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DEVELOPING CONDITION ASSESSMENT CRITERIA FOR OPEN SEWAGE DRAINS.

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Wastewater, Utilities, assessments, management, assets, effectively, protocols

ABSTACT

The main goal of this review paper is to provide water and wastewater utilities with guidance and information on how to effectively use condition assessment tools and technique to improve both the long term planning and day to day management of assets. Water and waste water utilities in developed countries with the challenges of how to most cost effectively manage a large investment in physical assets with providing safe and reliable services to their customers. A Strategic Management (SAM) approach can help us to utilities meet this challenge. A key element of SAM is the assessment of the assets condition and performance.

A Water Environmental Research Foundation (WERF) Sponsored workshop held in March 2002 identified that there were no standard guide line for conducting condition assessments, and that there is a need for protocols to help utilities better understand assets condition and performance.

1. INTRODUCTION

1.1. What is infrastructure?

"A civilization's rise and fall is linked to its ability to feed and shelter its people and to defend itself. These capabilities depend on infrastructure - the underlying, often hidden foundation of a society's wealth and quality of life. A society that neglects its infrastructure loses the ability to transport people and food, provide clean air and water, control diseases, and conduct commerce. The nation's infrastructure is its system of public facilities, both publicly and privately funded, which provide for the delivery of essential services and a sustained standard of living. This interdependent, yet self-contained, set of structures provides for mobility, shelter, services, and utilities… ….infrastructure is the base upon which society rests. Its condition affects our lifestyles and security and each is threatened by its unanswered decay."

1.2. Types of infrastructure:

Infrastructure can be broadly categorized in two types;

1.2.1. Hard infrastructure:

This refers to the physical network that keeps an industrialized nation smoothly functional. Among the components that are classified under the hard infrastructure are the capital assets like the utilities, transport vehicles, telecommunication systems, roads, highways, railways, subways, traffic lights and street lights, dams, walls and culverts, drainage systems, the airports and bus terminals, and bridges, among others.

1.2.2. Soft Infrastructure:

The soft infrastructure, on the other hand, is the framework required to keep and maintain the different institutions. This can also include both the physical and the non-physical assets. Examples of physical assets are the buildings that house the network and the equipment used to maintain the institution. For non-physical assets, this includes the software and programs, the governing rules and regulations, the financial system, and the organizational structure. In essence, the soft infrastructure embodies the system of delivery of services to the people. If you want to create a corporate culture within the company then you must have a soft infrastructure for that specific culture for the workers to follow. In any case, whether you are in business, in service, or in construction, you must have a well-laid infrastructure that is highly efficient and effective in achieving your corporate goals

1.3. Infrastructure management:

Infrastructure Management is the administrative process of creating, planning, and maintaining our infrastructures. It is an integrated, inter-disciplinary process that ensures infrastructure performance over its life cycle. A life cycle is entire time from design through decommissioning

- What do you own?
- What is its condition?
- What is it worth?

• What is the remaining service life?

• What do you fix?

1.4. Open drains:

An uncovered system of channels that discharge wastewater flows from individual households and conveys them to a disposal/reuse point. In developing countries, the per-capita GDP is low and the collectable taxes to the municipalities are not enough to provide a proper sewerage system. Furthermore, in most of the urban areas there is no waste water treatment plant facility. All such factors contribute to the adaptation of cheap sewage system. As compared to underground sewage system which requires high initial cost and accessories, the open sewage is preferred as the community can do maintenance work easily.

Open sewage drains are a major component of urban infrastructure in developing countries. Like other infrastructure facilities such as road networks, water supply schemes, irrigation canals, public buildings etc. it is important to have assessment criteria for open sewage drains. Unfortunately till now we have not developed any assessment criteria for this infrastructure; because open drains are designed for storm water only, furthermore underground sewage systems are developed in most of the developed countries. But as mentioned above, in developing countries mostly the sewage system consists of open drains. Regular condition assessment of open drains is necessary for updating the infrastructure inventory, from which the present value of asset can be estimated. Furthermore, the rehabilitation/maintenance cost can be worked out. Condition assessment is based upon visual inspection of open drains distress. Although the relationship between distress and performance is not well defined, there is general agreement that the ability of a drain to discharge the designed flow of sewage in an efficient and smooth manner is adversely affected by the occurrence of observable distress. As civil works facilities approach their design lives, there is an increasing demand for maintenance and repair projects to extend the design life and to minimize the potential for loss of function. It is necessary to develop rational prioritization schemes for these expenditures because not all MR projects can be funded in a given fiscal year. The U.S. Army Corps of Engineers is developing uniform condition assessment procedures for many of its civil works structures. The collected data are to be used in conjunction with other methodologies to focus and prioritize operations and maintenance expenditures for a wide variety of a large number of (often multipurpose) structures. The condition assessment is based upon objective and repeatable measurements, which, when processed by an algorithm, produce a numeric indicator, the Condition Index (CI). The CI is a number between 0 and 100 that is a gauge of the physical deterioration of a structure. For many structural components the CI also serves as an index of functional performance. As an indicator of the condition of the structure (or functionality) the CIs are useful to maintenance managers and engineers at all hierarchical levels of management within the Corps.

2. LITERATURE REVIEW

2.1. Road assets assessment:

Roads have certain systematic assessment criteria developed by different research organizations and departments such as:

PDI (Pavement distress index) developed by (Chia-Pei Chou n.d.) They have developed the assessment criteria based on distress identification and expert opinion survey to assign the weightage for each distress,23 experts were interviewed, Distress were rated from 0-100 based on their impact on riding quality.

The concept of pavement distress index (P.D.I) which mathematically combines the record distress types, severity, and extent into one value, has been broadly adopted in the pavement management system as well as pavement maintenance management systems of many highway agencies.

2.2. Pavement surface condition rating manual

Developed by Washington state transportation center University of Washington for Washington State Department of transport.PCR (Pavement Condition Rating), developed by the Ohio Department of Transportation in 2004. This manual is used as a guideline line for assessment of road infrastructure. The methodology adopted was the assigning of weightage to distresses by using expert opinion surveys.

The experts give weightages to different distresses occurring in the flexible pavement by using A.H.P method and then give weightages to their severity levels.

2.3. PSCR (pavement surface condition rating)

Prepared by Opus International Consultants (Canada) Limited for British Columbia Ministry of Transportation and Infrastructure. This manual is widely used by different transport department.
Subway infrastructure condition assessment criteria developed by (Gkountis et al. 2013) The researchers have adopted the expert opinion survey to assign weightage to distresses.

2.4. CAS (condition assessment survey) program, developed by department of energy. USA.

• General information is presented for
– asset determinant factor
– CAS repair codes
– CAS cost factors;
– guide sheet tool & material listing;
– testing methods;
– inspection frequency;
– standard system design life tables;

2.5. Condition index assessment for u.s. army corps of engineers civil works:

The U.S. Army Corps of Engineers is developing uniform condition assessment procedure for many of its civil works structures. The collected data are to be used in conjunction with other methodologies to focus and prioritize operations and maintenance expenditures for a wide variety of a large no of structures. The condition assessment is based upon objectives and repeatable measurements which when processed by an algorithm, produce a numeric indicator, the Condition Index (C.I).

3. CONCLUSION

- These criteria can be adopted by W.S.S.P to update the inventory regularly.
- Local government institutions can also use the updated inventory for prioritizing the budget utilization.
- A seminar with L.C.B and L.G should be arranged to introduce this criteria and proper training course can be provided if requested.
- For efficient record keeping every department Should develop rehabilitation and maintenance section separately where experts can efficiently utilize this criteria.

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