INDIAN WATER WORKS ASSOCIATION, MUMBAI CENTRE

IWWA MC YouTube - https://www.youtube.com/channel/UCyV5ztX7fl4Fv6ksP7m_Emg

DROPLET

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CONTENTS

from Chairperson Desk

Hello IWWA Mumbai Centre members,

By the time this issue reaches you, new year 2022 would have begun, let me offer New Year Greetings to all of you. Let this year being us the hope of coming out of this century epidemic of Covid-19.

IWWA 54th convention had been successfully convened at Lucknow on 08-09 January 2021. We on this platform congratulate the new President Er. P. K. Sinha and his team and assured cooperation from IWWA Mumbai centre.

At this juncture, we all are passing through the third wave of Covid-19 which has dampened our social activities. We are aiming of few events in physical formats wherein we all can enjoy face to face interactions, exchange of knowledge in enthusiastic way.

Our associate Er. Ulhas Paranjape is stirring the campaign of creating water storages at grass root level and his incessant contribution on this momentum is whole heartedly applaudable and appreciated.

Typically, this part of the financial years is hard pressed for achieving progress on implementation, commissioning of important projects to make them ready to cater needs before beginning of forthcoming summer. Also from financial side, the government departments and execution agencies try to utilize the allocated funds within financial year. Especially for Maharashtra state which is continuously ruined by cycles of haphazard rains and droughts, this period is of paramount importance. I sincerely appeal to all the implementing institutes, engineers, manufactures, vendors, contractors to maintain quality while maintaining the pace of construction.

- Er. Maniessha Palande

Editor Brief

The primary source of water for cities, towns & villages are storage reservoirs, rivers and Dams. Primarily dams have been constructed for irrigation and flood management purpose. However, some large corporations like Mumbai, Navi Mumbai have dedicated impounding storages constructed with dam structures for drinking water purpose. The Dam Safety Bill (2019), which was passed by the Lok Sabha in 2019, was passed by the Rajya Sabha on 2nd November 2021, paving the way for enactment of the Dam Safety Act across India.

Large dams in India encounter challenges, primarily associated with geological, seismological, hydro-metrological, and other man-made factors. Sudden catastrophes such as earthquakes or floods necessitate an instantaneous response, underlining the need for emergency preparedness. Dam safety assumes greater significance under prevailing and emerging climate change-related stresses. The Dam Safety Bill provides for proper surveillance, inspection, operation, and maintenance of all the large dams in the country to prevent dam failure-related disasters.

The Dam Safety Bill addresses critical concerns related to dam safety under prevailing and recently emerging climate change-related scenario in a holistic manner. It provides for a countrywide institutional framework to ensure the safe functioning of all the specified dams in India, to minimize the chances of dam failure and related accidents in the future. The Dam Safety Bill emphasizes adequate care and maintenance of dam structures and mechanisms. This would ensure that valuable public assets continue to deliver the intended benefits to society. Adequate provisions are there for committing human and financial resources towards professional management of the functioning of large dams. To ensure that the dam owners work responsibly, there are provisions for penalties for specified offences.

- Er. Dilip Sonwane

Stalwart's Advise

Dr. Rajesh Gupta
Professor, Visvesvaraya National Institute of Technology Nagpur

District metered areas formation in water distribution networks : A solution for proper management of flow and pressure

Urban water distribution networks (WDNs) mostly consist of interconnected pipes served through several service reservoirs placed at different locations in the network to manage desired flows and pressures at consumer ends. The per-formance of the network is greatly affected by leakages in the WDNs. Leakages cause not only the physical loss of water but the loss of revenue, also. Further, it increases the flows in pipelines to meet the desired demand, thereby causing additional head loss in pipelines. Due to additional head loss, pressure at con-sumer end may reduce resulting in partial or no supply especially at the nodes away from the service reservoirs or those located at high ground levels. This further leads to inequality in water supply to consumers

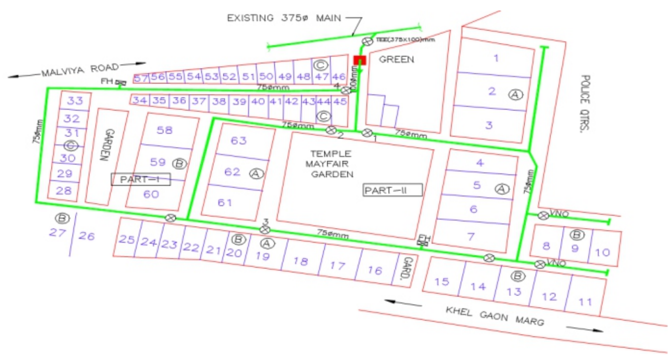
The concept of partitioning of WDN into District Metered Areas (DMA) was introduced to address the problem of leakage reduction. A DMA is defined as a part of network in which flow at all the entry points are measured. The difference between the total flow entering in to a DMA and the total outflow registered at the consumer meters provides total unaccounted for water. The major part of which is usually losses through leakage. Thus, DMA helps in assessment of leakage losses. In a large WDN, DMAs are initially formed to identify a part of the network to be supplied from a particular service reservoir. Valves are provided at the boundary pipes to completely isolate a part of network, if possible. When complete isolation is not possible, meters are located to register flow leaving the DMA. Thus, a simple DMA design problem consists of minimizing the cost of valves and water meters by satisfying the demands of all the consumers. Each DMA can be further subdivided into sub-DMA, which will be useful to assess leakage losses in smaller area and identifying the major leakage points by adopting active leakage control methodology. Herein, also the objective of sub-DMA could be same as of DMA formation.

Several minor leaks may remain unidentified by active leakage control methodology. Therefore, some passive leakage control methodology can be used to further reduce the leakage losses. As leakage losses are proportional to internal pressure in the pipeline, the reduction in excessive pressure to that sufficient to meet consumer demand helps in reducing leakage losses. The water leakage problem is made worse by higher pressure across the pipe network during low demand hours at night. Thus, a simple pressure reducing valve (PRV) or its variant like time or flow modulated PRV at the inlet of DMA helps in reducing the excessive pressure, thereby, achieving reduction in leakage losses as passive leakage control. The objective function in such a case will involve determining optimal location of predecided number of PRVs to achieve maximum reduction in losses, or determining number and locations of PRVs to achieve desired reduction in leakage losses.

Laucelli et al. (2017) suggested another way of looking at DMA/sub-DMA design problem from the con-sideration of leakage reduction and cost minimization simultaneously. WDNs are designed to have some redundancy so that it can perform satisfactorily under uncertainty of demands and pipe roughness values, or during the failure of its components. Also, there may be some inherent redundancy due to use of mini-mum diameter pipes. Thus, residual pressures more than the minimum required are observed at all nodes in the network. The availability of additional residual head may allow consideration of valves in closed condition in place of water meter, so that cost can be reduced. The closure of valve results in change in hydraulic path to immediate downstream consumers. This will cause additional head loss and will be helpful in reducing excessive pressure and thereby leakages. However, it may also affect the supply to downstream consumers. Laucelli et al. (2017) considered compromising the demand by a small percentage and formulated DMA design problem as a multiobjective problem of minimization of total cost of meters along with maximization of leakage reduction and minimization of unserved demands.

The other objectives of DMA design include pressure uniformity, water age minimization, resilience index maximization. All these objectives can be considered simultaneously to obtain trade off solutions through multi-objective optimization and most suitable solution can be adopted. It should be noted that main objective of DMA formation is to allow easy location of potential leakage points and reduction of leakage losses through unnoticed leakage points by minimizing the pressure in pipelines.

As valves are provided in the WDNs for several purpose, the DMA formation should consider existing valves in formation of DMA to reduce the overall cost (Zhang et al 2019, Sharma et al. 2021). Reduction in leakage losses helps in maintaining proper flows and pressures in the network. DMA formations, valve operations management ensure excessive pressure reduction resulting in to leakage loss reduction and equitable water distribution to consumers. ■■■



Expert's Article

Dilip Sonwane
Associate Vice President, Tata Consulting Engineers

Discussions on Use of Hydraulic Equations

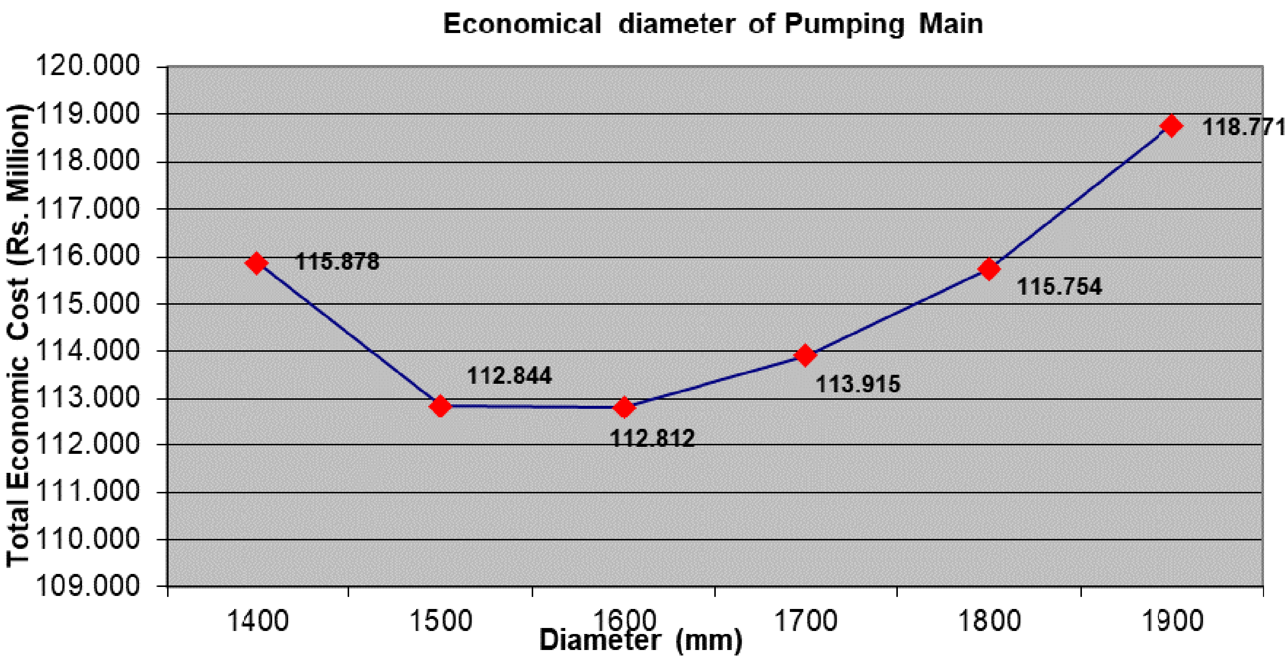
In water supply system for large cities, the pipeline network carrying water from Master Balancing Reservoir (MBR) to distribution reservoirs and distribution network from ground/elevated service reservoirs to consumers forms substantial part of overall investment requirements. The water network from Master Balancing Reservoirs is mainly tree network feeding to distribution stations. In majority of In-dian Water Boards and Municipal Corporations, the design of such Trunk Networks or downstream dis-tribution networks is carried out by using Hazen William's equation. The optimisation of such large networks by using proper hydraulic equation is necessary for mak-ing project cost effective and viable.

Hydraulic Equations : The planning and design of water systems involves selection of pipeline routes, hydraulic de-sign and sizing of water mains and distribution pipelines. These are mainly pressurized pipes flowing with full flow conditions. There are number of formulae available to estimate the flow carrying capaci-ty of pipelines or sizing of pipelines. The available hy-draulic equations include Hazen William's formula, Modified Hazen William's and Darcy-Weisbach formula cou-pled with Colebrook White equation. Also many hydrau-lic models have features that allow the user to select from the Darcy-Weisbach, Hazen-Williams or Manning head loss equations depending on the na-ture of the problem and user's preferences.

The Hazen-Williams formula is empirically based expression. This has been developed from experimental data. The formula is dimensionally inconsistent. This equation may result in an error up to +/- 30% in the evalu-ation of velocity and +/-55% in estimation of frictional head loss. The Hazen-Williams equation is predominately used in United States and India. The modified Hazen-Williams for-mula being an improvement has been suggested to use in lieu of HW equation. Most of the Municipal Corporations and Consultants use Hazen-Williams equation in India for the analysis of water distribution networks. The Darcy-Weisbach formula is dimensionally consistent. The estimation of Darcy,s 'f' for variations in velocity and diameter involves repetitive and tedious calculations. In European countries mainly Darcy-Weisbach formula coupled with Colebrook White equation is used.

The Darcy-Weisbach formula coupled with Colebrook White equation gives most accurate results followed by Modified Hazen-Williams and then Hazen-Williams formula. The Author has been associated with Jaipur water project involving large size trunk water supply network. The network has been optimized link wise for capi-tal costs and energy costs to obtain optimum pipe diameter for each pipe by using Colebrook White equation. One such optimization for section of network is shown below.

All the optimized pipe diameters for individual sections are checked under Hydraulic analysis software for the complete network by using Darcy's equation. The pressure heads available at different locations are checked for the residual pressure requirements. The entire network with selected optimum diameter has been checked for adequacies of flow, pressure and velocities. The entire project has been designed and optimised by using Darcy-Weisbach hydraulic equation.

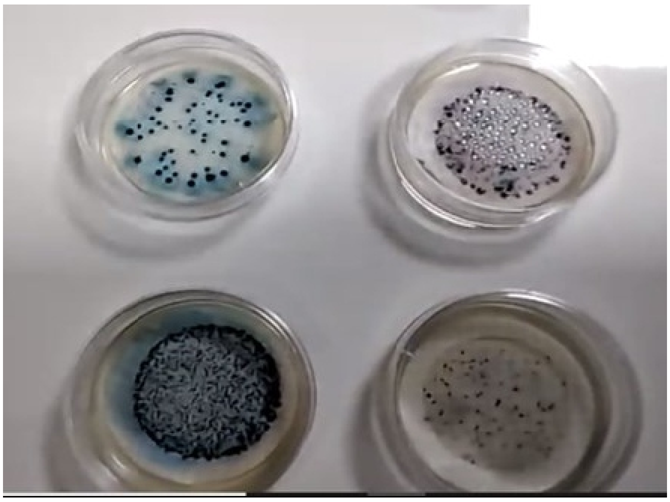


World Water Monitoring Day : 18th September 2021
Webinar on Water Quality - Monitoring and Management

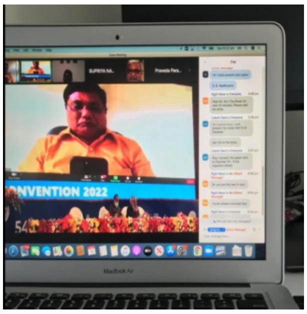
World Water Monitoring Day : 18th September 2021

The World Water Monitoring Day is celebrated on 18th September every year to increase public awareness and involvement in water monitoring and protecting water resources around the world. The day was established in 2003 by America's Clean Water Foundation (ACWF) as a global educational outreach program by engaging citizens to conduct basic monitoring of their local water bodies. The Indian Water Works Association, Mumbai center has arranged a Webinar to celebrate World Water Monitoring Day on 1st November 2021. Mr. Santosh Narayan Jathar, Food Analyst, Municipal Corporation of Greater Mumbai has been invited on this occasion.

Mr. Santosh Jathar has delivered a talk on Water Quality - Monitoring and Management. He made presentation on Disinfectant types, Contact time, Residual Chlorine, working of chorine, OTT Tests, estima-tion of chlorine dose, Indicator Organisms- Coliforms, E-Coli, Iron Bacteria etc, Water quality permissible limits as per IS acceptable and permissible limits, impacts of water quality, taste, diseases, water use for cloth cleaning etc. Mr. Jathar shared the data on water quality monitoring being done by MCGM, improvements over the years and shown the MCGM water laboratory with live testing. Mr Jathar shared the water quality monitoring by regular sample collection (over 200 daily) and testing by MCGM staff. The webinar had good response with presence of about 40 students, engineers and profes-sionals from reputed institutions and organizations.



NEWS ROOM



A. Mr K. B. Wadhavane, Vice Chairman, IWWA-Mumbai Centre & Team Leader, Yash Engineering Consultants has presented an article on "Redesign of Storm Water Pumping Station between Holding Pond and barrier wall to creek as flood control measure at Navi Mumbai" during 54th Annual Convention of IWWA at Lucknow held on 8-9th January 2022. He has shared project challenges about provision of temporary pumping in monsoon season during construction, construction of coffer dam without obstructing flow through existing holding pond. The paper highlights holding pond concept and design, isolation and construction features of the new Storm Water Pumping project underway.

B. The 40th Annual General Meeting of IWWA Mumbai centre has been planned on Jan 29,2022 at 7 PM on Virtual mode.