

Technical Guidelines for River and Sediment Management: Maintenance and Management of River Management Facilities and Structures (Draft)

in 1998 by Ministry of Construction, Japan

(Unauthorized translation from Japanese to English by Kamoto & Okubo in Feb. 2013)

1 . Introduction

1.1 Objective

These guidelines aim to define important issues in river maintenance and management and thus promote appropriate river management.

1.2 Policy of maintenance and management

River maintenance and management shall be conducted in an integrated manner, based on the characteristics of the area where the river is located, to prevent disasters by floods, storm surges and other hazards, to promote appropriate river use, to maintain the normal functions of the river flow, and to improve and conserve the river environment.

1.3 Scope of application

The technical guidelines shall be applied to river zones prescribed in Article 6(1) (hereinafter “river zones”), river management facilities and joint-use structures (excluding dams and sabo facilities). In addition, proper instructions and supervisions shall be provided to maintain and manage permitted structures pursuant to the guidelines.

2. Planning and other activities for maintenance and management

2.1 Introduction

2.1.1 Planning for maintenance and management

Maintenance and management plans shall be developed for rivers in the jurisdiction, including long-term goals and action plans for about next 10 years, to maintain and manage the rivers based on the plans.

2.1.2. River patrols and inspections

To maintain and manage rivers properly, river patrols shall be performed regularly to observe river conditions. In addition, inspections before the flood season, as well as special, regular and total inspections, shall be conducted.

2.1.3 River Record

A river record shall be prepared and preserved for each river, and used as a basic information source for maintenance and management. When inspections, repairs, disaster restoration, and investigations for maintenance and management purposes are conducted, important issues shall be recorded on the record immediately, and the recorded information shall be reviewed every fiscal year.

2. 2 River Patrols

2.2.1 River patrols in normal times

River patrols in normal times shall be conducted at appropriate intervals according to the conditions of the river. When unusual conditions are observed, immediate action shall be taken to cope with the conditions. For river zones where illegal waste dumping is often seen, more frequent patrols shall be conducted.

2.2.2 River patrols during flooding

During the flood season and storm surges, river patrols during flooding shall be performed to assess river and related conditions quickly and appropriately.

2.3 Inspections before the flood season

A thorough, on-foot inspection of river zones and structures shall be conducted either visually or instrumentally after the weeding in embankments and their surrounding areas every year before the flood season. In areas where a large increase in river discharge is expected due to snow melt, this type of inspection can be carried out at an appropriate timing during the non-flood season.

2.4 Special inspections

Special inspections shall be conducted after floods, earthquakes, tsunamis and other events.

2.5 Inspections for river structures

2.5.1 Regular inspections

Regular inspections shall be conducted for the following river structures: concrete parts, painting, and mechanical, electrical and control facilities (embankments, revetments applied to them, groins and flood channel protection are not subject to this type of inspection.)

2.5.2 Total inspections

Total inspections shall be conducted for river structures systematically at appropriate intervals by using appropriate methods for each structural order to collect detailed information on decreased function and/or damage due to aging or other reasons.

3. **Maintenance and management of river zones**

3.1 Introduction

3.1.1 Management of river zones

River zones shall be maintained and managed appropriately for their original poses of safe discharge of floodwaters and conservation of the river environment, as well as for various needs from river use for sports and recreation and from river improvement as part of urban development.

3.1.2 Contribution to river-channel and other plans

Due efforts shall be made to observe changes in the conditions of river zones and understand their causes, and the findings shall be contributed to development of river-channel and other plans.

3.1.3 Prevention of illegal dumping of garbage, sediment, vehicles, etc.

Due efforts shall be made to prevent illegal dumping of garbage, sediment, industrial waste, vehicles, boats, etc. by organizing clean-up projects with local communities, practicing more frequent river patrols, installing warning

signs, etc. When finding illegal dumping in progress, the person(s) shall be ordered to remove the wastes from the scene immediately.

3.1.4 Prevention of illegal occupation

When finding illegal occupation, necessary measures, such as issuing an order to restore the area, shall be taken immediately to eliminate the illegal occupation as soon as possible.

3.1.5 Measures for illegal mooring

Plans concerning measures for illegal mooring shall be developed in collaboration with related agencies, and illegal mooring shall be eliminated systematically, based on those plans.

3.1.6 Conservation of the river environment

The river shall be maintained and managed to conserve a healthy river environment appropriately, based on river improvement plans, river environment management basic plans and the results of environment assessment such as the National Census on River Environment.

3.1.7 Sand and gravel quarrying

Supervision over sand and gravel quarrying businesses, as well as regular patrols, shall be conducted to prevent problems in river management and damage to the river environment.

3.1.8 Disused river sites

If a disused river site is found to be free of future flood damage caused by a flood of design scale after embankments are completed in a series of river sections, the site shall be reviewed adequately for its use as land for river management. If a thorough review finds no use of the site for river management purposes, it shall be exchanged for other land wherever possible pursuant to the provision of Article 32 of the River Law.

3.2 Flood channel

3.2.1 Weeding

Weeding shall be conducted over an area where it is necessary, while paying attention to river environment conservation, in the following cases: when weeds are blocking flood discharge; when weeding is needed for management of river management facilities; when it is needed for river use; and when it is needed for crime and fire prevention purposes.

3.2.2 Management of trees

Trees in river channels, when considered causing problems in flood management, shall be removed in the order of the seriousness of the problems posed by the trees, while paying attention to river environment conservation. Trees left untouched or planted in river channels shall be subject to regular investigations and inspections and shall be maintained and managed appropriately so that they will not cause problems in flood management.

3.2.3 Conservation of river lagoons

River lagoons shall be conserved appropriately as long as they are not posing any threats to flood management.

3.3 Law flow channels

3.3.1 Maintenance of river beds

The conditions and trend of river-bed movement shall be observed by conducting longitudinal and cross-sectional measurements regularly and patrols after floods, and appropriate measures shall be taken if river beds are found causing problems in river management.

3.3.2 Maintenance of natural river banks

Due efforts shall be made for early detection of changes in river banks through patrols and inspections, and if the changes are found causing problems in river management, necessary measures shall be taken in consideration of the conservation of the river environment.

3.4 River mouths

If sediment blocks the river mouth and causes problems in flood control or aquatic environment, appropriate measures, such as the removal of sediment, shall be taken in consideration of salinity intrusion.

3.5 Maintenance of river closure sites

Appropriate measures, such as installation of marginal strips, shall be taken if such measures are considered necessary in flood control.

4. Maintenance and management of embankments, revetments and spur dikes

4.1 Embankments

4.1.1 Earth banks

4.1.1.1 Bank bodies

Bank bodies shall be maintained and managed to preserve their flood control functions in consideration of the conservation of the environment surrounding the embankments.

4.1.1.2 Side slopes of embankments

Weeding in the side slopes of embankments (excluding their crowns and side slopes covered with revetments) shall be conducted the appropriate number of times to maintain their strength and also to inspect them visually.

4.1.1.3 Crowns of embankments

Bank crowns shall be maintained and managed to minimize the infiltration of rainwater into bank bodies. Pavement (simple pavement) shall be applied, if possible, to bank crowns at the time of repair.

4.1.1.4 Slopes and stairs

Slopes and stairs shall be maintained and managed, paying particular attention to scouring and erosion at the connection to the embankment. At the time of repair or other construction, barrier-free structures shall be applied to them, if possible, in consideration of seniors, the physically challenged, those in a wheel chair, etc. In addition, if slopes are used for reckless driving and other inappropriate acts that are considered to cause problems in river management, appropriate measures shall be taken after discussions with local municipalities and other stake holders.

4.1.1.5 Protections for the feet of embankments

The feet of embankments shall be maintained and managed, paying particular attention to missing stones, deformation, sinking and other similar signs.

4.1.1.6 Drain channels along the feet of embankments (toe drains)

Toe drains shall be maintained and managed to preserve their drain functions.

4.1.1.7 Marginal strips

Marginal strips shall be maintained and managed to preserve their functions according to their type.

4.1.2 Special embankments

Special embankments employing the parapet-wall structure shall be maintained and managed, paying particular attention to the preservation of their crown heights, the formation of caverns in the embankment foundation, etc. In addition, embankments using the concrete retaining structure shall be maintained and managed, paying particular attention to uneven sinking, apertures and sheers in joints, etc.

4.1.3 Open levees

Open levees shall be maintained and managed pursuant to 4.1.1. In addition, continuous roads should be constructed for river management.

4.1.4 Overflow banks

Overflow banks shall be maintained and managed to preserve their functions.

4.2 Bank and foot protections

4.2.1 Revetment protections

4.2.1.1 Revetments

Revetments shall be maintained and managed to preserve their flood control functions. In inspections before the flood season, revetments, including their foundations and other underwater parts, shall also be examined for changes in their conditions.

4.2.1.2 Bank protections friendly to the river environment

Bank protections shall be maintained and managed to preserve their functions for flood control and environment conservation. In addition, a follow-up investigation shall be conducted after construction, and at the time of repair or other construction, the protections shall be improved to preserve and upgrade their functions.

4.2.1.3 Amenity-oriented bank protections

Amenity-oriented bank protections shall be maintained and managed to preserve their functions for flood-control and amenity-related purposes. In addition, a follow-up investigation shall be conducted for a certain period of time after construction by observing front water depths and stream conditions before and after the flood season, after flooding, before the recreation season, etc.

4.2.1.4 Special bank protections

Special bank protections shall be maintained and managed to preserve their functions as bank protection.

4.2.2 Foot protections

Foot protections shall be maintained and managed to preserve their functions for flood control. In inspections before the flood season, examination shall include the underwater parts of flood protections. In addition, whenever repair or

other construction is conducted, it shall be done in a manner to preserve and improve the environmental functions of the protections, considering that the water front provides a variety of habitats for various life forms.

4.3 Super dikes

Super dikes shall be maintained and managed to preserve their functions for flood control in consideration of changes in river conditions after construction. In addition, whenever repair or other construction is conducted, it should be done to preserve and improve their environmental functions.

5. Maintenance and management of river structures and facilities

5.1 Introduction

5.1.1 Guidelines for river inspection and improvement

Guidelines for river inspection and improvement shall be developed based on operation regulations, legal requirements and other rules, and they shall be used for the maintenance and management of river structures and facilities.

5.1.2 Maintenance and management of civil engineering structures and facilities

If abnormalities are detected, their causes shall be investigated, and appropriate measures, such as repair and reinforcement, shall be taken immediately with reference to the past records of disaster damage and abnormalities regarding the given structure or facility, as well as other records of similar type.

5.2 Ground sills and weirs

5.2.1 Civil engineering structures and facilities

5.2.1.1 Main bodies and aprons

In inspections before the flood season, main bodies and aprons shall be examined for the formation of caverns in their bottom parts and scouring at their feet, also paying attention to changes in bed protection. In addition, cracking, degradation and other abnormalities concerning the concrete parts shall be subject to instrumental assessment and monitoring if necessary.

5.2.1.2 Bed protections

Bed protections, particularly around the connections to the aprons, shall be maintained and managed with extra care, for damage to the connections can affect on the main bodies. In addition, particular attention shall also be paid to whether or not riverbed degradation and scouring are observed downstream.

5.2.1.3 Protection of embankments, attached retaining walls and flood channels

In inspections before the flood season, embankments, retaining walls and flood channels shall be examined for the formation of caverns and the conditions of the foundations and other underwater parts. Since retaining walls are installed in river sections with frequent hydraulic jumps and dynamic streams, their maintenance and management shall be conducted with extra care. If river degradation and scouring are observed downstream, retaining walls shall be prioritized for reinforcement. In addition, at the time of repair or other construction, it should be done in a manner to preserve and improve their environmental functions, considering that the water front provides a variety of habitats for various life forms.

5.2.1.4 Fish ladders

Fish ladders shall be maintained and managed to ensure a sound environment for fish to ascend or descend in rivers by repairing fish ladders and removing sediment from them. In addition, if river structures are preventing fish from ascending or descending, necessary measures, such as construction of fish ladders, shall be taken to ensure a sound environment for fish as much as possible at the time of repair or other construction.

5.2.1.5 Other facilities and structures

Other facilities and structures shall be maintained and managed to preserve their functions.

5.2.2 Gate facilities

Gate facilities shall be maintained and managed systematically to preserve their functions. In addition, they shall also be tested for proper function and operation in an appropriate way if necessary.

5.2.3 Electric and control facilities

Electric and control facilities shall be maintained and managed to preserve their functions according to their characteristics by conducting patrols and inspections appropriately.

5.2.4 Auxiliary facilities

Auxiliary facilities shall be maintained and managed to preserve their functions. In addition, movable weirs and fixed weirs with scouring sluices shall be equipped with warning facilities in river sections immediately downstream of auxiliary facilities or sections with dynamic water-level changes in response to weir operation.

5.3 Sluiceways and water gates

5.3.1 Civil engineering facilities and structures

5.3.1.1 Main bodies

Sluiceways and water gates shall be maintained and managed to preserve their functions for flood control, backflow prevention, discharge of irrigation and drainage water, and other purposes. In addition, they shall also be examined at appropriate intervals for internal cracks in the main bodies and caverns around the main bodies.

5.3.1.2 Parapet walls, wing walls and aprons

Parapet walls, wing walls and aprons shall be maintained and managed pursuant to 5.3.1.1.

5.3.1.3 Bed protections

Bed protections shall be maintained and managed pursuant to 5.3.1.2.

5.3.1.4 bank and flood-channel protections

Bank and flood-channel protections shall be maintained and managed pursuant to 5.3.1.3.

5.3.2 Gate facilities

Gate facilities shall be maintained and managed pursuant to 5.2.2.

5.3.3 Electric and control facilities

Electric and control facilities shall be maintained and managed pursuant to 5.2.3.

5.3.4 Auxiliary facilities

Auxiliary facilities shall be maintained and managed pursuant to 5.2.4. In addition, staff gauges shall be installed on both river and land sides for stable operation.

5.4 Drainage pump stations

5.4.1 Civil engineering facilities

5.4.1.1 Main structures of pump stations

The main structure of a pump station shall be maintained and managed for drainage pumps to function properly.

5.4.1.2 Sedimentation basins

Sedimentation basins shall be cleaned of sediment appropriately.

5.4.1.3 Discharge sumps, sluicing outlets and sluice pipes

Discharge sumps shall be maintained and managed with extra care for the watertightness of their bodies and joints. Sluicing outlets and sluice pipes shall be maintained and managed pursuant to 5.3.

5.4.2 Pump facilities

Pump facilities shall be maintained and managed systematically to preserve their functions. If necessary, test runs shall be conducted appropriately for management purposes to examine whether pump facilities function and operate properly.

5.4.3 Pump houses

Pump houses shall be maintained and managed to prevent damage to pump and other facilities, operational difficulties, and degradation of the operating environment.

5.5 Riverside and landside channels

Riverside and landside channels shall be maintained and managed to preserve their functions without causing damage to embankments and other structures.

5.6 Land locks

5.6.1 Main structure

The main structure of land locks shall be maintained and managed to ensure proper gate operation.

5.6.2 Gate facilities

Gate facilities shall be maintained and managed pursuant to 5.2.2. In the case of stop-log gates, the number of stop logs and their storage locations shall be kept readily available.

5.7 Inverted siphons

5.7.1 Main body

Appropriate instruction and supervision shall be provided for inverted siphons not to interrupt flood discharge and cause damage to adjacent embankments and river management structures and facilities. In addition, investigations shall be conducted at appropriate intervals for internal cracks in the main bodies and caverns around the foundations of embankments.

5.7.2 Gates

Appropriate instruction and supervision shall be provided to maintain and manage gates pursuant to 5.2.2.

5.8 Water intake facilities

5.8.1 Intake towers

Appropriate instruction and supervision shall be provided for intake towers not to cause damage to river channels and adjacent embankments and river management structures and facilities.

5.8.2 Sluiceways for water intake

Appropriate instruction and supervision shall be provided to maintain and manage intake sluiceways pursuant to 5.3.

5.8.3 Irrigation pumping stations

Appropriate instruction and supervision shall be provided to maintain and manage irrigation pumping stations pursuant to 5.4.

5.9 Bridges

5.9.1 Abutments

In inspections before the flood season, visual inspections shall be conducted for cracks and other abnormalities in the embankment body around abutments. If necessary, the inspections shall also include investigations for caverns.

5.9.2 Piers

Appropriate instruction and supervision shall be provided to monitor river-bed fluctuations for the maintenance and management of bridge piers by observing scours (maximum scour depth, scour area) around piers.

5.9.3 Attached revetments

Attached revetments shall be maintained and managed pursuant to 4.2.

5.10 Telecommunications facilities

Telecommunications facilities shall be maintained and managed through appropriate inspections.

6. Measures for flooding and water quality accidents

6.1 Flood measures

In case of flooding or storm surges, river management structures and facilities shall be protected in close collaboration with flood fighting efforts conducted by flood fighting management bodies. Cooperation shall be provided for flood fighting management bodies to conduct quick, well-directed flood fighting efforts.

6.2 Operation of river management structures and facilities

River management structures and facilities shall be operated appropriately based on accurate observation of water level, discharge, rainfall, etc. and operation methods such as operation regulations and guideline.

6.3 Measures for water quality accidents

In case of a water quality accident, information on the accident shall be collected and relevant administrative agencies shall be informed of the accident immediately. In addition, appropriate measures shall be taken without any delay in collaboration with such agencies.