

第6回（最終）セミナー

2018年2月27日に、メリディアンホテルで開催された。出席者数はDJB、JICA本部、JICAインド事務所、東京都水道局、JET及びJICAが支援している州の水道局から約130人であった。発表内容は次の通りであった。

- 1) SCADAを操作した均等配水の手法とNRWの算出手順の紹介（成果2の結果報告）:DJBの各担当者
- 2) 東京水道の発展とDJBの今後の課題:TSS 益子社長及び東京都水道局山本課長の講演

SCADA及びNRWの具体的な手法の説明が聴衆の関心を招き、活発な意見交換がなされた。

Addl.CEOが本プロジェクトで算出した高いNRWに関して、先ず数値で表現できる段階になった事を喜んだ。東京水道もNRWを40%から数%までに下げるのに、50年を要している事例を出し、DJBが今後も地道な活動が必要であるとの見解を表明した。

NIDHI SRIVASTAVA, IAS
ADDL. CHIEF EXECUTIVE OFFICER



DELHI JAL BOARD

Government of NCT of Delhi
Varunalaya Phase-II
Karol Bagh, New Delhi-05
Phone : 23637218
E-mail : addlceo.djb@nic.in

Agenda (Tentative)

Time	Topics	Speaker
10:00 - 10:20	Introductory Notes – Outputs/Results of the Projects	Mr. Momose / CE (Project)
10:20 – 10:30	Key Note Address	Mr. Anil Kumar Singh, CEO of DJB
10:30 – 10:40	Key Note Address	Mr. Sakamoto, Chief Representative of JICA India Office
10:40 – 10:50	Key Note Address	TBD, Government of NCT of Delhi
10:50 – 11:20	Tea/Coffee Break	
11:20 – 11:30	Key Note Address	Dr.Masuko, President of TSS Tokyo Water Co., Ltd
11:30 – 12:00	SCADA System in Pitampura Pilot Project	Mr. Rastogi, EE (E & M), Mr. Fukushima
12:00 – 12:20	NRW Calculation in Pitampura Pilot Project	Mr. Thakur, CE (West), Mr. Jindal, EE (Civil) and Dir (Revenue), Mr. Shimizu
12:20 – 12:35	Q and A	
12:35 – 13:15	Toward development of Delhi's water supply– Current issues and future visions	Mr. Yamamoto, Bureau of Waterworks of Tokyo Metropolitan Government
13:15 – 13:30	Q and A	
13:30 – 13:40	Distribution of SCADA training certificate	Presented by Ms. Nidhi, Addl. CEO and Mr. Tange, Senior Representative, JICA India Office
13:40 – 13:50	Closing Speech	Ms. Nidhi Srivastava, Addl. CEO
13:50 – 16:00	Lunch cum Interactive Session: Exchanging information at booths by water-related Japanese companies/ Presentations (Details will be announced at the seminar)	
16:00- Onward	Tea/Coffee	



एक कदम स्वच्छता की ओर



Japan International Cooperation Agency

THE SIXTH SEMINAR

on
"Innovative and Equitable Water Distribution Service for Delhi
- Learning from the Joint Technical Cooperation Project"

Organized By

Delhi Jal Board and Japan International Cooperation Agency

Date: 27th of Feb 2018

Venue: Le Meridien (Sovereign-1)	10.00 AM onwards	Location: Delhi, India	
Name	Designation	Contact Number	Signature
R.K. Lakheza	EE (P) col.		
SHER SINGH	EE (S) DW-III		
K. Kano	JCCII		
Kashinath Holder	Civil Engrg (PMS)		
S.K. Mehta	ca. PM, PMS		
Anil Anora	SEC (E) IV		
19bal Singh	EE (E) DW-III		
Neebi (OMRON)	AM-III		
Himanshu Agamwal	EE, NW-I		
D.K. SINGH	SE (SPM) I		
Kaishi Matani	UPMCHT		
Kuldeep Kumar	EE (E) DW-S-I		
Dinesh Kumar	EE (S) DW-XI		
J.P. Bannan	EE (S) Plant		
HIROSHI KOSHI	JET		
Chandrasekhar	Director CS-10		
V.K. SINGH	EE (S) II		
Prasad Pr Jain	SE (M)		
K.G. Mishra	EE (E) DW-XIV		
Gausan Yadav	AE (E) M		
I.P.D. Jais	EE (E) DW-III		
U. B. Tompathi	Secy / DW-III		
Arun Kumar	SE (E) DW-III		
Kuldeep	JE (E) M		



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Pulchraj Singh	AE (DR) DW-II		
R.S. GADGILE	JJ (R) HQ.		
K.K. HARIT	EE (C) DW-III		
SUKHPAL CHAUDHARI	EE (M) II		
Pravesh Kumar Jy.egi	EE (Project) DW-III		
Vijay Kumar Nungel	EE (E) DW-III		
R.K. Ganguli	EE (E) DW-III used		
ARVIND KATHAN	AGM / MTRU		
K.C. MCGHA	SELBOW DDM		
Sandeep Kapoor	EE (E) M		
CHAMBER PARGASH	EE (Dhanda) WTP		
P.S. RAJAT	EE (E) DW-II		
V.P. TANWAR	JDR W MW		
SANDEEP SHARMA	ZE Dhanda		
ANIL KR. SHARMA	AGM / MTRU		
SHIGEHIRO NAKAJIMA	Hiroshi India		
Harshira Juggya	PM		
Anu Kumar	JE (E) DW-II		
G.K. Anand	EE (E) DW-II		
DARSHIL SINGH	SE (E) DW-III		
Pawan Kumar	EE (E) DW-III		
Shobabha Kumar	CE (South)		
Rhupesh Kumar	S.F. / DW-III		
Berita Gaitello	Manager Coimben		



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Pulchraj Singh	AE (AR) W-II		
R. S. ADROBLEY	JJ (R) HQ.		
K. K. HARIT	EE (C) DR VII		
SUCHIPAL CHAUHAN	EE (CME) II		
Praveesh Kumar Jaggi	EE (Project) W-II		
Vijay Kumar Nungoh	EE (EAM) II used		
R. K. Bandhi	EE (EAM) II used		
ARVIND KAUSHAN	AGM / MITAN		
K. C. MEGHA	SE (SOP) DDB		
Sandeep Kapoor	EE (E) III		
CHAMBER PARKER	EE (Dwarka) WTP		
B. S. Rawat	EE (Proj.) W-II		
VP TANWAR	JDR W/III		
SANDEEP SHARMA	ZE Pitkappur		
ANIL KR. SHARMA	AGM / MITAN		
SHIGEHIRO NAKAJIMA	Hi-techi India		
Masahiro Toggata	PM -		
Arun Kumar	JE (Proj.) W-II		
Gok Anand	EE (E) W/II		
DARSH SINGH	SE (E) DR III		
Pansari Kunal	EE (Proj.) W-II		
Shobhab Kunal	CE (South)		
Rhupesh Kumar	SA (SOP) - II		
Bute Carols	Manager Coimman		



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Name	Designation	Contact Number	Signature
NARESH KUMAR DARGAN	EE (DR) W II		
KASHI Yashizaki	SE (SOP) W		
Shiroki Kobayashi	GM.		
M. K. CHAWLA	Tt. DIVECHA		
S. K. Goel	EE (DR) W II		
A. K. Gupta	SE (M) W/II / SDC		
Mukesh Jindal	EE (M) W/II		
YU GENDRA SINGH	JE - W/III		
Rajend Prasad	II (SINIO)		
Pankaj Gupta	EE (W) W-II		
Yashpal	EE (E) W/II		
Shash Ranu Singh	SE (SOP) W/II		
Anil Choudhary	EE (SOP) W-II		
S. S. Bhadwaj	EE (EAM) W/II		
S. C. Vardhishtu	SE (W) W/II		
Sandeep Kulwarshe	EE (SOP) W-II		
N. K. Khare	EE (SOP) W-II		
Nareesh Kumar	EE (W) W/II		
PUSHPENDRA KR	ZE (C) - I		
Pankaj A/V	EE (M) W/II		
V. K. Sharma	SE (PLG) W.		
VIKRAM SINGH	CE (SOP) W/II		
SUDHIR KUMAR	EE (SOP) W-II		
Smriti Gupta	SE (M) W-II		

Joint Technical Cooperation Project Assistance related to Delhi Water Supply Improvement Project

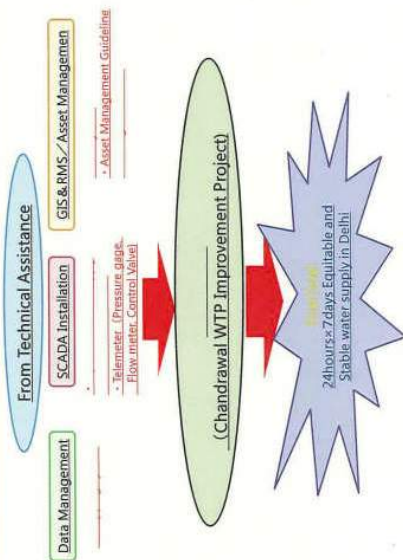
27 February, 2018

Delhi Jal Board
and
Japan International Cooperation Agency

Purpose of the Seminar (1) Joint Technical Cooperation Project

- To share the outputs of the Pitampura Pilot Project (for equitable water distribution and Non-Revenue Water (NRW) reduction) focusing on Supervisory Control And Data Acquisition (SCADA) system operation and NRW calculation method, and the recommendations for improved measures
- The Joint Technical Cooperation Project has been implemented to accelerate the commencement of Japanese ODA Loan Project in the Chandrawal Water Treatment Plant (WTP) command area and to strengthen DJB's capacity to implement the Loan Project. The purpose of the Loan Project is to realize equitable and continuous water distribution in Delhi.

Joint Technical Cooperation Project was implemented for Japanese ODA Loan Project



非表示 Slide For Narration

- (1) 円借款の目的→DBOの実施しているAdhocoベースの改修事業を一体的・集中的に実現する。
- ① ハード面 (DMA)の取替、SCADAシステムの導入、新設管の布設、老朽管の取替え
 - ② ソフト面 (SCADA)による均等配水、NRW削減
 - ③ 実現のメカニズム (BOT型の、Performance Indicatorの導入) (スライド3、PI項目の表示)
 - ④ 24時間配水実現による、充分な水量供給と給水水質の改善。これにより市民サービスが改善される。

Target and Weightage to KPIs/SLBs

S. N.	KPI / SLB	Target	Maximum payment as % of agreed O&M Cost for the Period	Remarks
A	Extent of Water Loss	15%	<ul style="list-style-type: none"> 2.0% (maximum including incentive) 15% (for meeting the performance target of 15% WL) 	Incentive shall be applicable only on Water Loss in case of exceeding the target performance
B	Continuity of water supply (24 hrs)	100%	5%	24 x 7 supply
C	Efficiency in redressal of customer complaints	90%	5%	MoUD's target is 80%
D	Quality of water supplied	100%	5%	
E	Meter reading, billing and distribution efficiency	100%	5%	
F	Response time for new water supply connections	100%	3%	
G	Extent of functional metering	100%	2%	Target is 100% but no reduction in payment until 98%
H	Power consumption efficiency	PF 0.98 or more	As covered in 'Power Guarantee'	

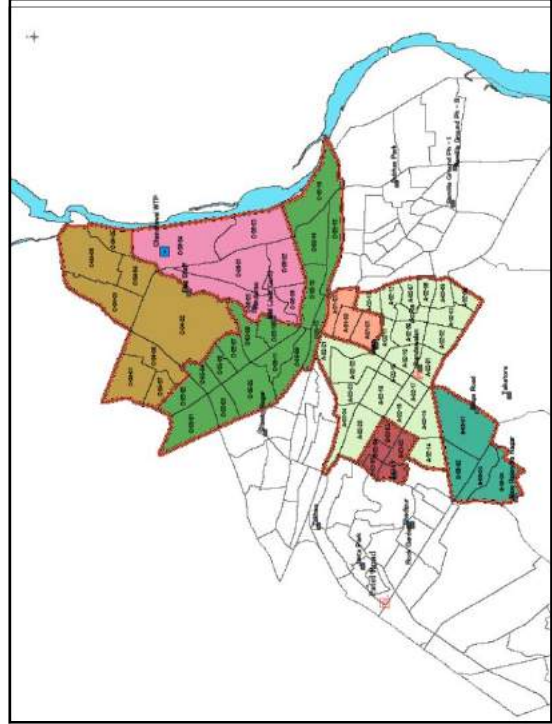
Zoning and DMA -- Visualization of Essential Information --

Wants to know the following information?

- * Flow - where and how much water is going?
- * Pressure – which area customers will not receive water?
- * Pressure – which area customers will receive too much water unnecessarily?
- * Non-revenue Water – where water is lost?

Visualization is required! – DMA creation!

6



SCADA System -- Tool to visualize information -- in DMA

- * Monitoring flow and pressure
- * Controlling flow and pressure
- * Visualizing NRW in DMA
 - * Inflow to DMA
 - * billed water volume (RMS system in Revenue department)
 - * Calculation of NRW in DMA cell
 - * Tackles NRW in high-NRW DMA (effective investment)

8

Purpose of the Seminar (2) Experiences of Tokyo


- To share the lessons learnt from the Project implementation in reflection with Tokyo's experiences
- Bureau of Waterworks of Tokyo Metropolitan Government would share the lessons learnt from this Project, reflecting the outcomes of the Project and experiences of Bureau of Waterworks.

9

Schedule

Time	Topics	Speaker
10:30 – 10:30	Key Note Address	Mr. Anil Kumar Singh, CEO of DJB
10:30 – 10:40	Key Note Address	Mr. Sakamoto, Chief Representative of JICA India Office
10:40 – 10:50	Key Note Address	Chief Secretary, Government of NCT of Delhi
10:50 – 11:20	Coffee Break	
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11:30 – 12:00	SCADA System in Pitampura Pilot Project	Mr. Rastogi, EE (E & M), Mr. Fukushima
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10

 **JICA** Chief


Innovative and Equitable Water Distribution Service for Delhi
– Learning from the Joint Technical Cooperation–

27th February, 2018
@Le Meridien New Delhi

Mr. Takema Sakamoto,
Chief Representative, JICA India Office

1

Japan International Cooperation Agency

 **JICA** Chief

Key Messages from JICA Chief

1. India is the **special** partner of JICA. Our portfolio is growing steadily.
2. **Speedy progress** and **quick impact** are our common targets.
3. **Quality Infrastructure** towards **sustainable, resilient** and **inclusive** impact is also to be pursued.

2

Japan International Cooperation Agency


 **JICA** Chief

Key Messages from JICA Chief

1. Support to Delhi: **19 Projects** (JPY 1,096 billion; **INR 70,000 Cr.**).
2. Strategic and comprehensive cooperation with **DJB** for Quality Infrastructure
 - ① Master Plan of Delhi Water 2021
 - ② Delhi Water Supply (Loan, INR 1,700 Cr.)
 - ③ Capacity Development to Delhi Water Supply (Technical Cooperation)
 - ④ Yamuna Action Plan Project (Loan, INR 4,000 Cr.)

3

Japan International Cooperation Agency

 **JICA** Chief

Key Messages from JICA Chief

Major Outputs of the Project (TC);

India's 1st SCADA system with Water-Controlled Valves.

- Equitable water distribution among DMAs (District Metered Areas)
- Reduction of NRW

*Tangible infrastructure
*Capacity development / Efficiency improvement


4

Japan International Cooperation Agency

Key Messages from JICA Chief

Way Forward;

1. **Sustainability.**
 - O&M.
 - Revenue improvement.
 - Public awareness.
2. **Dissemination to other areas.**
 - Pitampura pilot area as a model case - Apply to Loan Project.
 - Replication in other areas of India.

 Japan International Cooperation Agency

Thank you!
धन्यवाद

JICA INDIA OFFICE WEBSITE
[HTTPS://WWW.JICA.GO.JP/INDIA/ENGLISH/INDEX.HTML](https://www.jica.go.jp/india/english/index.html)
MESSAGE FROM CHIEF REPRESENTATIVE
[HTTPS://WWW.JICA.GO.JP/INDIA/ENGLISH/OFFICE/ABOUT/MESSAGE.HTML](https://www.jica.go.jp/india/english/office/about/message.html)

 5
Japan International Cooperation Agency

Delhi Seminar
27 February 2018

Tokyo's Experiences

Atsushi MASUKO, Dr. Eng.
President of TSS Tokyo Water

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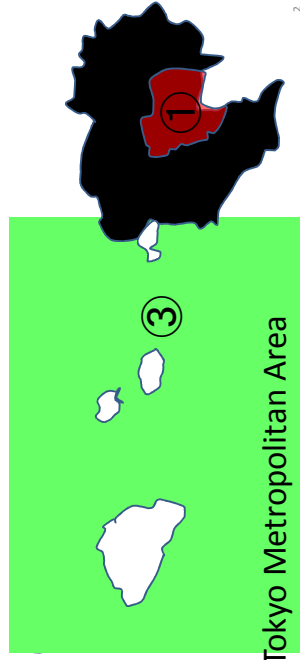
Today's Topics

- M&A History of Tokyo Waterworks
- Water Tariff Income and Bond Issues
- NRW Reduction Methods

1

M&A History of Tokyo Waterworks

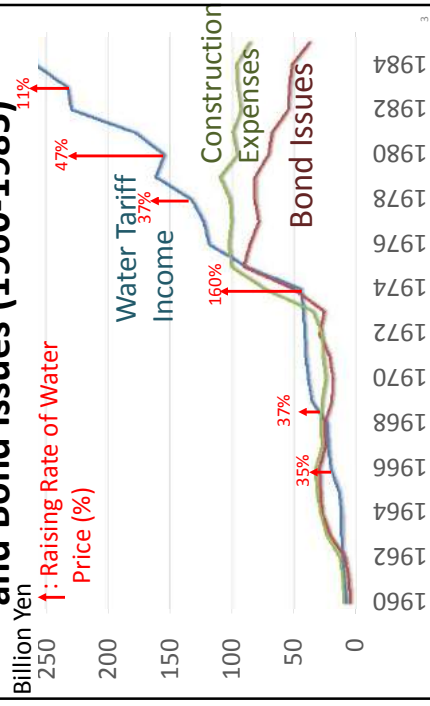
- ① **Tokyo City Waterworks** (1898-1932)
- ② **City Expansion & M&A of Surroundings** (-1945)
- ③ **M&A of Remaining Utilities** (1973-2017)



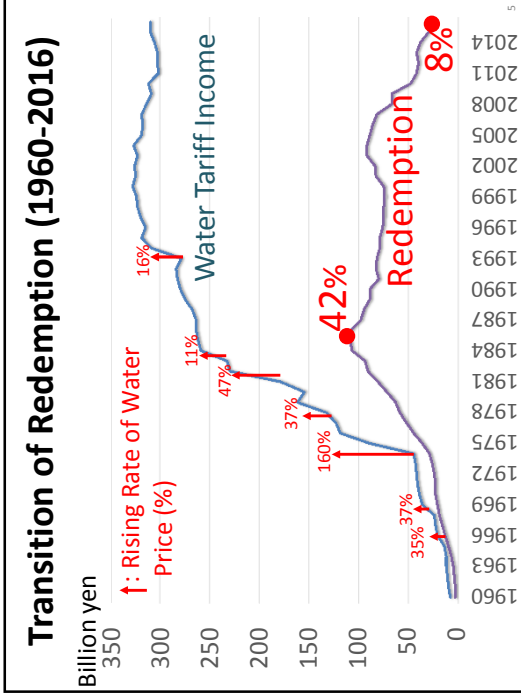
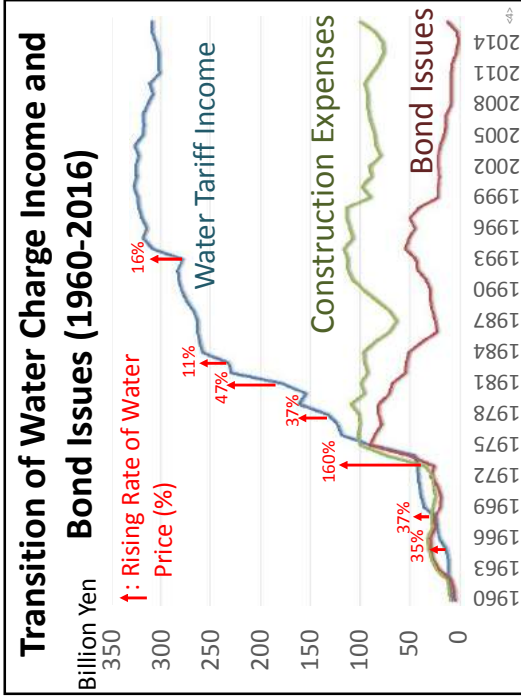
Tokyo Metropolitan Area

2

Transition of Water Tariff Income and Bond Issues (1960-1985)



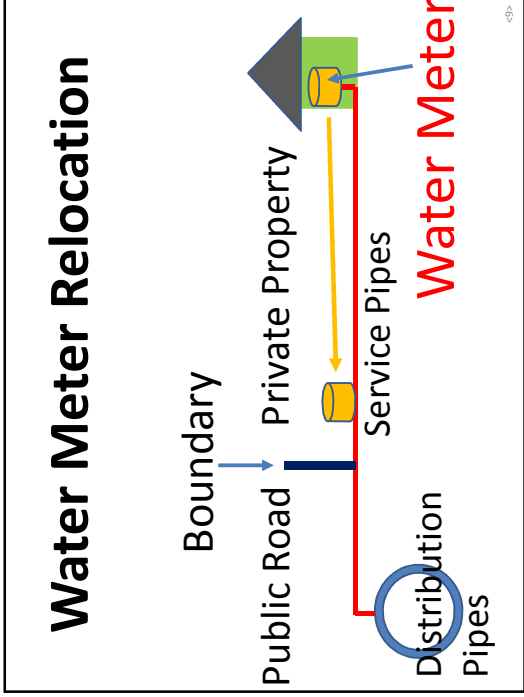
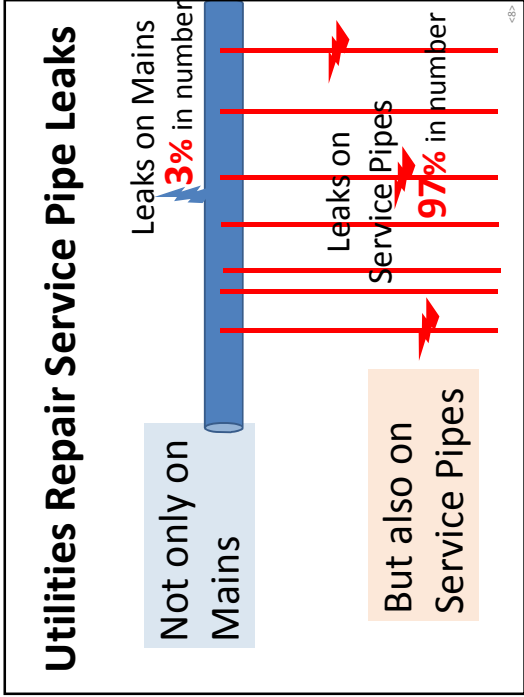
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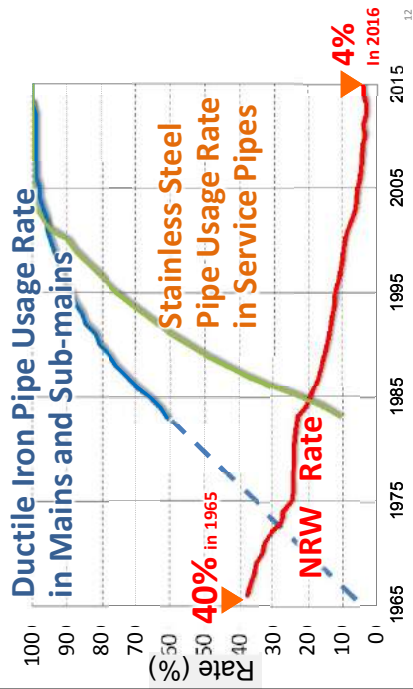
Lessons About Funds

- Depending upon Bonds is One Solution
- Price Increases and Debt Issuing are to be Well-Combined
- Social Economy Growth Reduces Debt

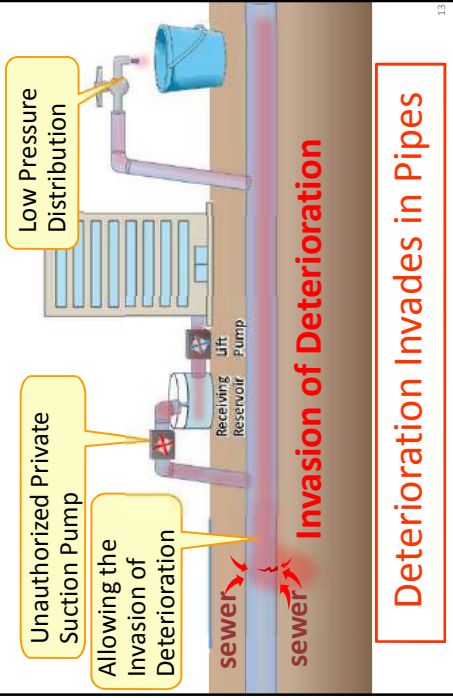
NRW Reduction Methods



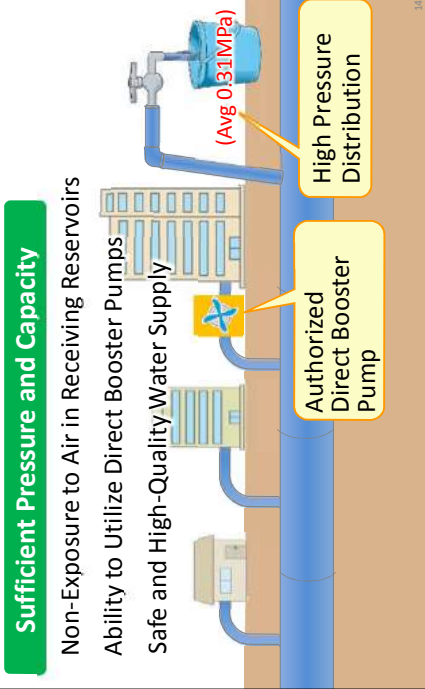
NRW Reduction in Tokyo



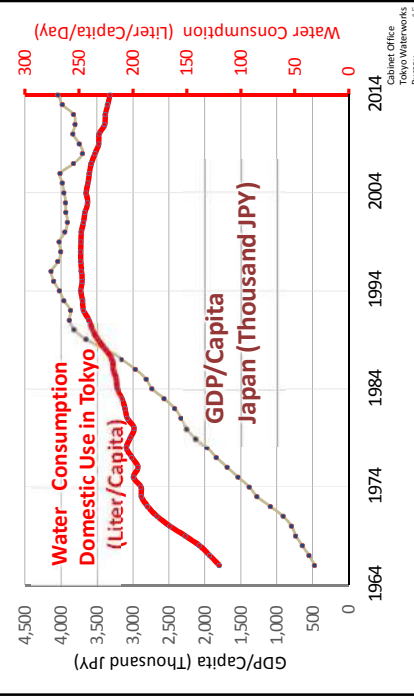
If Pressure is Low ?



Merits of Higher Pressure



Changes of Consumption in Tokyo



**To Realize
a 24/7 Water Supply**

<div>

SCADA System for Pitampura Pilot Project

Gaurav Yadav, A. E. (NW) E&M, Delhi Jal Board

The Assistance Related to Delhi Water Supply Improvement Project 1

Goal for the pilot project

- The pilot project intends to obtain the technical know-how on how to control valves for equitable water distribution and to minimize water pressure difference within DMAs.
- It also intends to obtain knowledge on how to measure NRW.
- SCADA system would prove to be a very effective tool for solving NRW issue. Valve adjustment enables equitable water supply and also it can measure the difference between quantity of water at inlet and the actual usage amount.

Target Achievement

Target Achievement of DJB's staff are as follows;

- Understand the basics of SCADA system.
- Operation of SCADA system for equitable distribution and NRW reduction.
- Develop Guideline on SCADA operation and NRW measurement.
- Operation and maintenance of SCADA.
- Utilize the SCADA system as the training facility.

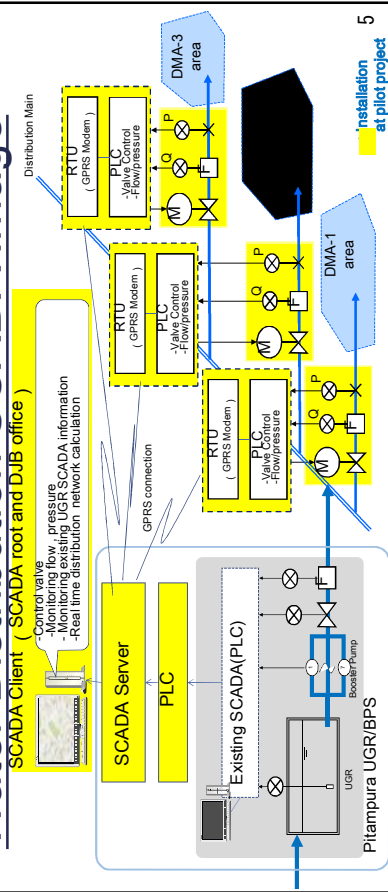
3

Water Distribution SCADA system

- SCADA systems for Water Treatment Plant are already in use at DJB and at other sites across India but this is the first attempt to use SCADA for water distribution control to achieve Equitable Distribution and Non-Revenue Water Management in India.
- Water Distribution SCADA monitors the water supply condition in real time, and operate the valves to control flow/pressure in the selected DMAs and selected control points.

4

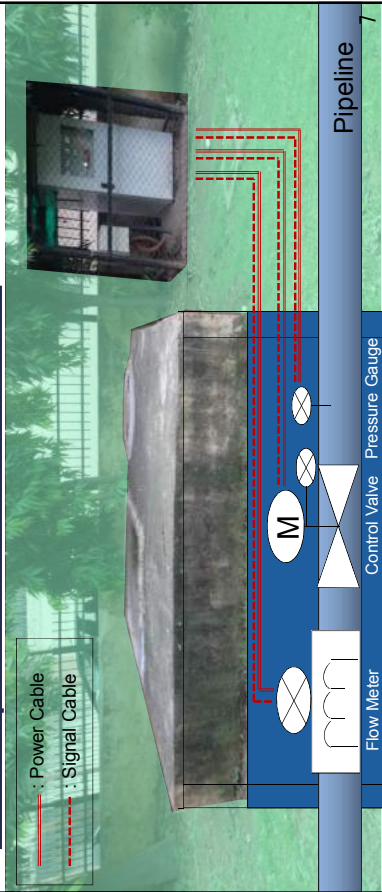
Water Distribution SCADA Image



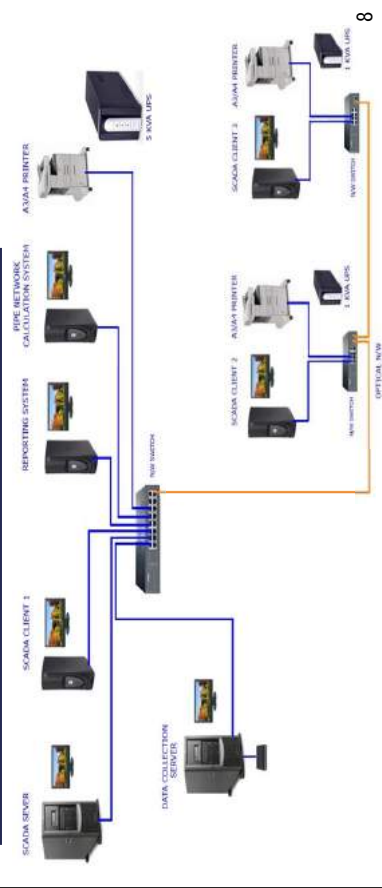
Major Equipment's Installed

S.N.	Description	No.	S.N.	Description	No.
Pressure Gauges					
1	Pressure Gauges	21	SCADA Components		
			1	PLC with peripheral devices	14
			2	Valve Control circuit, outdoor type	14
			3	Wireless transmission unit	14
Control Valves with Actuators					
1	Pipe diameter 100mm	1	Pipe diameter 100mm		1
2	150mm	3	150mm		3
3	200mm	2	200mm		3
4	250mm	2	250mm		2
5	300mm	1	300mm		1
6	500mm	2	500mm		2
7	800mm	1	800mm		1
8	900mm	1	900mm		1
	Total	13	Total		14
Electricity Leakage Protection					
1	Water level alarm system	14	2	Earth leakage circuit breaker	14
					6

Local panel and chamber



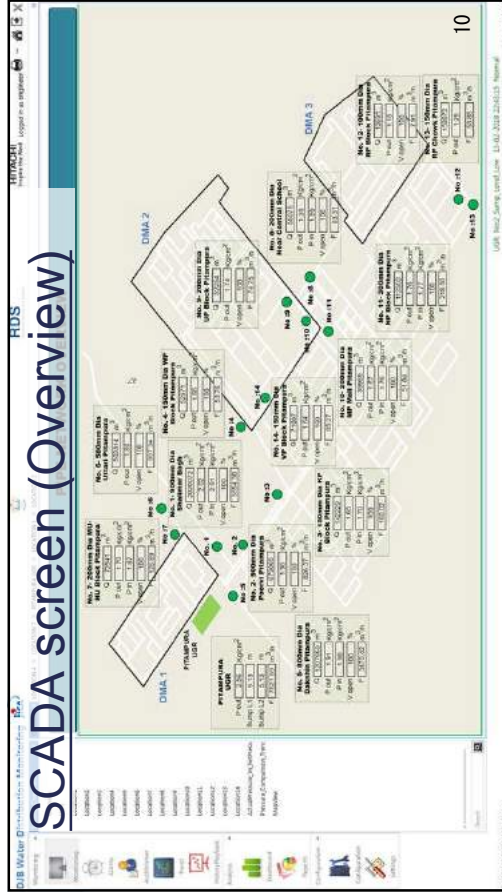
SCADA Server and Clients



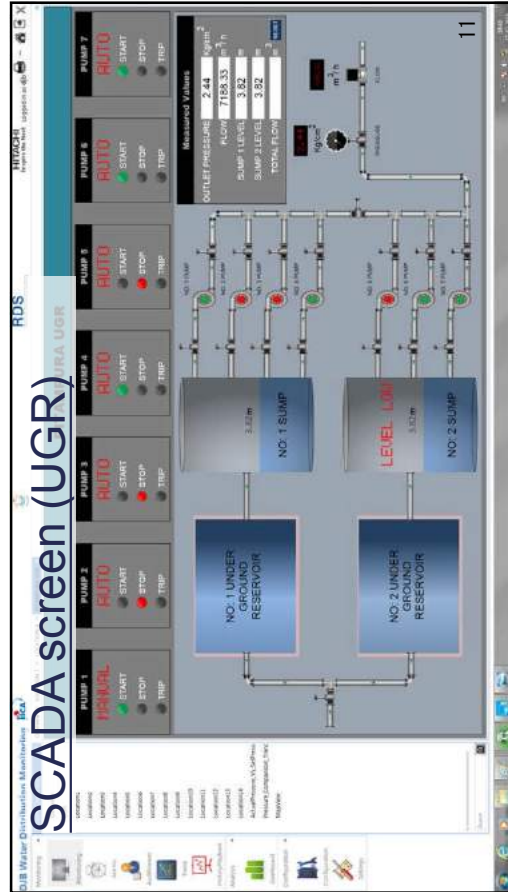
Features of this SCADA system

- Monitoring of flow/pressure.
- Control of valves through the SCADA.
- Transfer of information from the existing UGR SCADA.
- Installation of exterior measurement stations and GPRS transmission for the water distribution pipeline network.
- Real time distribution network calculation.

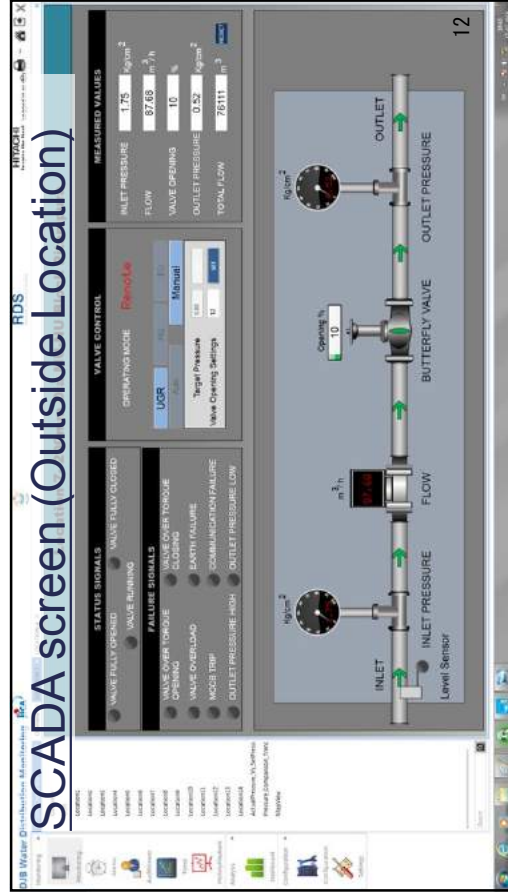
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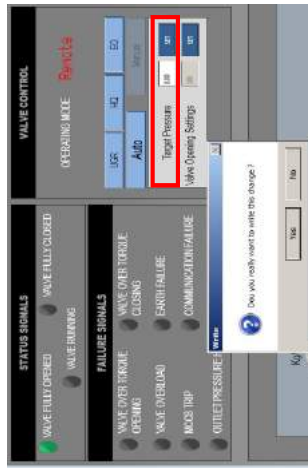
11



12

Auto Mode:

1. Select "Auto mode" from SCADA screen and then select "Yes" if you want to Set Target Pressure at the Output of the Valve
2. Then give Target Pressure Setting from 0 to 10 Kg/Cm² from the SCADA and Press SET and then select "Yes".



13

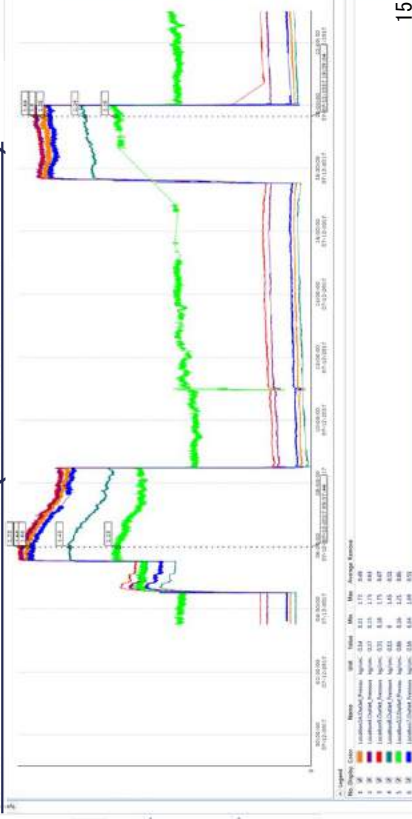
Manual Mode:

1. Select Manual mode from SCADA screen & Select Yes if you want to give Valve position setting
2. Then give Valve Opening Setting from 0 to 100 % & Select Yes



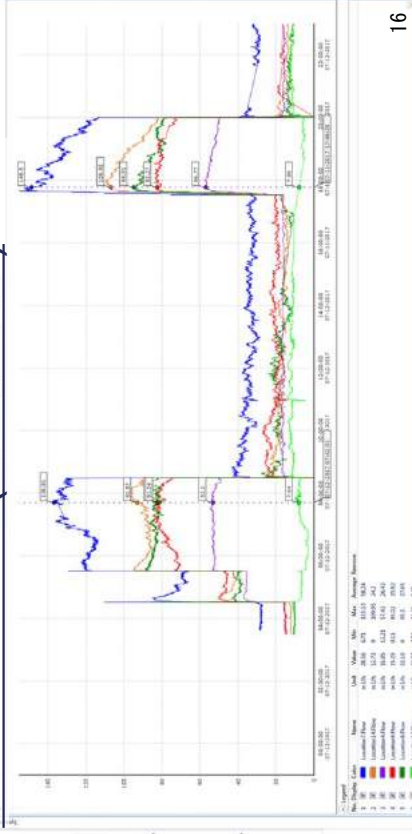
14

SCADA screen (Pressure Trend)



15

SCADA screen (Flow Trend)



16

Guideline for equitable water distribution and NRW management

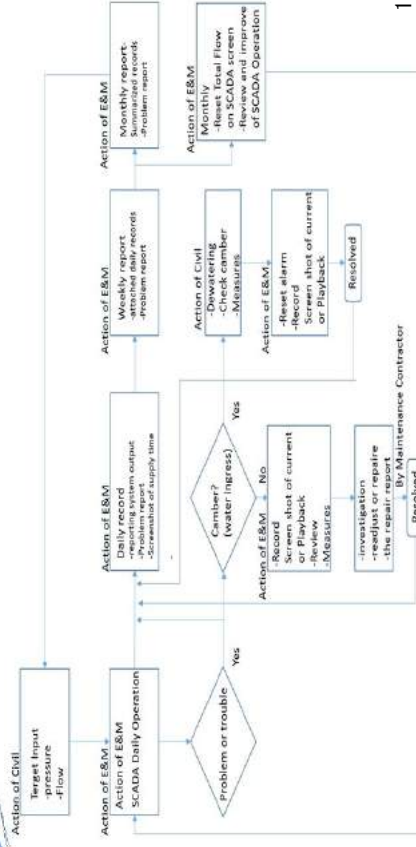
- CHAPTER 1 Introduction
 - Necessity and Objective of equitable water distribution and NRW management
- CHAPTER 2 Water Distribution SCADA
 - What is SCADA, Water Distribution SCADA
 - In the Pilot Project at Pitampura Command Area
- CHAPTER 3 Operation and Maintenance process
 - Reporting and instruction system for operation and maintenance of SCADA system
- CHAPTER 4 Operation for equalizing to each DMAs
 - Target Pressure setting
 - Controlling to target Pressure
- CHAPTER 5 Calculate procedure NRW ratio
 - Definition of Non-Revenue Water, Six Stages of NRW Reduction Measures
 - Selective measurement by Distribution Block
 - How to calculate NRW...



Sl. No.	Name of the Staff	Designation	Department
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2			
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17

Guideline for Equitable water distribution and NRW management



18

Trainings

- Trainings are organized continuously by training cell assisted by CE (West).



Training of SCADA



Training for other DJB staff by DJB Trainer

19

Trainings (Long term training plan of SCADA)

One Day Management Development Training Programme
On SCADA System & Operation

Venue: MU Block Pitampura, BPS

Level of Participant: Civil, E&M Engineer and ZRO's of all area

Trainer: EE, ZE, AE, JE (NW) III, (NW) E&M

"Understand Distribution SCADA with equitable distribution control and NRW calculation"

Contents of the Programme:

- Handing of SCADA room Component
- Handing of Chamber and outside panel
- Operation of SCADA (Control Valve) and Supply time monitoring for equitable distribution and NRW reduction

Training schedule: March, 2018 – December, 2022

2018		2019			2020			2021			2022												
S.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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20

CONCLUSION

- SCADA system for the distribution network has been introduced as a pilot for the successful utilization of the system in the Japanese ODA Loan project.
- Guidelines have been developed under this project.
- The skills of operating SCADA has been acquired.
- The training system has been established with creating trainers. The training will be conducted on a regular basis from March.

21

Challenges for the future

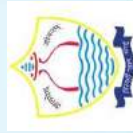
- Surely accumulating and reporting the data in SCADA by continuous communication with local station
- Minimizing failures and error by annual maintenance program
- Managing of accuracy and enhancing of flowmeter and pressure gauge
- Updating to smart Distribution SCADA system.
- Continuously automatic controls the UGR pump and all the valves in a coordinated manner

22

Thank You for your kind attention.

The Assistance Related to Delhi Water Supply Improvement Project

Non-Revenue Water



Mukesh Jindal
EXECUTIVE ENGINEER
DELHI JAL BOARD

1

Contents

1. Importance of NRW Reduction
2. Overview
3. Proportion of NRW Components
4. NRW Ratio
5. District Metered Area (DMA)
6. Practical of SCADA System
7. Findings
8. Our Mission (General)
9. Conclusion

2

1. Importance of NRW Reduction

- Primary objective of water utilities is to secure sustainable management in the future.
- For that it is important to remove negative factors and increase positive ones that affect sound management of water utilities.
- One of the most effective ways is to **reduce NRW**.

3

2. Overview

Water Balance Table of IWA			
System Input Volume	Authorized Consumption	Billed Authorized Consumption	Billed Metered Consumption
Water Losses	Unbilled Authorized Consumption Apparent(Commercial) Losses (Non-physical Losses) Real Losses (Physical Losses)	Unbilled Metered Consumption	Unbilled Unmetered Consumption
		Unbilled Unmetered Consumption	Unmetered Consumption
		Unauthorized Consumption	Customer Metering Inaccuracies
		Leakage on Transmission and Distribution Mains	Leakage and Overflows at Utility's Storage Tanks
		Leakage on Service Connections up to point of Customer metering	Leakage on Service Connections up to point of Customer metering
			Revenue Water
			Non-Revenue Water (NRW)

4

3. Major Components contributing to NRW

- Generally, leakage accounts for a large part of NRW.
- However, in Delhi losses due to water-theft and metering inaccuracy also account for considerable part of NRW.

5

4. NRW Ratio

NRW is defined as amount of water which is not billed and does not earn revenue.

NRW = System input Volume - Billed Authorized Consumption Volume

Where;

System input volume is the volume of distributed water obtained from **SCADA system**.

Billed Authorized Consumption Volume is the volume of water billed obtain from **RMS**.

NRW ratio is percentage of amount of water not billed against the total water supplied for distribution.

6

$$\text{NRW}(\%) = \frac{\text{Non Revenue Water Volume}}{\text{System input Volume}} \times 100\%$$

Where;

NRW ratio is percentage of amount of water not billed against the total water supplied for distribution.

7

Pitampura DMA



8

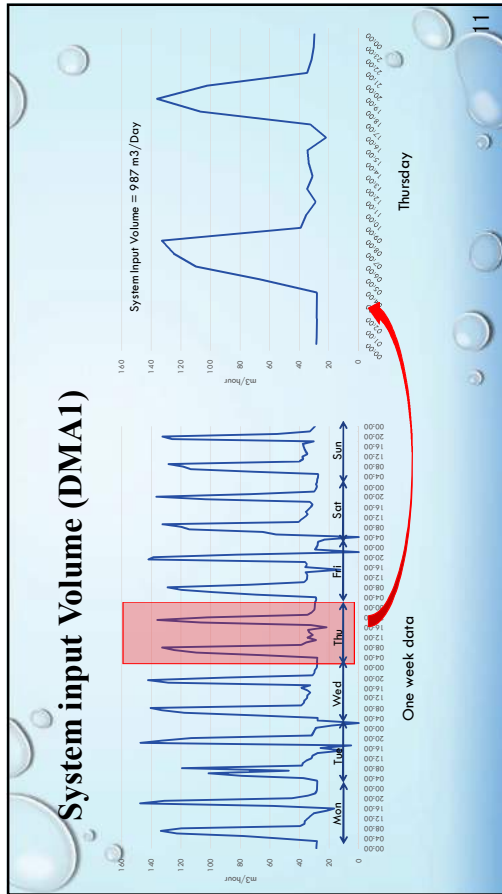
Confirmation of Isolated DMA (DMA1)

	Before	After
V-open	100%	0%
V-close	Open	Close
P : inside of DMA	1.41	0.00
P : outside of DMA	1.59	1.59

When Valve is closed, since the water pressure in DMA has become 0, there are no other pipelines connected to the DMA

Billed Authorized Consumption Volume (DMA1)

Meter	Billed Authorized Consumption (M3/Day)
MU 486	250
NU 310	142
total	392

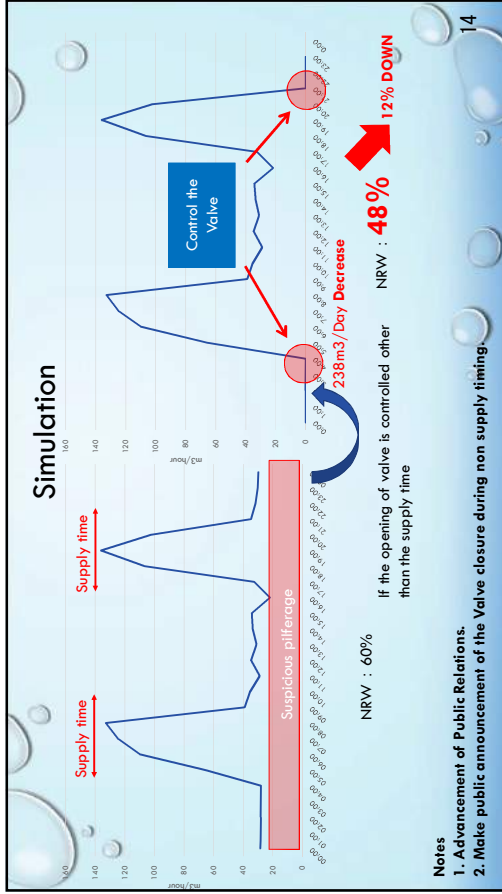
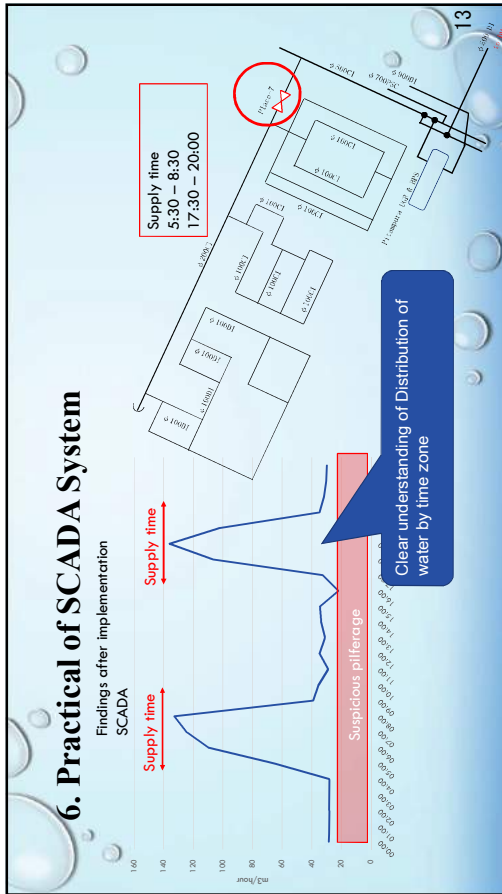


NRW Ratio

$$NRW(\%) = \frac{\text{Non Revenue Water Volume}}{\text{System input Volume}} \times 100\%$$

$$NRW(\%) = \frac{987 - 392 = 595}{987} \times 100\% = 60\%$$

	Billed Authorized Consumption (M3/Day)	System Input Volume SCADA (M3/Day)	NRW
DMA1	392	987	60%



7. Findings

1. Billed Authorized Consumption Volume data is organized, but need to achieve proper accuracy for lesser defects.
2. By using SCADA data, we can understand the amount of water distribution per hour, we can quantitatively analyse and simulate the water distribution.

15

8. Our Mission (How DJB will reduce NRW ratio)

Construction & Billing	Research
Replacement of Asbestos Cement Pipe (AC) / old distribution pipe / service pipes	Update Pipeline Map
Replacement of water meter	Leakage detection
Incorporation of all non revenue generating connections into billed consumption accurately.	Achieve billing accuracy

AND

UP! → Good impression

Improve the image of DJB

Public education, information and communication

16

9. Conclusion

1. The present Pirampura's NRW calculation will be **continued** along with other 33 DMA by DMA Cell
2. DJB will **continue** to use Pirampura pilot area as a training model.

17

TRIAL FOR EQUITABLE WATER DISTRIBUTION

ACHIEVEMENT TARGET:

- THE GAP AMONG DMA's WATER PRESSURE AND VOLUME IS TRYING TO BE REDUCED BY OPERATING SCADA SYSTEM.

18

TRIAL FOR EQUITABLE WATER DISTRIBUTION

The gap among DMAs in water pressure is reduced

BEFORE SCADA OPERATION

A gap of 0.54 kg/cm² (5.4 m) existed.

DMA	Location No.	Baseline
1	7	1.54
2	14	1.57
3	8	1.31

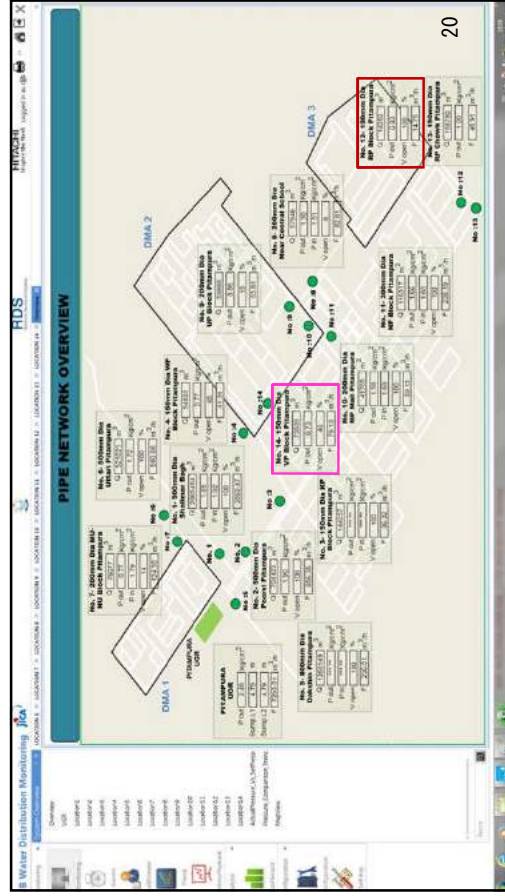
AFTER SCADA OPERATION

The gap was reduced to 0.06 kg/cm² (0.60 m).

DMA	Location No.	Baseline
1	7	0.77
2	14	0.73
3	8	1.30

Note: The work of isolating of DMAs is in progress.

19



20

TRIAL FOR EQUITABLE WATER DISTRIBUTION

The gap in supply volume per service connection is reduced

BEFORE SCADA OPERATION

A gap of 0.35 m3 per connection per day existed.

DMA	Location No.	Flow (m3/day)	Connection	Baseline
1	7	599.4	821	0.73
2	14	560.9	2015	0.62
3	12	37.4	566	0.97

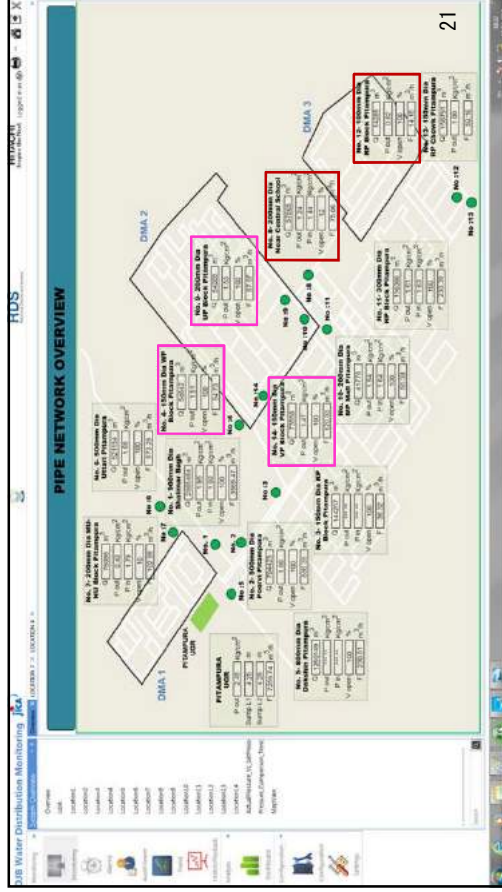
AFTER SCADA OPERATION

The gap was reduced to 0.14 m3 per connection per day.

DMA	Location No.	Flow (m3/h)	Flow (m3/day)	Connection	Baseline
1	7	103.0	509.0	821	0.62
2	14	120.3	571.4	2015	0.62
3	8	75.1	362.4	566	0.76

Note: The work of isolating of DMAs is in progress

21



CONCLUSION

- IN THE TRIAL RUN FOR THE EQUITABLE WATER DISTRIBUTION, THE GAP MINIMIZED IN WATER PRESSURE AND VOLUME AMONG DMAS.

23

WAY FORWARD

- GUARANTEEING THE EACH DMAs REMAIN ISOLATED
- FREQUENT UPDATION OF GIS PIPING DATA WITH ACCURACY FOR DMA ISOLATION
- RENOVATING PIPELINE NETWORK (ROUTE, DIAMETER, ETC.) PROPERLY

24

CHALLENGES FOR THE FUTURE

- **STEP1: ENSURING THE AMOUNT OF WATER BY REDUCING NRW.**
- **STEP2: AFTER SECURING THE WATER VOLUME, INCREASE THE DISCHARGE PRESSURE OF UGR/BPS**
- **STEP3: SHIFTING TO 24X7 WATER SUPPLY AND STOPPING INDIVIDUAL BOOSTER PUMPS AND STORAGE BY CONSUMER ENDS.**

25



Thank you for your cooperation and attention!!

26

Toward development of Delhi's water supply ~Current issues and future visions~

The Final Seminar Under
"The Assistance Related To Delhi Water Supply Improvement Project"

27th February, 2018 (Tuesday)
@Le Meridien New Delhi India

Waterworks Bureau of Tokyo Metropolitan Government
Yamamoto Yoichi
<yamamoto-yoichi@waterworks.metro.tokyo.jp>

1

Good afternoon, Ladies and gentlemen.
Deviyo aur sajjano. Aapko mera Namshkar.

My name is YAMAMOTO, Tokyo Metropolitan Waterworks Bureau.
Mera naam Yamamoto hai. Main Tokyo Metropolitan Waterworks
Bureau se hun.

It's been a while since we met at the fifth seminar in August last year.
Hum pichli baar 5th seminar ke waqt August me mile the.

I studied Hindi for three years for communicating and make a good
relationship with DJB staff.

Main pichle teen saalo se Hindi seekh raha hun, taki main DJB ke
adhikariyo se acche sambandh bana saku.

I thought of giving my whole presentation in Hindi but almost forgot
that I can do more than basic greetings. So I will speak English.

Mian apna sara presentation Hindi me karna chhta tha par muze yaad aaya
ki muzhe bas thodi si hindi aati hai. Ab main apna baki presentation English
me karunga.

2

Contents

1 The Assistance Related To Delhi Water Supply Improvement Project

2 The Present situation and Future destination in DJB ~From the Track of Tokyo Metropolitan Waterworks Bureau~

3 Looking back on the Technical Assistance Activity

4 At the end of the Final Seminar



3

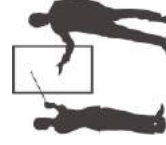
Contents

1 The Assistance Related To Delhi Water Supply Improvement Project

2 The Present situation and Future destination in DJB ~From the Track of Tokyo Metropolitan Waterworks Bureau~

3 Looking back on the Technical Assistance Activity

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4

1 The Assistance Related To Delhi Water Supply Improvement Project

General Information of Technical Assistance

- ◆ Title of the Project
The Assistance Related to Delhi Water Supply Improvement Project
- ◆ The Project Period
From June.2013
- ◆ Overall Goal
To achieve the equitable and continuous water supply in the Capital of Delhi
- ◆ Project Purpose
DJB's capacity to implement, operate and maintain "Delhi water supply improvement project" is strengthened.
- ◆ Outputs
 - Activity1 Strengthening capacity to manage data and information on water supply facilitated in Chandrawal command area
 - Activity2 Upgrading capacity to monitor and control the water distribution
 - Activity3 Draft of scenarios for stage wise development of GIS/RMS application in DJB

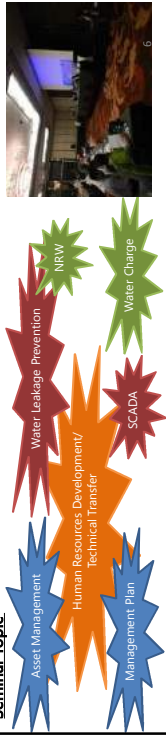
5

1 The Assistance Related To Delhi Water Supply Improvement Project

DJB-JICA Delhi Seminar

1st	Aug.30.2013	Outline of Tokyo Waterworks and Approach for Sustainable Management Facility Improvement of Tokyo Waterworks
2nd	Mar.6.2014	Management policy and financial management through mid and long term perspective
3rd	Aug.27.2014	NRW Reduction Measures by Management Improvement
4th	Mar.3.2015	Prevention of water leakage in Tokyo Efforts of Asset Management at the Bureau of Waterworks, Tokyo Metropolitan Government - Database and Renewal Plan -
5th	Aug.29.2017	Rate Systems for Sound Management The realization of Equitable Water Supply and the management of NRW ~ The Installation of SCADA System ~ Human Resources Development for Sustainable Water Supply Business - Examples of Tokyo Metropolitan Waterworks Bureau -

Seminar Topic

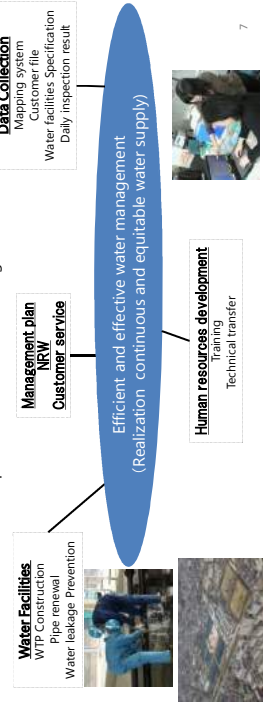


6

1 The Assistance Related To Delhi Water Supply Improvement Project

Characteristic of the Project

- ◆ Technical Assistance so far
There are special problem and technical transfer such as water leakage prevention and water quality improvement.
⇒ The project results in the strengthening capacity of special Technical field, but there are various problems which should be solved such as water charge and customer service and so on.
- ☆ Characteristic of the Project
In this project, JICA Expert worked on the improvement of wide-ranging field of DJB not only technical but also business problem such as Asset management.



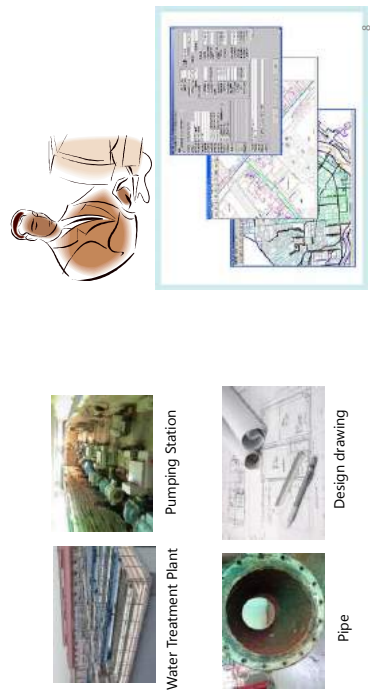
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1 The Assistance Related To Delhi Water Supply Improvement Project

The point of activity 1 and future image

The point of activity 1

Obtaining necessary information for detailed design of Delhi water supply improvement project



8

1 The Assistance Related To Delhi Water Supply Improvement Project
The point of activity 1 and future image

Future image in DJB

- ◆ Efficient water facility maintenance (Water Treatment Plants, Pumping Stations, UGRS)
 - ☆ Grasping installed equipment status
 - ☆ Prompt action of disordered equipment repair
- ◆ Planned improvement of aged water facilities and pipe
 - ☆ Make an appropriate renewal plan
 - ☆ Distribute budget purposefully
- ◆ Realization prompt water leakage repair
 - ☆ Grasping of leakage (repair) information in advance
 - ☆ Enhancement of customer service

9

1 The Assistance Related To Delhi Water Supply Improvement Project
The point of activity 2 and future image

The point of activity 2

Equitable water supply by SCADA system, Management of NRW (@Pitampura pilot project area)



SCADA



Example of SCADA display



Water meters

10

1 The Assistance Related To Delhi Water Supply Improvement Project
The point of activity 2 and future image

Future image in DJB

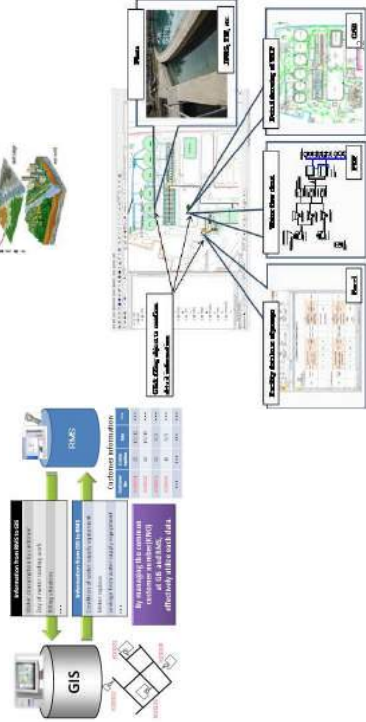
- ◆ Technical transfer to water facility operation staff in DJB
 - ☆ Realization efficient water facility operation by SCADA system
- ◆ Grasping of NRW ratio
 - ☆ Clarification of water business problem
 - ☆ Decreasing water leakage ratio
- ◆ Realization 24x7 continuous and equitable water supply
 - ☆ Decreasing complaint from customers
 - ☆ Increasing revenue from water charge

11

1 The Assistance Related To Delhi Water Supply Improvement Project
The point of activity 3 and future image

The point of activity 3

- Finding effective utilizing way of GIS and RMS in DJB
- Preparing guideline for asset management



1. The Assistance Related To Delhi Water Supply Improvement Project

The point of activity 3 and future image

Future image in DJB

- ◆ Preparing mid-long term water management plan and efficient water management
 - ☆Accountability to water users
 - ☆Ensuring transparency in business dealing
- ◆ Creating future water facility renewal plan
 - ☆ Realization of stable water supply
 - ☆ Equalization of construction budget



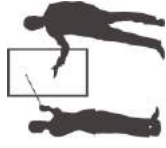
Overall goal

- ◎ Stable supply of water business
- ◎ Stable supply of safe and tasty water for 24hours×7days

13

Contents

- 1 The Assistance Related To Delhi Water Supply Improvement Project
- 2 The Present situation and Future destination in DJB
~From the Track of Tokyo Metropolitan Waterworks Bureau~
- 3 Looking back on the Technical Assistance Activity
- 4 At the end of the Final Seminar

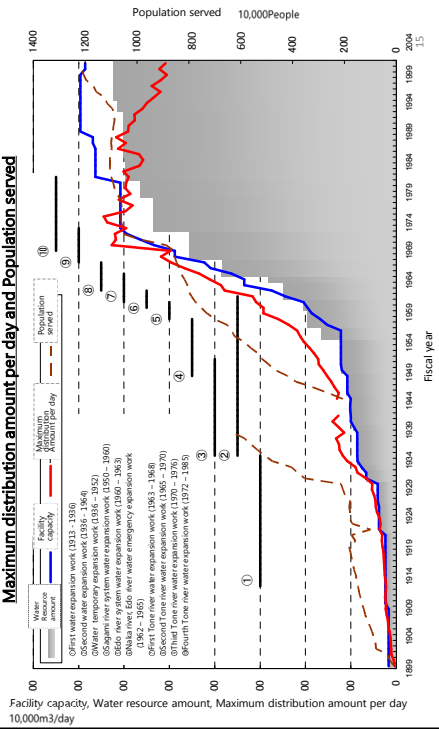


14

2 The Present situation and Future destination in DJB

~From the Track of Tokyo Metropolitan Waterworks Bureau~

Transition of Water resource amount, Facility capacity, Maximum distribution amount per day and Population served



15

2 The Present situation and Future destination in DJB

~From the Track of Tokyo Metropolitan Waterworks Bureau~

- Contamination of channels and the rotting of wooden conduits
- Water supply by gravity



Wooden conduits



Construction of Yodobashi water treatment plant


16

2 The Present situation and Future destination in DJB


~From the Track of Tokyo Metropolitan Waterworks Bureau~

- Rapidly developed in Tokyo Metropolis area
- Increased water demand and distribution amount
- Post-war restoration

- Waterworks expansion



Completion of Higashimurayama WTP



Post-war restoration


17

2 The Present situation and Future destination in DJB

~From the Track of Tokyo Metropolitan Waterworks Bureau~

- Water demands increased rapidly
- ⇒ Double in 20years
- Lack of water resources and frequent water shortage

- Waterworks expansion
- Construction of Dam
- New water resources development



Construction of Big water Dam


18

2 The Present situation and Future destination in DJB

~From the Track of Tokyo Metropolitan Waterworks Bureau~

- Customer's needs changed from quantity to quality
- Difficulty of water resources development

Water quality (safety, tasty)
Stable water supply



The necessity of limited precious water utilization and improvement of water leakage

19

2 The Present situation and Future destination in DJB

~From the Track of Tokyo Metropolitan Waterworks Bureau~

Requirement of waterworks development Technique

Preparation of rules and regulations

- Establishment of water facility construction technical standard
- ⇒ Concrete indicator of facility construction
- Establishment of water quality criteria
- ⇒ Establishment and strengthening of water quality management structure


Adoption of appropriate water technique

- Epidemic measure Water treatment (slow sand filter, rapid sand filter), Obligation of chlorine disinfection
- Complication and diversification of water quality problem
- ⇒ Installation of advanced water treatment and membrane treatment
- Improvement of water pipe material (earthquake-resistant, declination of water leakage rate)


Premeditative facility construction and expansion

- Forecast and planning in the future

Realization advanced water facility



Sakai water treatment plant
(Slow sand filter)



Advanced water treatment facility
(Ozone injection)

20

2 The Present situation and Future destination in DJB

~From the Track of Tokyo Metropolitan Waterworks Bureau~
Requirement of waterworks development... Finance

Institutionalization of cost recovery by charge collection

- Establishment of self-supporting system as municipal utility
- Full-cost pricing

Institutionalization of financing method for facilities construction

- State subsidy system
- Public bond system

Securing the water facility construction finance

21

Contents

- 1 The Assistance Related To Delhi Water Supply Improvement Project
- 2 The Present situation and Future destination in DJB
~From the Track of Tokyo Metropolitan Waterworks Bureau~
- 3 Looking back on the Technical Assistance Activity
- 4 At the end of the Final Seminar

22

3 Looking back on the Technical Assistance Activity

Activity 1 (Customer Service/Leakage, water quality, Pipe accident)

Prompt water leakage repair by utilization of Mapping system

- Notify water leakage to customer center and area branch office
- Mobilization for investigation and repair

Before mobilization

- Prepare necessary data such as Mapping drawing figure
- Confirm pipe information
- Assume water leakage cause

Notify water leakage point as much as before mobilization

- Repair under direct management
- Arrange maintenance shop

Utilization of Mapping system

23

3 Looking back on the Technical Assistance Activity

Activity 1 (Utilize at area branch office)

Development of effective mapping system data utilization

24

3 Looking back on the Technical Assistance Activity

Activity 3 (Preparing of mid-long term management plan)

Features of Infrastructure

- ▶ **Construction period**
It takes long time to complete commencing construction project.
The case of large scale water treatment plant, it takes 5 – 10 years
- ▶ **Running period**
Waterworks facilities are operated for a long period.
In some cases, it takes 50 – 100 years.

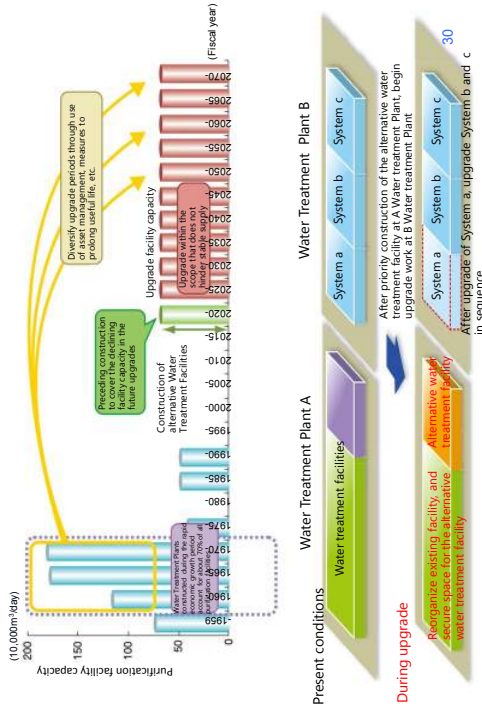


◆ Asaka WTP ◆

Considering usage and needs of waterworks after 50-100 years

3 Looking back on the Technical Assistance Activity

Activity 3 (Preparing of mid-long term management plan)



Contents

- 1 The Assistance Related To Delhi Water Supply Improvement Project**
- 2 The Present situation and Future destination in DJB**
~From the Track of Tokyo Metropolitan Waterworks Bureau~
- 3 Looking back on the Technical Assistance Activity**
- 4 At the end of the Final Seminar**



4 At the end of the Final Seminar

Three suggestions from our side

The First Suggestion

Preparing the future vision and management plan in DJB is very important

An example of WTP construction and Old WTP renewal work

- Consider future plan to improve old WTP in advance
- Construction cost is enormous
- 4 or 5 years to renew old WTP
- Restrict the renewal area
- Each system should improve = Capacity of WTP will be reduced by half

Construct new WTP for increasing of new demand (2 or 3 years)

Operate WTP (More than 50 years)

Expand System

Overly easy to construct WTP at a new land

- 2 or 3 years to construct new WTP
- More than 50 years should be operated and maintained

The First Stage (A system Renewal)

Improve the old WTP on system basis (4 or 5 years)

The Second Stage (B system Renewal)

★ It is necessary to prepare appropriate renewal plan taking the future into account.

★ Renewal cost is enormous. It is important to consider the finance plan based on the renewal plan.

4 At the end of the Final Seminar

Three suggestions from our side

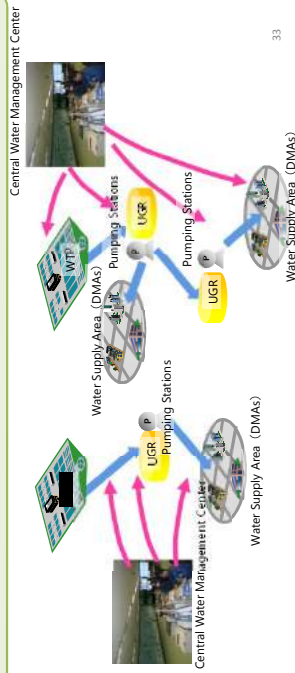
The Second Suggestion

Human resources development and technical transfer is very important

Anxiety of Water Supply Management→ Increasing contracting out to private water operation company

However many water facilities' operation in DIB is outsourced by private water operation company...

→DIB technical staff have responsibility to supervise contracting out company.
 →In order to supervise appropriately, DIB technical staff develop their capability and advance technical transfer to young technical staff.



33

4 At the end of the Final Seminar

Three suggestions from our side

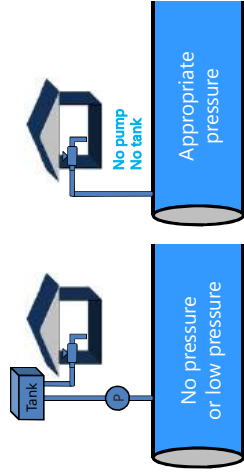
The Third Suggestion

○For removing the booster pump and water storage tank...

○For realization equitable water supply ...



☆It is necessary to secure the fully water pressure and distribution amount.



34

4 At the end of the Final Seminar

Three suggestions from our side

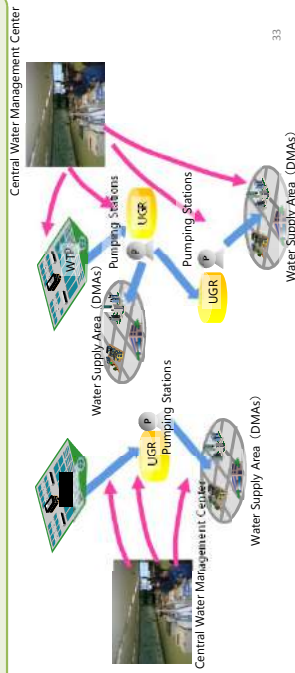
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33

4 At the end of the Final Seminar

Finally

From Technical Assistance

Data Management

- Mapping System

SCADA Installation

- Equitable Water Supply
- Non Revenue Water
- Telemeter (Pressure, pipe, Flow meter, Control Valve)

GIS & RMS / Asset Management

- GIS system
- Asset Management Guideline
- Management Plan

To Yen Loan
 (Chandrawal WTP Improvement Project)



35

Invitation to the IWA World Water Congress & Exhibition 2018, in Tokyo

Date: September 16th – 21st, 2018

Venue: Tokyo Big Sight

Number of participants: 6,000 people

(2,000 from abroad ;4,000 from Japan)

Attendees: Government officials, Water Utilities, and Companies, Researchers, etc.

Congress



Exhibition



36

Thank you very much



for your kind attention

37

Tokyo Metropolitan Waterworks Bureau is, together with Technical Assistance experts, ready to support and move forward hand in hand with the Delhi Jal Board, the capital city of Delhi and the state of India.

Tokyo Metropolitan Waterworks Bureau TA ke sath milkar DJB ka har prakar sahyog dete hue kandhe se kandha milakar chalna chahta hai.

I have appreciated your cooperation.

Aapke sahyog ka dhanyawaad.

Thank you very much for your kind attention.

Dhyan dene ke liye dhanyawaad

38

