TOWN OF TWO HILLS

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Policy Subject: Waterworks Systems Maintenance / Renewal Management

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POLICY STATEMENT:

The purpose of this policy is to establish priorities and a system of inspection for maintenance/renewal of the waterworks systems within the Town of Two Hills. This policy will ensure that the Town's potable water infrastructure is maintained in a manner that will protect public health and safety, provide a high level of service, reduce capital replacement and long-term insurance costs, protect the rate payer from the interruption of this important municipal operation and service, ensure the sustainability of the system and provide renewal funding that is sufficient and effectively spent. The object is to identify the system components that would benefit mostly from preventive maintenance, perform this identification in a timely manner, and select the most the most beneficial treatment. By slowing the rate of deterioration, treatment can effectively increase the useful life of the waterworks systems. The waterworks systems maintenance will be integrated with other municipal infrastructure maintenance programs to minimize total cost and disruption to residents and businesses.

PROCEDURE:

Preventive Maintenance Program

Preventive Maintenance is a planned strategy used to implement mitigation measure in a timely manner so as to extend the useful service life of the waterworks system to an optimum length of time and thereby minimize the overall economic, social and environmental cost of the system operations. The program shall use two complementary approaches to develop both long–term capital (over 10 years) and short-term capital plans for the purposes of maintaining or replacing the waterworks infrastructure.

Long–term capital needs shall be determined by using a "top- down" approach, which will project the renewal costs of the waterworks system by estimating its replacement costs and theoretical life expectancy.

Short-term capital needs shall be defined by using a "bottom-up" approach, which will quantify the short–term costs for renewal of *each component* in the waterworks system. The bottom–up approach shall incorporate risk management principles where the probability of failure and the consequences of failure are both considered in the decision-making process. A risk management approach will improve the level of service provided to customers as well as minimize life cycle costs and risks.

The overall framework for the waterworks maintenance program will be described as a framework of six “questions”: (1) what does the municipality own; (2) what is it worth; (3) what is its condition; (4) what needs to be done (5) when do we need to do it, and (6) how much will it cost? This six-question framework shall be used to quantify both the “top-down” and “bottom-up” approaches to long and short-term costs.

1. **What does the municipality own?**
   This first level of framework is best described as an inventory system. For effective inventory management a clear categorization of the waterworks system components, as well as design, construction, fit-up, operational and maintenance records are needed. The asset, whatever its age, will eventually be refurbished or renewed and detailed design and construction information will be required to implement those changes in the most economical fashion. Therefore, this first question shall hold information on the size, location and as-constructed information on systems and components used to construct asset.

2. **What is it worth?**
   a. For long-term costing purpose the cost of replacing the waterworks system shall be used to determine this value.

   b. For short-term costing purposes a database showing the cost of renewal of each component of the system shall be used to determine this value. The databases’ component cost shall clearly indicate whether the cost include restoration, engineering, contingencies, and taxes. The database shall also show the potential cost saving if a system component is replaced when other infrastructure such as roads or sewer is reconstructed.

3. **What is its condition?**
   a. For long-term forecasting purposes the age of the waterworks system will be used as an indicator of condition. Ideally the waterworks system component will be broken down into homogeneous groups to account for the different life expectancies of the groups. It should be recognized that while the age of the system is the simplest and most useful condition indicator, physical, environmental and operational factors can also affect the condition of the waterworks system.

   b. For short-term forecasting purposes the best practice for investigating the condition of the waterworks system will be based on a two-phase approach.

      The first phase involves a preliminary assessment of the structural condition, hydraulic capacity, leakage and water quality on a system-wide basis using data gathered from complaints, water main breaks, unaccounted water, routine sampling, and inspection and system maintenance records.

      The second phase involves a more detailed investigation of *specific problems* identified in the first phase preliminary assessment. Evaluation will be based on the level of service, economics, risk and benefits. A detailed investigation should be conducted when warranted by one or more of the following conditions:

- preliminary investigations indicate an excessive break rate, excessive leakage, inadequate hydraulic capacity and/or impairment of water quality;
- risk analysis identifies critical waterworks system components with a high potential for significant property damage, environmental impact and/or loss of service;
- due diligence is required (e.g., failure analysis of a failed critical component);
- to support capital planning (e.g. other construction is proposed within the road allowance) and asset management programs;
- when pilot testing new technologies to support long-term planning; and
- during opportunistic work, such as when a water main is temporarily out of service.

Once a *specific problem* has been established the municipality shall institute a condition rating system to assist with the prioritizing of the problem.

4. What needs to be done?

There are various rehabilitation or replacement technologies that will address deterioration of the water works system. If a specified component is identified as a problem and does not meet current design standards or is undersized, then it should be replaced and not considered a candidate for non-structural rehabilitation.

It should be noted that there might be several technically feasible renewal technologies for any particular component of the system. However, these alternative technologies may have different life expectancies and therefore, the most cost-effective technology should be selected on the basis of a life cycle analysis (comparing alternate schemes that have different costs over a certain planning period) that determines the lowest present worth. The life cycle analysis should not only consider costs for infrastructure repair, rehabilitation, and replacement, but also socio-economic costs. Also noted that due to the high mobilization costs of some rehabilitation technologies, they are only cost effective when a significant quantity of water main is to be rehabilitated.

A comprehensive waterworks system plan shall be implemented to establish the following needs:

- Water mains and services that do not conform to current design standards in size and/or material, depth of cover as well as water service size, material, and cover should be considered for replacement.
- Replace or structurally rehabilitate mains that have high break rates or leaky joints.
- Rehabilitate unlined iron mains with non-structural linings if they that not experienced a high break rate, but their hydraulic capacity and/or water quality is significantly affected by deterioration.
- Replace mains that are to small (even after being cleaned and lined) to supply the required flows at adequate pressures.

- Cathodically protect metallic components if they are installed in corrosive soils.
- Replace or rehabilitate highly critical mains before they fail.
- Repair or replace valves and hydrants that are non-standard, inoperable, or leaking.

5. When do we need to do it?

A cost-benefit analysis should be undertaken to determine the most efficient timing for the following:

- Is it more cost effective to replace or structurally rehabilitate a component than to continue to repair it?
- If the soil is corrosive, is it cost effective to cathodically protect some metallic water main and/or other metallic components (e.g., valves, hydrants, fittings) to extend their life?
- Is it more cost effective to rehabilitate an unlined iron main rather than continue to pay higher pumping costs and/or construct additional mains to provide the required hydraulic capacity?
- Is it more cost effective to rehabilitate leaky joints in large diameter mains rather than continue to lose water?
- Is it more cost effective to coordinate the work with other projects (e.g., road construction, sewer replacement) to achieve synergistic benefits?
- Socio-economic factors (critically) and environmental factors need to be considered. If socio-economic factors are considered, it may be more economical to replace or rehabilitate a main before it ever breaks.

The conditions rating from part 4 along with information on the importance and hazard potential will assist in the prioritization of all work to be done.

6. How much will it cost?

The costs of a rehabilitation or renewal project can be estimated using input from other municipalities, local contractors, recent construction contracts and technical reports. The fact that some renewal technologies are very site specific has to be considered in the decision-making process. The projected costs should be compared with those estimated using the “top-down” approach to ensure the short-term plan is consistent with the long-term plan.

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