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Government of India
Ministry of Jal Shakti
Department of Drinking Water and Sanitation
(National Jal Jeevan Mission)
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CGO Complex, Lodhi Road,
New Delhi-110003
Date:27April, 2020

To,
The Principal Secretary / Secretary
In-Charge of Rural Drinking Water Supply,
All State & UTs

Subject: - Low-cost interventions useful for the Har Ghar Jal Programme, under the Jal Jeevan Mission

Sir,

This is to draw your kind attention towards the field relevant Research & Development (R&D) of interventions in the water supply and liquid waste management conducted by Dr. Pradip Kalbar, Assistant Professor, Centre for Urban Science and Engineering, IIT Bombay in collaborating with Urban Local Bodies (ULBs) and Government Departments. The summary of the above mentioned intervention is enclosed for ready reference

The above mentioned R&D seems to be quite innovative and useful for the State Government to follow. Therefore, the brief comments of this Department on the interventions of Dr. Pradip Kalbar, are enclosed at **Annexure.I** for kind perusal. The states are requested to examine the innovations further and share any practical application that they might implement in field, with the ministry.

Encl.: As above

Yours sincerely,

27/4/2020

(Pradeep Singh)
Director
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Copy to (for information) :

Dr. Pradip Kalbar, Assistant Professor, Centre for Urban Science and Engineering, IIT Bombay.

Annexure.I

The low cost interventions of interventions in the water supply and liquid waste management conducted by IIT-Bombay have been examined and the observations are as below:-

1. **Small scale tanks**

Need: The current practice is to create huge storage tanks at one location which provides an opportunity to the Operator to extend the distribution network infinitely. This makes it impossible to track the network and attribute to the respective storage tank. Typically the OHSR/ESR tank is kept at a height of 12-15m so as to provide a pressure head of at least 7m at the ferrule point. Capacity of storage tanks vary from 0.1 to 2.5 ML.

Utility: In rural areas, it does not have much application as tanks are already small. However, in the prei-urban areas, there is possibility of implementing small storage tanks.

2. Multi-outlet tanks

Need: Present practice follow providing only one outlet. This creates uneven and unequal distribution of water where there is mixed land use and differently elevated areas. In some part of the network, water will not reach.

Utility: Multi-outlet tanks in rural and peri-urban areas can help in tackling differently elevated areas and plan for future expansion which is the need to address the urbanization effects. Multi-outlet tanks dampen the peak demand and hence optimizing investment.

3. **Manifolds**

Need: Manifolds are basically a pipe-valve arrangement. The inlet and outlet diameter are the same. The inlet diameter is distributed into 3 pipe-valve systems, typically the $1/3^{rd}$ area of the pipe. There are two ends for the drum systems. The system is initially closed by valves, so that pressure exists on the incoming side. Once the valves are opened, the pressure will be reduced till the pipeline is filled. Such a stabilized manifold system has tendency to auto-balance in the optimal range of diurnal and seasonal variations of flows. The water supply schemes are typically designed for 30 years for peak flow conditions and hence there needs to be some control on the withdrawal in the initial period. However, in practice, due to poor O&M practice, there is no control on withdrawal and hence the design flows do not exist in the field and unequal distribution at both transmission level and distribution level occurs.

Utility: Manifold will be useful in multi-village schemes and for peri-urban area schemes for transmission side (bulk water supply). This will avoid the partial flowing of water in the pipeline and maintain the designed velocity.

4. **Shafts**

Need: Shafts are basically a vertical pipeline structure with the top of the pipe open to sky. The height of the shaft will be dependent on the inlet velocity of water and the characteristics of the outlet. Shafts basically act as directed storage near the consumer and help in matching the demand pattern resulting in peak dampening. Typically, in water supply systems, there is excess

pressure in some parts of the network. There is also need for a hydraulic barrier between the supply side and demand side. The big storage tanks provided usually are not fully utilized in intermittent water supply regime. Additionally due to paucity of space or lack of funds, storage tanks are not possible to construct at every location.

Utility: In rural and peri-urban areas, shafts can serve as an alternative to storage tanks, which is a low cost solution. Shaft can also be used for tackling water hammer effect in transmission side.

5. **Non-mechanized water treatment plants**

Need: Majority of conventional mechanized water treatment plants in rural and remote areas fail due to poor O&M, lack of skilled labour and/or lack of funds for O&M.

Utility: The non-mechanized water treatment plants will be a better alternative in rural and peri-urban areas. The use of vortex (instead of flash mixer and flocculation) and plain sedimentation (instead of clarifier) will avoid mechanization and use of energy during the operation. One such plant is under operation at Dhamangaon in Maharashtra.

6. **Jal Tantra**

Need: The water supply schemes need to be designed optimally due to heavy investments. There are many commercial tools for optimization of water supply network. However, either they are very costly or very complex. Hence there is a need for low cost and Indian conditions specific tool.

Utility: IIT-Bombay has developed JalTantra tool, which is a free for all open source tool for optimization of water supply schemes. Current version of this tool is very useful for designing rural water supply schemes and Government bodies in Maharashtra State are already using it.

7. **Pipe in pipe (master piece)**

Need: The water supply network require pressure management as there can be undulations in the ground. There is need to dissipate the excess head at some locations to manage the pressure in the network.

Utility: A simple Pipe in pipe (master piece) can be a very effective long term solution for reducing the pressure in the transmission and distribution networks. In this intervention, a small diameter pipe is inserted into a large diameter pipe for a short length of 1-5m. The void between the piped is filled with concrete. The smaller diameter pipe induce head loss in the pipeline and acts as spring (more the discharge, more is the head loss and vice versa).