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TECHNICAL AUDIT OF FACILITIES AND INFRASTRUCTURE OF WATER DAMAGE CONTROL STRUCTURE AT JANGKOK RIVER IN MATARAM CITY

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ABSTRACT

Jangkok Watershed is one of the big river basin areas located in Lombok Island that has complexity related issues of conservation and maintenance. In the basin Jangkok has built a lot of river infrastructure, irrigation, beaches, and raw water. River Jangkok located in the area of Mataram City, is one of the river that passes Mataram City and serves as a provider of water for various needs as well as one of the main drainage in the city of Mataram. Conditions that encourage to be conducted research Technical audit of facilities and infrastructure of water damage controller. Rehabilitation of rivers and river basins has been done as appropriate, but it is necessary to periodically perform technical audits of water damage control facilities as part of the operation and maintenance activities for the prevention of water damage. The technical audit of facilities and infrastructure of water damage controller is carried out to determine the quality of the structures, the problems that occur in the structures and what things are required in the return of structures function. From the results of inventory activities conducted on the River Jangkok river search results obtained results of some structures that have been damaged quite badly and need to be followed up with rehabilitation and repair activities or design review. Priority of handling in this technical audit will refer to the standard method of drafting the master plan of urban drainage system.

Key words: technical audit, operation and maintenance, priority handling.

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1. INTRODUCTION

The river is avour or natural artificial water or water container in the form of a water-drainage network with water in it, from upstream to estuary, with a cyber-bordered left and right riverbed defined as the perimeter of the river. River space consists of river riverbeds and river borders, where the riverbed serves as a container for running water and as a site for the life of the river ecosystem and river border serves as a buffer space between river and land ecosystems, so that the river functions are not disturbed by activities that develop around it. Utilization activities and efforts to increase the value of the benefits of existing resources in the river can provide optimal results while maintaining the sustainability of river functions. So that the destructive power of river water to the environment can be limited.

Thus the river and its system must be protected and preserved, enhanced function and its usefulness, and controlled by negative impacts to its environment. For the condition of river with unstable capacity, construction of damaged water control building such as parapet, embankment, chekdam, groundsill and other water constructions. Therefore, for construction that has been built not working properly or damaged then it needs to be repaired. For the above purposes, Operation and Maintenance (OP) activities are required, the technical audit of damaged water damage control structure is necessary to know the quality of the structure, the problems that occur in the structure and the type of maintenance required for the restoration of the structure function. Malano, et al (1999) studied about asset Management for Irrigation and Drainage Infrastructure in Vietnam. It reveals identifies the role of the asset management program (AMP) within the framework of service oriented management of irrigation and drainage services. An infrastructure and investment profile developed from the asset survey identified the investment requirement over the next 40 years. Petts and Eduljee (1994) study about environmental impact assessment for waste treatment and disposal facilities.

Technical audit of facilities and infrastructure of water-damaged river-handling controls that are technically reviewed and in accordance with other laws or regulations relating to such activities, which provide principles, justifications, and estimates and evaluations of the operations and maintenance activities to be undertaken. This Technical Audit becomes a reference for determining the scale of operation and maintenance activities. So far, the implementation of OP activities has not yet touched directly on river infrastructure points that are in need of maintenance and have not been well targeted. Therefore, to handle the above problems, will be analyzed Technical Audit Facilities and Infrastructure water damaged control of the River Jangkok, with the determination of the priority scale of maintenance and rehabilitation activities using the standard method of drafting the master plan of urban drainage system (Directorate of Environmental Sanitation Development of Settlements Directorate General of Human Settlements of the Ministry of Public Works, 2012) are modified.

In relation to funding, maintenance activities or rehabilitation of damaged power control buildings cannot be implemented at once, but are done in stages. This gradual development requires prioritizing activities for its implementation. The prioritization of maintenance and rehabilitation activities will be carried out with the standard procedures for preparing the master plan of the modified urban drainage system.

2. METHODS OF IMPLEMENTATION

The technical audit work of water damage control facilities and infrastructure is divided into several stages, among others:

- Preparation
- Inventory of initial data
- River search
- Assessment of river condition and facilities and infrastructure of water damage controller
- Classification of conditions and plans for maintenance or restoration of damaged water control facilities / facilities
- Preparation of priority scale of maintenance or recovery of water damage control facilities and infrastructure
- Maintenance or recovery condition of facilities and infrastructure damaged water damage

For more details are presented in the following flowchart in Figure 1.

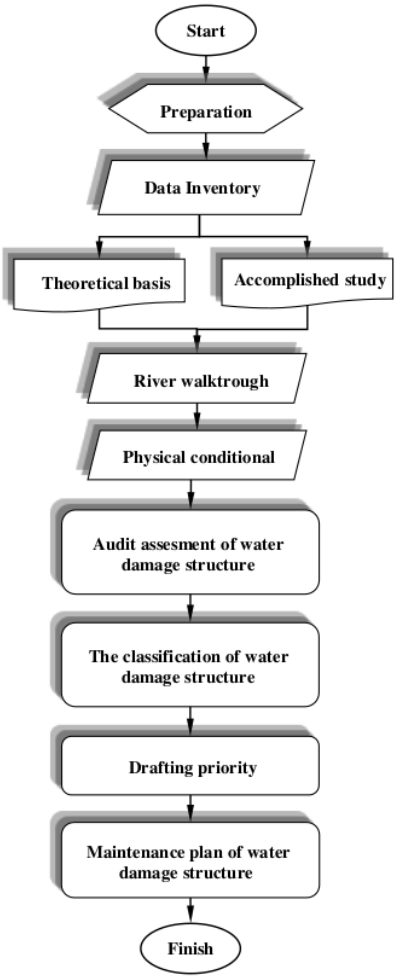

Figure 1. Flow chart of technical audit work of water damage control facilities and infrastructure

Operation and maintenance are two interrelated activities; however the outline of the objectives can be distinguished. Without adequate maintenance, an object or infrastructure

will quickly experience both physical degradation and function. Without the maintenance of the river and its infrastructure, the smooth operation of river infrastructure will also be disrupted and cannot be function optimally.

2.1. Operation and Maintenance Activities

A. Operation of facilities and infrastructure of water damage controller

Operation activities of water damage control facilities and infrastructures include actions or activities of regulation and utilization of river infrastructure, namely:

1) Regulatory or discharge control building and river flow direction; as well as inspection roads.

2) Building or monitoring post of hydrological, hydrometeorological and water quality conditions;

3) Supporting infrastructure or supporting OP activities consisting of:

- Office buildings, warehouses, workshops, guard posts and security signs
- Information and telecommunication equipment
- Heavy equipment and transportation equipment

B. Maintenance of water damage control facilities and infrastructure

Maintenance of water damage control facilities includes maintenance and protection of water damage control facilities and infrastructure to ensure the sustainability of its functions.

Maintenance of damaged water control facilities and infrastructures is done through:

a. Preventive measures or activities of deterioration or deterioration (preventive action)
b. Improved river damage and infrastructure (corrective action)
c. Recovery (rehabilitative action).
d. Maintenance of damaged water control facilities and infrastructure, including:

- Infrastructure of riverbed,
- Infrastructure to control the flow of river water.

Prior to maintenance activities it is necessary to carry out technical audit activities on water damaged control facilities and facilities aimed at:

1) Obtaining information on the last physical condition of facilities and infrastructure of water damage controller.

2) Obtain an assessment of the extent of damage to water damaged facilities and infrastructure.

3) Obtain priority ranking handling of water damage control structures.

2.2. Technical Audit of Flood Control Facility / Infrastructure

2.2.1. Inventory data

Data inventory activities include initial data collection and inventory data based on previous studies.

Previous studies consist of previous technical data relating to job sites. These data will be used as supporting data for field observation.

2.2.2. The River Tracking Activity

The river tracking activity aims to detect parts of rivers and river buildings that are problematic and require repair, as well as to assess appropriate types of maintenance measures. Assessment of the condition of the structure will be the basis in determining the category of action (preventive or corrective).

River search activities conducted to inventory the existing condition of facilities and infrastructure damaged water damage control such as:

a. Embankment
b. Revertment / retrograde
c. Sabo Dam
d. Reservoir floods
e. Krib
f. Tidal water gate
g. Groundsill
h. Chekdam
i. Jetty

2.2.3. River Condition Rating

As a basis for reference, the River Condition assessment was adopted from the criteria for assessment of river conditions on the work of "Composing OP River Manuals in NTB"; Nusa Tenggara River Region Hall I; 2009. The value of criteria can be seen in the following discriptions:

1. 70 – 100 (%) for A. No barriers, B no narrowing, C low erosion, D and E low landslide, F low density, G No activity, H no sedimentation, I river boundary line regultion are available, J not utilized, K flowing smoothly, L no wastewater discharges.
2. 50 - 70 (%) for A. medium barriers, B medium narrowing, C medium erosion, D and E medium landslide, F medium density, G medium activity, H medium sedimentation, I river boundary line regulation are in process, J utilization under control, K flow inhibited, L wastewater discharges under control.
3. 0 - 50 (%) for A. hug barriers, B hug narrowing, C high erosion, D and E high landslide, F high density, G high activity, H high sedimentation, I No river boundary line regulation, J utilization uncontrolled, K not flowing, L wastewater discharges uncontrolled.

The criteria for assessment of river condition can be seen in the following descriptions:

A. Water Flow Barriers
B. River Narrowing
C. Riverbed Erosion
D. Leftbank Landslide
E. Rightbank Landslide
F. River Plant Density
G. Sediment Excavation Activity
H. River Sedimentation
I. River Boundary Line Regulation
J. Utilization of River Boundary Area, outside the Embankment
K. Flow on the Estuary
L. Waste Water Discharge

2.2.4. Assessment of Physical Condition Infrastructure Facilities Water Damaged Control

Assessment of the physical condition of flood control facilities was conducted to determine the condition of the function of infrastructure of flood control facilities in each river under review whether it is still functioning properly, lightly damaged, moderately damaged or heavily damaged. Currently there is no specific rule that discusses the criteria for assessing the condition of infrastructure facilities for flood control. The scoring criteria used are adopted from the Regulation of the Minister of Public Works and People's Housing No. 13 / PRT / M / 2015 on Emergency Disaster Relief Effects of Water Damage, as described below:

1) Heavy Damage (physical damage condition >= 40%) : units collapsed or most of the components were damaged
2) Medium Damage (physical damage condition 20% - 40%) : units are still exist but small part of the structure is damaged and the supporting components are damaged
3) Small Damage (physical damage condition < 20%) : units are still exist but some structure components are cracking (structure still usable)

The damage criteria are applied to each section of the flood control structure so that it can be used to assess each part of the structure in detail. The level of damage and description of each level damage conditions for flood control structure are described belows:

I. The level of damage

1) Good: < 10%
2) Small Damage: 10-20%
3) Medium Damage: 21-40%
4) Heavy Damage: >40%

II. Detail Flood Control Structure Part

A. Weir

1) Main Dam Damage
2) The service bridge damage
3) Abutment damage
4) Pillars Damage
5) Water gates Structure Damage
6) Foundation Damage
7) Electrical Equipment Damage
8) Mechanical Equipment Damage
9) Flushing gate Damage
10) Upstream sedimentation
11) Sluice gate
12) Downstream erosion
13) Stilling Basin Damage

B. Check Dam / Sabo Dam / Sand Pocket / Consolidation Dam

1) Main Dam Damage
2) Sub Dam Damage
3) Weir Floor Damage
4) Abutment Damage
5) Pillars Damage
6) Foundation Damage
7) The service bridge damage
8) Downstream erosion
9) Weir cliff protector damage
10) Downstream floor of Sub Dam Damage

C. Embankment

1) Top of the embankment Damage
2) Embankment Damage
3) Embankment Top Damage
4) Change of embankment slope
5) Inspection Road damage
6) Drainage gates Damage
7) Grass layer damage

D. Cliff Protector

1) Cliff protector structure damage
2) Cliff damage
3) Foundation damage
4) Change of top structure
5) Scour under the foundation

E. Krib/Jetty

1) Elevation decrease of top structure
2) Main structure damage
3) Foundation damage
4) Change of top structure
5) Water gates Structure Damage

2.2.5. Damage Rate Classification and Maintenance Plan

From the assessment of damage conditions can be determined classification of damage levels and types of physical structure maintenance based on damage conditions. Classification of structure physical condition adopted from Regulation of Minister of Public Works No. 12/2015, as follows:

1) Good condition if damage level <10% from initial condition of building / channel and required routine maintenance.
2) Small damaged condition if damage level 10 - 20% from initial condition of building / conduit and maintenance periodic maintenance is required
3) Medium damaged condition if damage level 21 - 40% from initial condition of building / channel and maintenance required repair.
4) The condition is heavy damaged if the damage level> 40% from the initial condition of the building / ducts and required heavy repair or replacement.

Implementation of physical maintenance of river structures aims to maintain the condition of the building concerned is always maintained so that it can function in accordance with its development goals.

The physical maintenance of river structures can be grouped into three categories of actions according to the hierarchy and the nature of the work, namely:

1) Preventive maintenance;
2) Corrective maintenance; and
3) Rehabilitative maintenance

The maintenance category of flood control facilities / infrastructure refers to the Director General of Water Resources Circular Letter No.05/2016, described below:

Periodic maintenance is done at different time intervals for each type of structure, eg every 1 month, 3 months, 6 months, 1 year, 2 years, or 3 years. In periodic maintenance there is also partly or partially replaced part of the river infrastructure component either because it has been damaged or because it has reached the replacement period as its manufacturer specified, for example door replacement, this plan is exempted for emergency repair work.

Emergency repairs are an instant act done in very urgent circumstances. This urgent work aims to deal with sudden damage in the event of an emergency against floods, landslides or earthquakes. Therefore, the quality of work is also temporary, for example to reduce or isolate the occurrence of escalation puddles, or to prevent the occurrence of worse conditions or harm the environment. After the flood event has subsided, this temporary work needs to be dismantled and planned for improvement based on corrective maintenance design principles that meet the normal standards of structure construction. In this recovery plan will be

discussed what items should be done to restore the condition of flood control structures. Recovery plans for flood control infrastructures that require improvement include the type and point of damage.

2.2.6. Determination of Priority for the Treatment and Handling of Damage

To overcome the damage problem of flood control structure may also be difficult to implement due to limited funds and resources. Therefore, it needs to be done with a scoring system by comparing a score number of the parameters of each building. A high value flood control structures means obtaining a priority in handling the damage.

The criteria for prioritizing the handling of flood control structures in accordance with the modified Building Works DGT Standards are described using the following tables:

Table 1 Damage quantities of water damage control structure

GRADE	SCORE
Damage factor structures	
>40 %	10
0,50 – 1,00 %	8
0,30 – 0,50 %	6
0,10 – 0,30 %	4
< 0,10 %	2
0%	0

Table 2 Financial and economic losses (economic factors)

AREA TYPE	SCORE
1. Industrial area	10
2. Trading area/market	9
3. Congested shopping area	8
4. Luxury residential area	7
5. Medium or moderate housing area or store	6
5. Low-income housing area or small shop or street vendors	5
7. Agricultural area	4
8. Vacant land	1

Table 3 Social disturbance (social factors)

URAIAN NILAI	SCORE
1. High/densely populated area	10
2. Medium population	7
3. Low population	4
4. Veryless (empty area)	2

Note:

1. Dense area, with density> 500 person / ha
2. Medium, with a density of 100 - 499 people / ha
3. Less, with a density of 50-100 people / ha
4. Very less, with a density of <50 people / ha

Table 4 Disruption to social service facilities (special factors)

SOCIAL SERVICE FACILITIES	EFFECT	SCORE
1.High if there are many social service facilities	High	10
2. Medium facilities	Medium	7
3. Low facilities	Low	4
4. Veryless (no social service facility)	Very low	2

Note:

1) Type and order / importance of social service facility:
   - Hospital
   - University / school building
   - Clinic
   - Worship place
   - Orphanage
   - Meeting / sports hall
   - Other means of social services.
2) In addition to the level of interest, the amount of each service facility affects the level of interference.

Table 5 Disruption to the smoothness of the government (political factor)

SOCIAL SERVICE FACILITIES	EFFECT	SCORE
1. High (there are many government offices, officials houses, main roads)	High	10
2. Medium facilities	Medium	7
3. Low facilities	Low	4
4. Veryless (no goverment facility)	Very low	1

Note:

Type and order or level of importance of supporting facilities for smooth running of government:

- vital government offices
- Other government offices
- House of the terrace officials
- House of other officials
- Archive storehouse
- Workshop / pool of official vehicles

Table 6 Disturbance to the flow of goods and services (traffic factor)

TRANSPORTATION FACILITIES	EFFECT	SCORE
1. High (there are many transport facilities with high density)	High	10
2. Medium facilities	Medium	7
3. Low facilities	Low	4
4. Veryless (no transportation facility)	Very low	1

Note:

1) Type and order of interest of supporting facilities for the smooth flow of goods and services:
   - Airfield with all amenities
   - Highway according to class or density
   - Workshop or pool of public transport vehicles
   - Gas station
   - Rail Road
   - Warehouse
2) In addition to the importance level, the number of each facility also affects the level of the disturbance.

The maintenance priorities above are determined by differentiating the scores and the values of each factor (a score scenario is created). Priority handling analysis using Scenario factor score/ scoring criteria can be illustrated in the table below:

Priority of maintenance or repair of water damage control facilities and infrastructure is obtained from the sorting of score from the largest to the smallest score, where the greater score get the highest priority.

Table 7 Scenario Score Determining Factor Priority Maintenance

SCORE	FACTOR A	FACTOR B	FACTOR C	FACTOR D	FACTOR E	FACTOR F	TOTAL
0	16.67	16.67	16.67	16.67	16.67	16.67	100.00
1	25.00	15.00	15.00	15.00	10.00	20.00	100.00
2	35.00	10.00	10.00	10.00	10.00	25.00	100.00
3	20.00	15.00	15.00	15.00	15.00	20.00	100.00
4	10.00	20.00	20.00	20.00	20.00	10.00	100.00
5	15.00	20.00	20.00	15.00	15.00	15.00	100.00

Note:

Factor A : water damage structures score
Factor B : economic factor score
Factor C : social factor score
Factor D : social facilities factor score
Factor E : political factor score
Factor F : traffic factor score

3. RESULTS AND DISCUSSION

3.1. Result Assessment of the river

Assessment of River Jangkok condition done by using criteria of river assessment are as follows:

Table 8 Assessment of Jangkok River Conditions

NO.	ASSESMENT ASPECT	PERFORMANCE VALUE (%)	CONDITION	DESCRIPTION
1	Water barriers	**90**	no barriers	floating objects exist but not interfere the water flow
2	River narrowing	**85**	no narrowing	a small cliff damage but does not interfere the river condition
3	Riverbed erosion	**65**	medium erosion	riverbed is eroded but has not reached the bedrock
4	Left bank landslides	**85**	low landslide	small landslide on left bank but not interfere the river conditions
5	Right bank landslides	**85**	low landslide	small landslide on right bank but not interfere the river conditions
6	Plants Density in the riverbanks	**85**	low density	grass and small plants are exist, but not disrupt the flow of water
7	Excavation activities in the river	**80**	No activity	No excavation activity
8	Riverbed sedimentation	**65**	medium	low sedimentation in then river bend area
9	The river boundary lines's laws	**90**	river boundary line regultion are	river boundary line regulation has not been established
10	Utilization of the river border area, outside the embankment	**60**	utilization under control	riverbank are utilizing as required
11	Estuary stream	**85**	flowing smoothly	river water level higher than sea level
12	Wastewater discharges	**85**	no wastewater discharges	waste disposal disrupts the quality of river water
Average condition		**80**		

From the assessment of the condition of the River Jangkok in general as mentioned above, it can be concluded that the river condition is still quite good, the existingproblems are generally erosion and sedimentation of the river basin.

3.2. Assessment result of physical condition, damage level classification and maintenance Plan of water damage control structures

The classification and maintenance plan of water damage controlling facility of Jangkok River refers to the Director General of Water Resources Circular Letter No. 05/2016. Recapitulation of condition, classification of damage level, and maintenance plan of flood controlling facility of Jawang River are presented as follows:

Table 9 Result Assessment of condition, classification of damage level, and maintenance plan of flood controlling facility of Jangkok River

(Left Side of River)

NO.	SECTION (KM)	INFRASTRUCTURES TYPE	LEVEL OF DAMAGE (%)	DAMAGE CLASSIFICATION	MAINTENANCE CATEGORY
1	-0 + 060 s/d 0 + 030	Estuary Structure Tetrapod Jetty	12.00	Small damage	periodic maintenance
2	0 + 030 s/d 0 + 520	Cliff Protector Paraffets and Masonry Structure	9.20	Good	Routine maintenance
3	0 + 520 s/d 0 + 660	flood embankment Embankment	14.00	Small damage	periodic maintenance
4	0 + 520 s/d 0 + 660	Cliff Protector Paraffets and Gabion	17.00	Small damage	periodic maintenance
5	0 + 660 s/d 1 + 560	flood embankment Embankment	6.67	Good	Routine maintenance
6	0 + 660 s/d 1 + 560	Cliff Protector Masonry Structure	8.00	Good	Routine maintenance
7	1 + 560 s/d 2 + 260	flood embankment Embankment	9.71	Good	Routine maintenance
8	1 + 560 s/d 2 + 260	Cliff Protector Gabion	9.80	Good	Routine maintenance
9	2 + 260 s/d 3 + 280	flood embankment Masonry Structure	18.17	Small damage	periodic maintenance
10	2 + 260 s/d 3 + 280	Cliff Protector Gabion	7.20	Good	Routine maintenance
11	3 + 280 s/d 3 + 360	Cliff Protector Masonry Structure	6.40	Good	Routine maintenance
12	3 + 635 s/d 4 + 080	Cliff Protector Gabion	8.80	Good	Routine maintenance
13	4 + 550 s/d 4 + 800	Cliff Protector Masonry Structure and gabion	12.00	Small damage	periodic maintenance
14	6 + 120	Riverbed Protector Groundsill	41.50	Small damage	Heavy Repair / Replacement
15	9 + 030	hydroelectric power plant Weir Weir	14.17	Small damage	periodic maintenance
16	10 + 250	Irrigation Weir Weir	19.33	Small damage	periodic maintenance

Right Side of River)

NO.	SECTION (KM)	INFRASTRUCTURES TYPE	LEVEL OF DAMAGE (%)	DAMAGE CLASSIFICATION	MAINTENANCE CATEGORY
1	-0 + 045 s/d 0 + 000	Estuary Structure Tetrapod Jetty	15.40	Small damage	periodic maintenance
2	0 + 000 s/d 0 + 020	flood embankment concrete	2.40	Good	Routine maintenance
3	0 + 020 s/d 0 + 520	flood embankment Masonry Structure	4.80	Good	Routine maintenance
4	0 + 520 s/d 0 + 660	flood embankment Embankment	10.57	Small damage	periodic maintenance
5	0 + 520 s/d 0 + 660	Cliff Protector Paraffets and Gabion	13.80	Small damage	periodic maintenance
6	0 + 660 s/d 1 + 290	flood embankment Embankment	22.14	Medium Damage	Periodic Maintenance / Repair
7	0 + 660 s/d 1 + 290	Cliff Protector Masonry Structure	24.60	Medium Damage	Periodic Maintenance / Repair
8	1 + 290	flow steering Crib	23.00	Medium Damage	Periodic Maintenance / Repair
9	1 + 290 s/d 1 + 430	flood embankment Embankment	10.71	Small damage	periodic maintenance
10	1 + 290 s/d 1 + 430	Cliff Protector Paraffets and Gabion	6.60	Good	Routine maintenance
11	1 + 430 s/d 1 + 910	Cliff Protector Gabion	9.20	Good	Routine maintenance
12	2 + 260 s/d 3 + 280	flood embankment Embankment	8.86	Good	Routine maintenance
13	2 + 260 s/d 3 + 280	Cliff Protector Masonry Structure	7.40	Good	Routine maintenance
14	3 + 280 s/d 3 + 345	Cliff Protector Gabion	8.40	Good	Routine maintenance
15	3 + 705 s/d 4 + 080	Cliff Protector Gabion	7.80	Good	Routine maintenance
16	4 + 160 s/d 4 + 270	Cliff Protector Gabion	16.40	Small damage	periodic maintenance
17	4 + 240	flow steering Crib	10.20	Small damage	periodic maintenance
18	4 + 280	flow steering Crib	7.40	Good	Routine maintenance
19	6 + 180	Riverbed Protector Groundsill	42.13	Heavy Damage	Heavy Repair / Replacement
20	8 + 690	hydroelectric power plant Weir Weir	14.17	Small damage	periodic maintenance
21	9 + 920	Irrigation Weir Weir	19.33	Small damage	periodic maintenance

3.3. Priority Maintenance

From the audit results of the damage condition of water damaged structures should be prepared a priority scale of handling damages / maintenance efforts of river facilities / infrastructure in order to be compiled a schedule of maintenance and improvement implementation in accordance with the level of urgency.

Table 10 Scoring with scenario of water damage control structures in left side of Jangkok River

INFRASTRUCTURE CODE	TOTAL OF SCORE 0	PRIORITY SCALE	TOTAL OF SCORE 1	PRIORITY SCALE	INFRASTRUCTURE CODE	TOTAL OF SCORE 2	PRIORITY SCALE	TOTAL OF SCORE 3	PRIORITY SCALE	INFRASTRUCTURE CODE	TOTAL OF SCORE 4	PRIORITY SCALE	TOTAL OF SCORE 5	PRIORITY SCALE
1	2	3	4	5	1	6	7	8	9	1	10	11	12	13
1	31	II	34.8	II	1	31.8	II	35.7	II	1	39.6	II	37.8	II
2	35	II	33.6	II	2	30.3	II	34.2	II	2	36.6	II	36	II
3	44	II	42.9	II	3	41.4	II	43.8	II	3	44.4	II	44.4	II
4	44	II	42.9	II	4	41.4	II	43.8	II	4	44.4	II	44.4	II
5	45	I	40.8	II	5	36.3	II	43.2	II	5	48.6	I	45.3	I
6	45	I	40.8	II	6	36.3	II	43.2	II	6	48.6	I	45.3	I
7	46	I	42.6	II	7	39.6	II	45	I	7	48	I	46.5	I
8	46	I	42.6	II	8	39.6	II	45	I	8	48	I	46.5	I
9	41	II	39.3	II	9	36.9	II	40.2	II	9	42.6	II	41.7	II
10	33	II	30.9	II	10	26.4	III	31.5	II	10	36	II	34.5	II
11	33	II	30.9	II	11	26.4	III	31.5	II	11	36	II	34.5	II
12	33	II	30.9	II	12	26.4	III	31.5	II	12	36	II	34.5	II
13	35	II	33.9	II	13	30.6	II	33.9	II	13	37.2	II	36.3	II
14	41	II	44.7	II	14	48.6	I	42.9	II	14	37.2	II	40.8	II
15	34	II	31.2	II	15	30	II	33	II	15	36	II	32.4	II
16	34	II	31.2	II	16	30	II	33	II	16	36	II	32.4	II
TOTAL	620		594		TOTAL	552		611.4		TOTAL	655.2		633.3	

Table 11 Scoring with scenario of water damage control structures in Right Side of Jangkok River

INFRASTRUCTURE CODE	TOTAL OF SCORE 0	PRIORITY SCALE	TOTAL OF SCORE 1	PRIORITY SCALE	INFRASTRUCTURE CODE	TOTAL OF SCORE 2	PRIORITY SCALE	TOTAL OF SCORE 3	PRIORITY SCALE	INFRASTRUCTURE CODE	TOTAL OF SCORE 4	PRIORITY SCALE	TOTAL OF SCORE 5	PRIORITY SCALE
1	2	3	4	5	1	6	7	8	9	1	10	11	12	13
1	28	III	30.3	II	1	28.2	III	30.3	II	1	32.4	II	32.4	II
2	27	III	24.3	III	2	19.8	III	25.5	III	2	30	II	28.8	III
3	30	II	26.1	III	3	21.6	III	28.2	III	3	33.6	II	31.5	II
4	41	II	39.3	II	4	36.9	II	40.2	II	4	42.6	II	42.6	II
5	44	II	42.9	II	5	41.4	II	43.8	II	5	44.4	II	45.3	I
6	42	II	43.2	II	6	43.2	II	42.6	II	6	40.8	II	43.2	II
7	42	II	43.2	II	7	43.2	II	42.6	II	7	40.8	II	43.2	II
8	36	II	36.9	II	8	36.9	II	36.3	II	8	35.4	II	36.9	II
9	37	II	36.6	II	9	34.5	II	36.6	II	9	37.8	II	37.8	II
10	36	II	34.5	II	10	30.9	II	35.1	II	10	37.8	II	37.2	II
11	33	II	30.9	II	11	26.4	III	31.5	II	11	36	II	34.5	II
12	40	II	37.2	II	12	33.3	II	38.7	II	12	42.6	II	41.1	II
13	40	II	37.2	II	13	33.3	II	38.7	II	13	42.6	II	41.1	II
14	27	III	25.5	III	14	22.8	III	26.1	III	14	28.8	III	28.2	III
15	33	II	30	II	15	26.4	III	31.5	II	15	36	II	33.6	II
16	41	II	39.3	II	16	36.9	II	40.2	II	16	42.6	II	41.7	II
17	38	II	35.7	II	17	32.4	II	36.6	II	17	40.8	II	39	II
18	36	II	32.7	II	18	28.2	III	34.2	II	18	39.6	II	37.2	II
19	29	II	34.8	II	19	41.4	II	32.1	II	19	22.8	III	27.9	III
20	36	II	36.6	II	20	36.6	II	36.6	II	20	34.8	II	36.6	II
21	17	III	18.6	III	21	19.8	III	17.7	III	21	15.6	III	17.1	III
TOTAL	733		715.8		TOTAL	674.1		725.1		TOTAL	757.8		756.9	

4. CONCLUSIONS

From the result of technical audit analysis, Flood Control Structures of Jangkok River can be concluded several things as follows:

a. Assessment of damage conditions and structures performance level refers to the assessment criteria of each structure such as crib, cliff reinforcement, flood embankment, weir grounds and Jetty. The assessment of the structure on the left Jangkok river with a minimum damage of 6.4% and a maximum of 42.13%, to the right of 2.4% and a maximum of 42.13%. Maximum damage is found in groundsill.

b. The results of the assessment of the condition of each building vary, consisting of good conditions, minor damage, moderate damage and severe damage. As for the main priority in the calculation, namely at building numbers 5, 6, 7, and 8 on the right side of the Jangkok river, in the form of cliff and flood embankment.

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