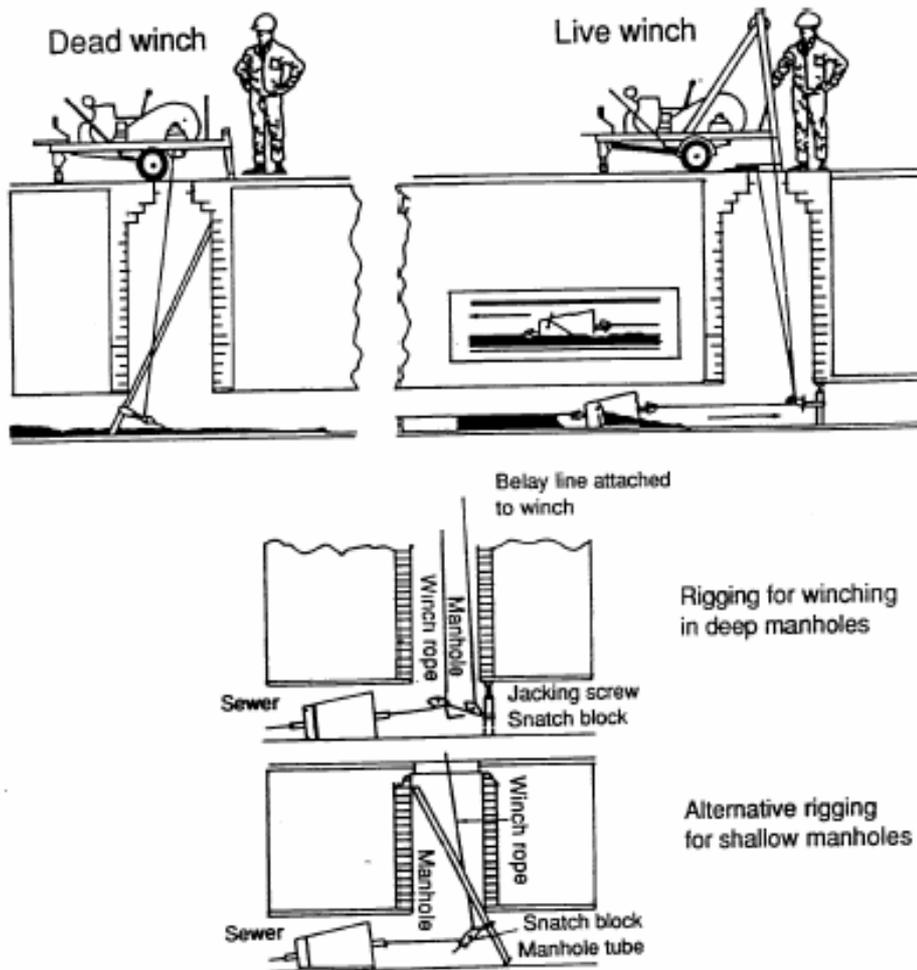


Figure – 3 : Sewer Cleaning Machine

Sewer Cleaning Machines

Sewer cleaning machines are very useful in cleaning medium to large size sewers. The following steps are usually followed:

Step 1: Make a Way – Before starting cleaning, connection between the two manholes has to be established. By floating an electrical lamp or if a blockage exists, Jetting or rodding should be done to establish this connection.

Step 2: Preparation – A light steel wire or rope 5 mm in diameter is drawn through the sewer section. “Live winch” is positioned over the manhole on the down-stream side of the sewer while the “dead winch” over the manhole on the up stream side. Wire or rope from the dead winch is tied to the smaller end of the bucket. Wire rope from the live winch is tied to the bigger end of the bucket. The bucket has a pivoted flap. Shake block, Snatch block, jacking screw and a manhole tube is used to support the wire or rope in the sewer.

Step 3: Operation – The bucket is pulled through the sewer by the dead end winch. The bucket flap pivots to allow free passage of the silt through the bucket. Normally bucket should not travel more than 5 to 10 meters at a time. As the pull is reversed by the live winch, the bucket flap closes and full load of debris will be brought to the

surface. The cycle is repeated, progressively drawing further through the sewer. Care should be taken not to damage the fabric of the sewer.

Sewer Puncturing

Sewer puncturing is used when it becomes impossible to rod or jet from one manhole to another. In such cases sewer has to be punctured at a point so that it can be reached from both the manholes. Steps used are : (a) Rodding is done from both manholes in turn along the sewer. (b) Marking the distances covered, if they overlap, the point of overlapping should be marked. (c) Excavation is done to the sewer at a point marked from (b) and the top of the sewer has to be broken say one meter long. Cleaning is initiated by rodding. After cleaning a manhole has to be built over the point.

Sewer Jetting

Sewer jetting is an effective and efficient method of sewer cleaning. With correct type of jetting head and appropriate jetting pressure quite large amounts of silt/detritus can be moved from within the sewer to manhole positions from where it may be grabbed, dug or sucked out. Normal sewer jetting procedures are as follows:

- a) As with all other sewer cleaning works the sewers are jetted from the downstream end of the system. Usually each length is cleaned in turn from manhole to a manhole with stanking boards used in the downstream start manhole to prevent the silt being carried away to the already cleaned lengths.
- b) With the smaller jetting units it is usual to attempt jetting only when the flows are relatively low, a full sewer soon dissipates the energy from the jet. However, the larger more powerful machines can be used to effect in full or partially full sewers. The equipment comprises either of two vehicles (one for jetting and one vacuum tanker for removing the silt) or one vehicle with combined jetter cum sucker.
- c) Site procedures are straight forward in that both vehicles (or the single vehicle) are parked at the start downstream manhole, stanking boards are fitted and the jetting commences. The removal of silt with the vacuum tanker can either be after the jetting of the length has been completed or, preferably, simultaneous with the jetting.

Records of Sewer Cleaning

Following records should be maintained in Proforma – S1 for sewer cleaning

- Date of work
- Sewer location
- Plant used
- Silt removed
- Men used
- Cost of works

Sewer Cleaning Record Form

Area Code : Year: Operational Unit:

Date	Location	Start MH Ref	Finish MH Ref	Dia.	Depth	Sewer Length Cleaned	Volume of Silt
Note : MH is manhole						Total	

Diameter
0-600 mm
600-1200 mm
1200-1800 mm
Exceeding 1800 mm

Depth
0-2 m
2-4 m
4-6 m
Exceeding 6 m

Manhole Inspection

During an inspection of a manhole the following items should typically be included:

- Check that the manhole cover is in place
- Check that the cover or frame is not broken or cracked
- Check that the cover is flush with the ground level or road surface
- Check that the opening in the cover and access shaft is sufficient for safe access (usually 600 mm or more)
- Check for missing step irons
- Check that the step irons are sound
- Check evidence of bad atmospheres
- Check for odors
- Check the general internal structural condition of the manhole.
- Check the depth of sediment in the invert and on benching and walls
- Check that the sewer is operating satisfactorily
- Check ladders and platforms
- Check for gross infiltration in the sewer flow
- Check maximum surcharge level

Safety in Sewers

Sewers are not dangerous places provided sensible precautions are taken prior to work. Following matters should be taken care off:

- a) Personnel – Personnel should be physically fit, have good eyesight and good sense of smell. They must have good training.
- b) Health hazard – Personnel should be made aware of the potential health hazards such as: jaundice, tetanus, poliomyelitis, etc. Operators must take all precautions against swallowing sewage or the contaminations of cuts or grazes with sewage. After leaving sewer they must wash hands and face with soap, antiseptic solution and water. Eyes should be protected during work.
- c) Protective clothing – Personnel should be provided with protective clothing.
- d) Atmospheric hazards – Care should be taken against oxygen deficiency, presence of toxic and flammable gases such as carbon monoxide, methane, petroleum vapor, hydrogen sulphide, etc. As a safety sewer should be ventilated prior to work.