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Analysis of Maintenance and Maintenance Management of Gets Hotel Semarang Building Plumbing and Sanitation Utility Components

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Abstract:- In commercial buildings such as hotel buildings, regular maintenance of each component is required to maintain the quality of service, especially in the supply of clean water. The Gets Hotel Semarang building has various plumbing and sanitary components including pumps, water tanks, filter tanks, water heaters, and sanitary fittings. Each of these components is related to the comfort of building users so that regular care and maintenance is required. However, maintenance of plumbing components and clean water sanitation was not scheduled, resulting in complaints from guests about the condition of the components that were not qualified. This study was conducted to analyze maintenance management of plumbing and sanitation components. Research results include; The booster pump P4 gets a value of 20% in a damaged condition and requires rehabilitative maintenance, the H7 and H9 water heaters get a performance value of 75% each in a slightly damaged condition due to a leak in the installation pipe. Based on these results, a schedule and plan for daily and preventive maintenance of components and standard maintenance procedures (SOP) are prepared in accordance with the Regulation of the Minister of Public Works Number 24 of 2008 concerning Guidelines for the Maintenance and Care of Buildings and referring to the related component maintenance manual. A maintenance budget plan is also prepared which is composed of a budget for purchasing sanitation components and a budget for utility maintenance services with a total value of IDR 66,222,000.

Keywords:- *Maintenance, Components, Plumbing, Sanitation.*

I. INTRODUCTION

Gets Hotel is one of the hotels located in the city of Semarang and began operating in 2016. As the age of the building increases, efforts to extend the operating period and maintain performance so that it remains functional need to be carried out both in the building and the infrastructure or utilities in it. the building. Therefore the implementation of regular and structured maintenance and maintenance management needs to be implemented. Maintenance and maintenance is the main key to maintaining the performance or quality of plumbing and sanitary components is maintained. In addition, maintenance measures can reduce the risk of damage requiring major repair or replacement.

Based on the activity report of the Gets Hotel Engineering Department, there were one hundred and thirty-two complaints from building users within six months regarding the sanitation component that did not meet expectations. For a business establishment with the aim of attracting as many visitors as possible, the amount of utility damage will affect visitor interest and engagement. This figure is due to the fact that a series of maintenance activities for plumbing and sanitation components has not yet been arranged.

Research on physical conditions and functions aims to obtain field data regarding plumbing and sanitary components. So that it can determine the existing condition of components related to research objectives intended to find damage to sanitary components, and determine standard operating procedures (SOP), as well as prepare maintenance schedules for plumbing and sanitation components according to applicable regulations. The preparation of schedules and standard operating procedures (SOP) aims to ensure that the control process for maintenance activities can be carried out centrally, a maintenance budget plan is also prepared based on component damage reports that can be used as a reference for the budget for the Engineering Department of Gets Hotel Semarang.

II. LITERATURE REVIEW

Regulation of the Minister of Public Works Number 24/PRT/M/2008 concerning Guidelines for the Maintenance and Maintenance of Buildings states that, “Building maintenance is an activity to maintain the reliability of buildings and their infrastructure and facilities so that buildings are always fit for function. Building maintenance is the activity of repairing and/or replacing building parts, components, building materials, and/or infrastructure and facilities so that the building remains functional."

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Hestin Mulyandari and Rully Adi Saputra in a book entitled Building Maintenance: Basic Skill Facility Management, state that building maintenance is not aimed at increasing the capability or capacity of a system or tool above its maximum capability, building maintenance is to prevent the building from any damage.

The author uses visual and performance assessment methods with related parties to obtain quantitative values from the components of the plumbing and sanitation utilities reviewed. The author makes a field assessment form that aims to assess physical conditions and functional conditions, the author also prepares a condition index scale table based on the building condition index scale table as a translation of data in the form of descriptions of physical conditions into data in the form of percentages.

Assessment of physical condition and function will be carried out on the components of the plumbing and sanitation utilities under review, so that the results obtained from the observations and assessments whether the components under review require routine, preventive, corrective or rehabilitative maintenance. The classification of these actions is based on the module issued by the Ministry of PUPR's Center for SDA and Construction Education which can be seen in the table below.

Table 1 Maintenance Indicators

No.	Damage Percentage	Condition	Outine Maintenance
1	< 10%	Good	maintenance
2	10% - 20%	lightly damaged	light repair
3	21%- 40%	medium damaged	major repair/replacement (rehabilitative)
4	>40%	heavily damaged	outine maintenance

(Source: Module Issued by the Ministry of PUPR's Center for SDA and Construction)

The following is a condition index scale table compiled with the building manager based on a modification of the building condition index scale table according to Greimann, et al (1997).

Table 2 Building Condition Index Scale

Zone	Condition Index	Condition Description	Handling Measures
1	85 – 100	Very Good : No visible damage	Immediate action is still not needed
	70–84	Good: Only minor deterioration or damage occurs	
2	55 – 69	Moderate : Starting to occur deterioration or damage but does not affect the function of the building structure as a whole	It is necessary to make an economic analysis of alternative improvements to determine appropriate/appropriate actions
	40–54	Adequate : Deterioration or damage occurs but the building is still functional	
3	25 – 39	Bad: Critical enough damage occurs so that the function of the building is disrupted	Detailed evaluation is required to determine corrective, rehabilitation and reconstruction actions.
	10 – 24	Very Bad : Damage is severe and the building is barely functional	
	0 - 9	Collapse : The main component of the building collapses	

(Source: Greimann, et al, 1997)

Table 3 Physical Condition Index Scale

Zone	Condition Index	Levels	Condition Description	Handling Measures
1	100% - 80%	Good	No visible damage, stains appear due to repeated use.	Quick action is not necessary
2	79% - 60%	Enough	There is visible minor damage due to age and use, visible damage to utility parts which causes a decrease in aesthetics.	It is necessary to carry out an economic analysis to determine the appropriate course of action and treatment of various alternatives
3	59% - 0%	Bad	There is serious damage to several parts. There was total damage to the physical utility to cause malfunctions.	Evaluation details are needed to determine corrective actions

(Source: Author)

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Table 4 Function Condition Index Scale

Zone	Condition Index	Levels	Condition Description	Handling Measures
1	100% - 80%	Good	Function optimally, no damage occurs, signs of aging and use appear	Quick action is not necessary
2	79% - 60%	Enough	There is a decrease in function, appears due to the influence of age and use, does not significantly affect utility functions, minor damage occurs causing disruption of utility functions.	It is necessary to carry out an economic analysis to determine the appropriate course of action and treatment of various alternatives
3	59% - 0%	Bad	There is serious damage to some parts, but basic functions are still operational. A total crash occurred which rendered the utility completely unusable.	Evaluation details are needed to determine corrective actions

(Source: Author)

III. RESEARCH METHODS

A. *Data Collection*

The research was conducted by collecting data from the field or building managers related to the plumbing and sanitation utility components at the Gets Hotel Semarang Building. This data can be used as a basis for research because it is valid and can be accounted for. The data obtained include:

➢ *Primary Data*

- Table data (form) assessment of the physical condition and function of utility components.
- Data from interviews regarding information on the implementation of maintenance activities for plumbing and sanitation utility components.
- Research object documentation data.
- Installation plan of plumbing and sanitary components.

➢ *Secondary Data*

- Related laws and regulations
- Related journals/studies
- Guide book / manual book of related equipment.

B. *Research Procedure*

The research was conducted on the building's plumbing and sanitary utility components which fall within the boundaries reviewed by the authors. The following is the flow of research conducted:

➢ *Assessment of Physical Condition*

Assessment of the physical condition of the plumbing and sanitation utility components with concrete evidence in the form of documentation taken when carrying out direct inspections.

➢ *Assessment of Functional Conditions*

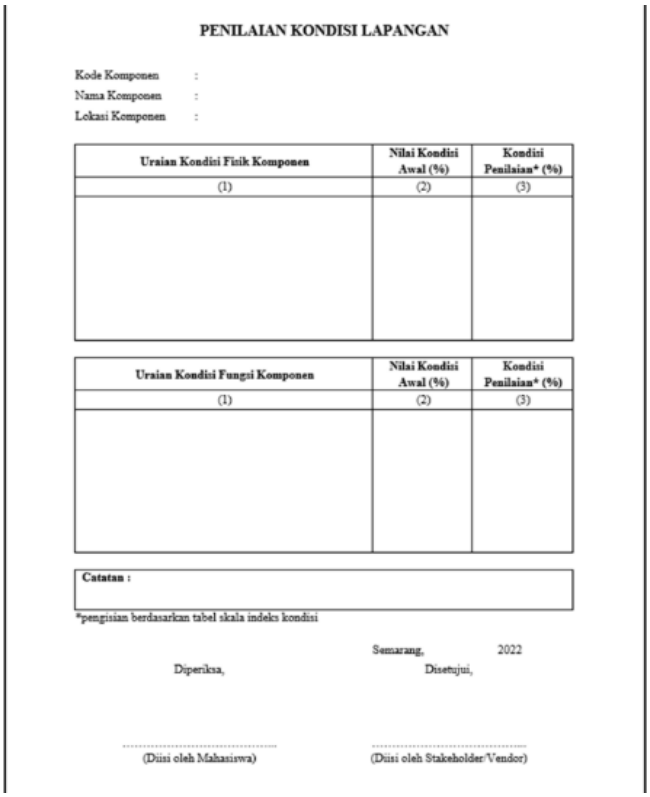
Assessment of functional conditions is carried out directly by observing the parameters in the form of a component's performance. So that in carrying out the assessment it is important to communicate with the building manager so that the data obtained is accurate.

➢ *Determination of Physical Weight and Function*

The physical and functional assessment weights are determined directly by the building manager who has knowledge and experience in the field. The weight of the physical assessment is based on the condition of the observed components. While the weight of the function assessment is based on component performance when compared to new conditions. Each physical and functional assessment weight affects the total performance value of a component of plumbing and sanitary utilities.

➢ *Compilation of Assessment Tables*

The assessment table is the table that will be used when the authors together with the building manager evaluate the physical condition and function of the plumbing and sanitation utility components to be examined. The following is the assessment form used.



PENILAIAN KONDISI LAPANGAN

Kode Komponen :
Nama Komponen :
Lokasi Komponen :

Uraian Kondisi Fisik Komponen	Nilai Kondisi Awal (%)	Kondisi Penilaian* (%)
(1)	(2)	(3)

Uraian Kondisi Fungsi Komponen	Nilai Kondisi Awal (%)	Kondisi Penilaian* (%)
(1)	(2)	(3)

Catatan :

*pengisian berdasarkan tabel skala indeks kondisi

Semarang, 2022

Diperiksa, Disetujui,

(Diisi oleh Mahasiswa) (Diisi oleh Stakeholder/Vendor)

Fig 1 Field Condition Assessment form
(Source: Author)

➢ *Data Analysis*

The data that has been collected from each component that is reviewed is then analyzed using the following formula:

- **$Si = (Ai_{function} \times Pi_{functional} \times Bi_{funtion}) + (Ai_{physical} + Pi_{physical} + Bi_{physical})$**
- Information :
- Si = Total (%)
- Ai = Initial Conditions (%)
- Pi = Rating Condition (%)
- Bi = Weight (%)

After obtaining the final score or total performance of the plumbing and sanitation utility components, the next step is to choose follow-up maintenance activities based on the selected score.

IV. RESULTS AND DISCUSSION

C. Evaluation of Component Conditions

Based on the assessment of the condition of the components that have been carried out by the authors together with the building manager on each component of the plumbing and sanitation utilities, a performance value is obtained and a decision on the action that must be taken. The following is an evaluation table for the condition of the plumbing and sanitation utility components at the Gets Hotel Semarang Building.

Table 5 Component Condition Assessment Results

No. Component Code	Component Name	Evaluation	Condition Value (%)	Weight (%)	Performance	Total	Decision
(1)	(2)	(3)	(4)	(5)	(6 = 4 x 5)	(7)	(8)
P1	Transfer Pump	Physique	85	50	42,5	82,5	preventive
		Function	70	50	35		
P2	Transfer Pump	Physique	100	50	50	100	Routine
		Function	100	50	50		
P3	Cold Water Booster Pump	Physique	95	50	47,5	92,5	Routine
		Function	90	50	45		
P4	Cold Water Booster Pump	Physique	40	50	20	20	Rehabilitative
		Function	0	50	0		
P5	Hot Water Booster Pump	Physique	90	50	45	90	preventive
		Function	90	50	45		
P6	Hot Water Booster Pump	Physique	90	50	45	90	preventive
		Function	90	50	45		
P7	Hot Water Booster Pump	Physique	90	50	45	90	preventive
		Function	90	50	45		
P8	Hot Water Booster Pump	Physique	90	50	45	90	preventive
		Function	90	50	45		
F1	Filter Tank	Physique	90	50	45	92,5	Routine
		Function	95	50	47,5		
F2	Filter Tank	Physique	90	50	45	92,5	Routine
		Function	95	50	47,5		
T1	Water tank	Physique	85	50	42,5	92,5	Routine
		Function	100	50	50		
T2	Water tank	Physique	85	50	42,5	92,5	Routine
		Function	100	50	50		
T3	Water tank	Physique	85	50	42,5	92,5	Routine
		Function	100	50	50		
T4	Water tank	Physique	85	50	42,5	92,5	Routine
		Function	100	50	50		
T5	Water tank	Physique	85	50	42,5	92,5	Routine
		Function	100	50	50		
T6	Water tank	Physique	85	50	42,5	92,5	Routine
		Function	100	50	50		
T7	Water tank	Physique	85	50	42,5	92,5	Routine
		Function	100	50	50		
T8	Water tank	Physique	85	50	42,5	92,5	Routine
		Function	100	50	50		
T9	Water tank	Physique	85	50	42,5	92,5	Routine

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No. Component Code	Component Name	Evaluation	Condition Value (%)	Weight (%)	Performance	Total	Decision
(1)	(2)	(3)	(4)	(5)	(6 = 4 x 5)	(7)	(8)
		Function	100	50	50		
T10	Water tank	Physique	85	50	42,5	92,5	Routine
		Function	100	50	50		
H1	*Water heater*	Physique	90	50	45	92,5	Routine
		Function	95	50	47,5		
H2	*Water heater*	Physique	90	50	45	92,5	Routine
		Function	95	50	47,5		
H3	*Water heater*	Physique	90	50	45	92,5	Routine
		Function	95	50	47,5		
H4	*Water heater*	Physique	90	50	45	92,5	Routine
		Function	95	50	47,5		
H5	*Water heater*	Physique	90	50	45	92,5	Routine
		Function	95	50	47,5		
H6	*Water heater*	Physique	90	50	45	92,5	Routine
		Function	95	50	47,5		
H7	*Water heater*	Physique	90	50	45	75	Corrective
		Function	60	50	30		
H8	*Water heater*	Physique	90	50	45	92,5	Routine
		Function	95	50	47,5		
H9	*Water heater*	Physique	90	50	45	75	Corrective
		Function	60	50	30		
H10	*Water heater*	Physique	90	50	45	92,5	Routine
		Function	95	50	47,5		
H11	*Water heater*	Physique	90	50	45	92,5	Routine
		Function	95	50	47,5		
H12	*Water heater*	Physique	90	50	45	92,5	Routine
		Function	95	50	47,5		
H13	*Water heater*	Physique	90	50	45	92,5	Routine
		Function	95	50	47,5		
H14	*Water heater*	Physique	90	50	45	92,5	Routine
		Function	95	50	47,5		
H15	*Water heater*	Physique	90	50	45	92,5	Routine
		Function	95	50	47,5		
H16	*Water heater*	Physique	90	50	45	92,5	Routine
		Function	95	50	47,5		
S1	Sink	Physique	85	50	42,5	82,5	preventive
		Function	80	50	40		
S2	*Shower*	Physique	80	50	40	85	preventive
		Function	90	50	45		
S3	toilet	Physique	80	50	40	85	preventive
		Function	90	50	45		
S4	Urinal	Physique	95	50	47,5	92,5	Routine
		Function	90	50	45		
S5	Water faucet	Physique	90	50	45	95	Routine
		Function	100	50	50		
S6	*Kitchen Sinks*	Physique	85	50	42,5	92,5	Routine
		Function	100	50	50		

(Source: Field Observation)

D. Scheduling Maintenance and Maintenance Activities

Preparation of a schedule for periodic inspection activities as well as maintenance and care activities based on the time set by the author taking into account the conditions of the Gets Hotel Semarang Building and the Minister of Public Works Regulation Number 16/PRT/M/2010 concerning Technical Guidelines for Periodic Building Inspection of Buildings. The timeframe decision taken by the author considers several things, including:

- The possibility of complaints from users (users);
- The possibility of damage and actions that require direct handling;
- Sanitary equipment maintenance activities in guest rooms are carried out together with a predetermined room maintenance schedule;
- The activities carried out are of course sustainable with the costs that will be incurred.

The following is a decision on the time span of inspection activities as well as maintenance and maintenance activities determined by the author.

Table 6 Schedule of Periodic Inspection Activities

No.	Items	Volume		Periodic Inspection
I	**Pump**			
1	Transfer Pump	2	Units	3 months
2	Cold Water Booster Pump	2	Units	3 months
3	Hot Water Pump	2	Units	3 months
4	Hot Water Return Pump	2	Units	3 months
II	**Water heaters**			
1	*Water heater*	16	Units	6 months
III	**Water Manager**			
1	Water tank	10	Units	1 months
2	Filter Tank	2	Units	1 months
IV	**Sanitary Equipment**			
1	Sink	195	Units	3 months
2	*bath shower*	185	Units	3 months
3	toilet	202	Units	3 months
4	Urinal	7	Units	3 months
5	Water faucet	17	Units	3 months
6	*Kitchen Sinks*	12	Units	3 months

(Source: Author)

The maintenance and maintenance of plumbing and sanitary utility components requires an appropriate and structured Time Schedule. The following is a maintenance and maintenance activity plan for the Plumbing and Sanitary Utilities components of Gets Hotel Semarang for twelve months in 2023.

Table 7 Maintenance Master Plan

No	Items	Tahun 2023											
		Jan	Feb	Mar	Apr	Mei	Jun	Jul	Ags	Sep	Okt	Nov	Des
I	Pump												
1	Transfer Pump												
2	Cold Water Booster Pump												
3	Hot Water Pump												
4	Hot Water Return Pump												
II	**Water heaters**												
1	*Water Heater*												
III	**Water Manager**												
1	Water tank												
2	Filter Tank												
IV	**Sanitary Equipment**												
1	Sink												
2	*bath shower*												
3	toilet												
4	Urinal												
5	Water faucet												
6	Kitchen Sink												

(Source: Author)

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E. Improvement of Maintenance and Maintenance Organizational Performance

The organization of maintenance of plumbing and sanitary utility components follows the organizational structure of the engineering department (Engineering Department) of Gets Hotel Semarang which was previously formed. In a department there is a Chief Engineer, a supervisor (Engineering Supervisor), and five technicians (Engineer). The following is the organizational structure of the Gets Hotel Semarang Engineering Department.

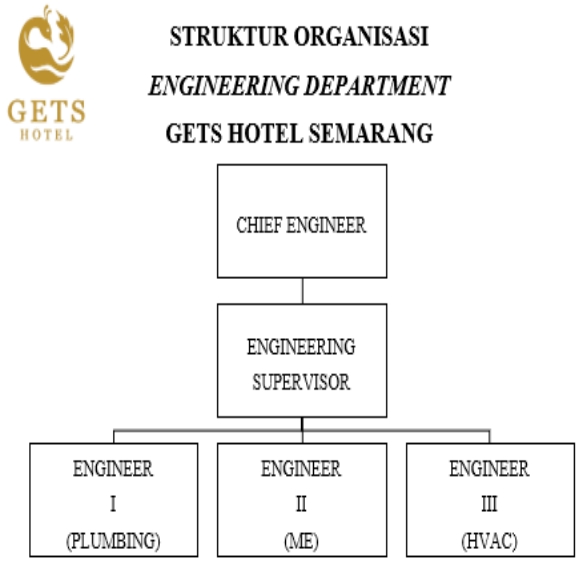

Fig 2 Organizational Structure of Engineering Department Gets Hotel Semarang
(Source: Gets Hotel Semarang Archive)

Even though there is a division of labor, maintenance and care are still not optimal because there is a lot of damage and complaints from visitors. Therefore, the authors suggest adding experts in their fields or providing training to engineers so that they have competency skills/skills in the field of building maintenance and maintenance in accordance with their fields.

F. Formation of Maintenance and Care SOPs

Standard operational procedure, abbreviated as SOP, is a daily operational reference that forms the basis for workers to carry out work. The author divides it into two types, namely daily SOP and preventive SOP.

Daily SOPs are SOPs that are used as a reference for carrying out operations related to daily use and what must be done on a daily basis from the components under review. Meanwhile, preventive SOPs are SOPs that are used as an operational reference for carrying out maintenance that aims to find problems that occur before they develop into more serious problems. The following are daily SOPs and preventive SOPs for plumbing and sanitation utility components at Gets Hotel Semarang which are based on Minister of Public Works Regulation No. 24 of 2008 concerning Guidelines for the Maintenance and Maintenance of Buildings and the manual book of related components.

➢ *Water Tank*
The daily SOPs carried out include:

- *Visual inspection of the condition of the tank*
- *Checking the quality of water*
- *Inspection of pipe installation*

- *Preventive SOPs Carried Out Include:*

✓ *Cleaning the surface of the water tank and the surrounding area*
✓ *Checking for pipeline leaks*
✓ *Cleaning/draining the inside of the water tank*

➢ *Filter Tank*
The daily SOPs carried out include:

- *Visual inspection of the condition of the filter tank*
- *Checking the quality of water*

- *Preventive SOPs Carried Out include:*

✓ *Cleaning of the surface of the filter tank and the surrounding area*
✓ *Replacement of the filter tank media*

➢ *Water Pump*
The Daily SOPs Carried Out Include:

- *Visually Check the Condition of the Pump*
- *Clean Water Pump Trip Alarm Check*

- *Preventive SOPs Carried Out Include:*

✓ *Cleaning of the pump and the surrounding area*
✓ *Checking for pipeline leaks*
✓ *Pump control panel cleaning*
✓ *Checking the condition of the pump by the vendor*

➢ *Water Heaters*
The Daily SOPs Carried Out Include:

- *Turn on/off the water heater based on the number of visitor needs*
- *Visual inspection of the water heater*
- *Inspection of pipe installation and water heater electricity*

- *Preventive SOPs Carried Out Include*:

✓ *Examination of the inside of the water heater tube*
✓ *Cleaning the inside of the water heater tube*
✓ *Repairs to loose or leaking flexible hose installations*
✓ *Service or repair of the water heater every four years*

➢ *Sink*
The Daily SOPs Carried Out Include:

- *Visual inspection of washbasins and faucets*
- *Cleaning the surface of the sink tub using soap or other cleaners that do not cause rust*
- *Cleaning the remaining water using a cloth wipe*

- *Preventive SOPs Carried Out Include:*

✓ *Cleaning scale and rust on water faucets using acid or WD-40, Brasso, and other lubricants*
✓ *Cleaning the crusted and yellowed sink surface using porcelain cleaning fluid*
✓ *Cleaning scale and rust on the drain pipe using acid or WD-40 liquid, and Brasso*
✓ *Cleaning the dirt that clogs the drain by releasing the drain and then removing the dirt in it.*

➢ *Showers*
The Daily SOPs Carried Out Include:

- *Visual inspection of the shower and water faucets*
- *Cleaning the shower surface using soap or other cleaners that do not cause rust*
- *Cleaning the remaining water that sticks using a cloth wipe*

- *Preventive SOPs Carried Out Include:*

✓ *Cleaning scale and rust on water faucets using acid or WD-40, Brasso, and other lubricants.*
✓ *Clean the scale and rust on the shower using acid or WD-40, Brasso, and other lubricants*
✓ *Reconnect the loosened joints using sealtape so that no leaks occur*
✓ *Repairs to the old water faucet are carried out by re-tightening the faucet lever using pliers or other tools. If conditions do not allow it to be replaced with a new faucet.*

➢ *Toilet*
The daily SOPs carried out include:

- *Visual inspection of the toilet / toilet*
- *Clean the remaining water that sticks to the toilet and the flexible hose using a cloth wipe, such as a kanebo cloth*

- *Preventive SOPs Carried Out Include:*

✓ *Cleaning the toilet using porcelain cleaning fluid*
✓ *Cleaning the inside of the toilet water tank using porcelain cleaning fluid and scrubbing until clean.*
✓ *Check for leaks, and smooth disposal, as well as the function of the toilet flush button.*
✓ *Cleaning scale and rust on flexible hoses using acid or WD-40, and Brasso.*
✓ *Surface scrubbing with jet spray to remove stains*
✓ *If there is a leak at the flexible hose or jet spray connection, then reconnect with the help of sealtape.*

➢ *Urinals*
The Daily SOPs Carried Out Include:

- *Visual inspection of the urinal*
- *Cleaning the urinal by scrubbing the surface and then dousing it with clean water in the afternoon/after the event is over.*
- *Cleaning the remaining stagnant water on the top surface of the urinal*

- *Preventive SOPs Carried Out Include:*

✓ *Examination of the physical condition and function of the urinal components*
✓ *Flushing the drain using warm water*
✓ *Cleaning the urinal drain if the drain is blocked*

➢ *Water Faucet*
The daily SOPs carried out include:

- *Visual inspection of the condition of the water faucet*
- *Cleaning of water stains on the surface of water faucets located in public areas*
- *Turn off the water faucet when not in use*

- *Preventive SOPs Carried Out Include:*

✓ *Examination of the physical condition and function of faucets in public areas*
✓ *Cleaning stubborn stains attached to the faucet*
✓ *Cleaning the faucet using lubricant to remove scale or rust*

➢ *KitchenSink*
The daily SOPs carried out include:

- *Visually check the condition of the sink*
- *Cleaning the dirt that sticks to the sink*
- *Cleaning the remaining water attached to the surface of the tub*
- *Disposal of impurities left on the filter*

- *Preventive SOPs Carried Out Include:*

✓ *Examination of the physical condition and function of the washbasin*
✓ *Patching if there is a leak in the tub*
✓ *Cleaning of garbage that clogs the sewer*
✓ *Replacement of dirt filter in case of damage*

G. RAB Maintenance

The budget plan is prepared using daily engineering reports or daily activity reports from the Gets Hotel Semarang Engineering Department for the 2022 period. Determination of the volume of materials needed is based on the highest data on the amount of damage resulting in replacement each month. Whereas for components that are damaged less than 2 per month, the management (Engineering Department) makes a decision on the volume of material requirements = 10% x **Σ** Utility Components. The following is a table of the number of component

replacements that occurred at Gets Hotel Semarang for the period January - June.

Table 8 Number of Component Replacements

No	Component Name	Number of Component Replacements						Conclusion
		Jan	Feb	Mar	Apr	Mei	Jun	
1	**Sink**							
	Sink Faucet	-	1	-	-	2	2	2
	Close the Sewer	2	1	-	-	-	-	2
	Goose neck	-	1	-	1	-	-	2
	Stop Sink Faucet	-	-	-	-	-	-	2
	Sink Flexible Hose	-	-	-	-	-	-	2
2	***Kitchen Sinks***							
	Kitchen Sink Faucet	2	-	-	1	-	-	2
3	***Shower***							
	Shower Faucet	-	-	-	-	-	1	2
	Shower head	1	2	1	1	4	1	4
4	**Toilet**							
	JetSpray	5	2	1	2	5	5	5
	Jet Spray Hose	1	-	5	1	1	3	5
	T Closet Faucet	1	-	3	3	-	3	3
	Stop the toilet faucet	-	-	-	1	-	1	2
	Closet Flexible Hose	-	-	-	-	-	-	2
	Toilet Flush Button	-	-	-	-	-	-	2
5	**Water Faucet**							
	Faucet	-	-	-	2	1	2	2

(Source: Daily Report Engineering Department)

Table 9 Maintenance Cost Budget Plan

NO	DESCRIPTION	VOL.	SAT.	UNIT PRICE	TOTAL
A	**MATERIALS**				
1	Sink Faucet ½”	24	units	IDR 250.000	IDR 6.000.000
2	Afur Press Sink Siphon (plug)	24	units	IDR 80.000	IDR 1.920.000
3	Sink Goose Neck 1”	24	units	IDR 100.000	IDR 2.400.000
4	½” Sink Faucet Stop	24	units	IDR 50.000	IDR 1.200.000
5	Stainless Steel Sink Flexible Hose 40 cm ½”	24	units	IDR 30.00	IDR 720.000
6	Kitchen Sink Faucet ½”	24	units	IDR 100.000	IDR 2.400.000
7	Toto Planting Shower Faucet TX405SDN ½”	24	units	IDR 890.000	IDR 21.360.000
8	SW06 ½” Wall Mounted Shower Head	48	units	IDR 110.000	IDR 5.280.000
9	*Jet Washer Toilet 120 cm ½”*	60	units	IDR 120.000	IDR 7.200.000
10	Nipple T Toilet Faucet ½”	36	units	IDR 22.000	IDR 792.000
11	½” Closet Faucet Stop	24	units	IDR 60.000	IDR 1.440.000
12	40 cm ½” Closet Flexible Hose	60	units	IDR 50.000	IDR 3.000.000
13	Bidet Flush Button	24	units	IDR 25.000	IDR 600.000
14	Drain Anti-Clog Powder (800 gram)	3	bottle	IDR 40.000	IDR 120.000
15	½” Water Faucet	24	units	IDR 25.000,00	IDR 600.000
16	*Safety Valve Water heater* ½”	16	pcs	IDR 40.000	IDR 640.000
17	Water heater flexible hose 30 cm ½”	32	units	IDR 40.000	IDR 1.280.000
18	*Seal Tape 10 m½”*	1	dus	IDR 240.000	IDR 240.000
19	Descaling Liquid (250 ml)	40	bottle	IDR 40.000	IDR 1.600.000
20	Rust Remover Liquid (100 ml)	40	bottle	IDR 35.000	IDR 1.400.000
21	*Clear Color Sealant (300 ml)*	24	pcs	IDR 45.000	IDR 1.080.000
B	**SERVICE**				

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NO	DESCRIPTION	VOL.	SAT.	UNIT PRICE	TOTAL
1	Inspection of Water Pumps 8 units (idr 75,000 / unit)	4	inspection	IDR 600.000	IDR 2.400.000
2	Water heater inspection 16 units (idr 75,000 / unit)	2	inspection	IDR 1.200.000	IDR 2.400.000
3	Inspection of Filter Tank 2 units (idr 75,000 / unit)	1	inspection	IDR 150.000	IDR 150.000
TOTAL PRICE					IDR **66.222.000**

V. CONCLUSION

➢ *Based on the Results of the Analysis and Discussion, the Following Conclusions can be Drawn:*

- Maintenance of water pump components consisting of transfer pumps and booster pumps is carried out once every three months. Based on the maintenance schedule prepared, maintenance is carried out in February, May, August and November. Maintenance carried out includes checking and repairing if damage occurs, according to the guidelines in the SOP.
- Maintenance of the water heater component or water heater is carried out every six months, in May and November. Maintenance activities carried out include cleaning the inside, and repairing the flexible hose if damage occurs.
- Maintenance of the water tank and filter tank components is carried out once a year in July. Maintenance in the form of draining the water tank, and replacing the filter media in the filter tank.
- Maintenance of sanitary components consisting of sinks, showers, toilets, urinals, faucets and kitchen sinks. Maintenance is carried out within a period of three months, the implementation of maintenance follows field conditions. Maintenance actions carried out include cleaning and replacement of components.
- The establishment of daily and preventive SOPs is based on Minister of Public Works Regulation No. 24 of 2008 concerning Guidelines for Maintenance and Maintenance of Buildings and the manual book of related components.
- Scheduling maintenance and maintenance of plumbing and sanitation utility components is based on Minister of Public Works Number 16/PRT/M/2010 concerning Technical Guidelines for Periodic Inspection of Buildings and adapted to existing conditions in the field.
- Draft Budget for the Maintenance of Plumbing and Sanitation Components for the Gets Hotel Semarang Building with a total cost of IDR 66,222,000.00. This figure consists of the budget for spending on sanitation components and inspection of plumbing and sanitation components.

SUGGESTION

➢ *Based on the Existing Research Conclusions, the Authors Provide Several Suggestions for Further Similar Research as well as for the Management of the Gets Hotel Semarang Building as Follows:*

- It is hoped that the research can be used as a reference for building managers of the Gets Hotel Semarang Building in carrying out maintenance and maintenance of plumbing and sanitation. So that the act of managing the maintenance of plumbing and sanitation components can run well and be on target.
- It is necessary to rehabilitate the cold water booster pump (P4) in the form of replacing a new unit so that the 1 standby / 1 duty pump system can be carried out.
- It is necessary to carry out preventive maintenance and minor repairs to the H7 and H9 water heater units so that the hot water supply runs properly and optimally.
- It is necessary to hold training for engineers so that they have competency skills/competencies for maintenance and maintenance of buildings according to their fields.
- It is hoped that this research can be used as a guideline for further research related to maintenance management and maintenance of building plumbing and sanitation, with a more in-depth review of the existing conditions of plumbing and sanitation components as well as adjustments to SOPs for the buildings under review.

➢ *Thank-You Note*

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