भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन नदी विकास एवं गंगा संरक्षण विभाग
केंद्रीय जल आयोग
प्रदर्शन अवलोकन और प्रबंधन सुधार संगठन

सत्यमेव जयते

Government of India
Ministry of Jal Shakti
Dept. of Water Resources, RD&GR
Central Water Commission
Performance Overview & Management
Improvement Organisation (PO&MIO)

संख्या: T-44/1/2020-IPO/126-133 **दिनांक :** 22/01/2024

विषय:- Comments/Remarks on Chapters/Proposed Sections of "CWC GUIDELINES FOR PLANNING AND DESIGN OF PIPED IRRIGATION NETWORK-2017 provided by SIMP- Phase-2, PIN specialist consultant- Support for Irrigation Modernization Programme (SIMP)

Kind attention is invited to POMIO, CWC e-mail dated 19th Jan-2024 vide which the comments/Remarks on Chapters/Proposed Sections of CWC GUIDELINES FOR PLANNING AND DESIGN OF PIPED IRRIGATION NETWORK-2017 provided by PIN specialist consultant of SIMP Phase-2 was forwarded to you.

In this regard, the matter was also discussed during the meeting taken by Chairman on 19th Jan-2024 at 1800hrs and ***Chairman CWC desired that the comments/Remarks provided on Chapters/Proposed Sections by SIMP team needs to be taken up with appropriate concern wing /organisation/Directorate of CWC for their views and comments and further needful revision of guideline, if required.***

This issues with the consent of Chairman CWC.

Encl :-As above.

22/1/2024

(P.Dorje Gyamba)
Chief Engineer, POMIO,
BPL #3820

प्रति/To,

1. Director, TC Dte CWC, Sewa Bhawan, R.K Puram, New Delhi

प्रतिलिपि / Copy for Information to:-

1. PPS to Chairman CWC, Sewa Bhawan , R.K Puram, New Delhi
2. PPS to Member RM, CWC, Sewa Bhawan , R.K Puram, New Delhi
3. PPS to Member WP&P, CWC, Sewa Bhawan , R.K Puram, New Delhi
4. PPS to Member D&R, CWC, Sewa Bhawan , R.K Puram, New Delhi
5. Director, CB Dte / Director IPO Dte, PoMIO, CWC , New Delhi
6. Director, WP&P Coordination Dte , CWC, New Delhi
7. Mr Lance, ADB/ Mr Daniel/Mr Shiv Kumar/ Mr. Alan

INDIAN GUIDELINES FOR PIN, JULY 2017

SUGGESTED REVISED CONTENTS

Alan K Clark, Irrigation Specialist and ADB Consultant, SIMP-2

Chapter	Proposed Sections	Remarks
CHAPTER-1. INTRODUCTION	1.1 Overview 1.2 Classification of Pipe Systems 1.3 Advantages and Disadvantages of Pipe Systems compared to Canal Systems. 1.4 New Pipe Systems 1.5 Modernization of existing MM Canal Schemes using Pipes (refer Chapter **). 1.6 Types and Choice of Pipes 1.7 Design Process 1.8 Nomenclature 1.9 Review of Pipe Irrigation Systems in India and Internationally 1.10Content of Guideline Annex I. Pipe Diameters and Characteristics (uPVC, HDPE, etc.) Annex II. Review of Pipe Irrigation Systems in India and Internationally	Revise and expand existing Chapter to cover additional sections. The types of new pipe systems will be discussed, including gravity and pressure systems of various lifts and sizes. Adopting pipe systems to modernize MM canal systems will also be discussed and the implications briefly mentioned.
CHAPTER-2. PIPE IRRIGATION NETWORK PLANNING	2.1 Level of Service (distance to farm plot, irrigator flow, pressure) 2.2 Farmer Irrigation Infrastructure and Implications (tanks, dug wells, tubewells, pipes/ hoses, micro-irrigation equipment, irrigation practices, etc.) 2.3 Irrigation Water Demand, Application Method and Efficiency, Design Duty, and Pipe System Design Flow 2.4 Conjunctive Use Schemes 2.5 Irrigator (farm outlet) Flows and Outlet Pressures 2.6 Gravity and Pumped Pressure Systems (cost considerations - refer to Chapter **) 2.7 Layout Planning and Options (supply mains, pumping in stages, 2-tier, 3-tier, branch, or looped distribution systems) 2.8 Optimizing Layouts (ensuring supply, least cost, considerations) 2.9 Data Requirements 2.10 Stakeholder Consultations Annex III. Crop precipitation deficits (typical) Annex IV. FAO programs Climwat and Cropwat Annex V. Irrigation Application Methods, Efficiencies, and Indicative Costs	This Chapter will be revised and reorganized starting with a discussion on the Level of Service, followed by the importance of understanding current irrigation practices and farmers level of investment in farm infrastructure in setting the level of service. The treatment of pipeline layout and optimization will be presented in more detail, with optimization not only being about cost, but also other factors (such as reliability and level of service, access for maintenance, tier layouts to facilitate operations, and so on).
CHAPTER-3. HYDRAULICS OF PIPE FLOW	3.1 Introduction 3.2 Surface Friction (pipe resistance) 3.3 Form Losses (pipe devices and fittings) 3.4 Transient Pressures - Water hammer	Free (part full) flow in pipes is not relevant and need not be covered in this guideline. A section on

Chapter	Proposed Sections	Remarks
		transient pressures is proposed in this Chapter.
CHAPTER-4. DESIGN STANDARDS FOR PIPED IRRIGATION NETWORK	4.1 Introduction 4.2 Flow Velocity Limits and Pressures 4.3 Flow Control and Measurement Devices (flow control valves, pressure control valves, air valves, meters, etc. Also, typical head-losses) 4.4 Typical Control Structures and Pipe System Civil Works (pipe bend radius, pipe trenches, long sections and pipeline slopes, trench bedding, primary, distribution hubs, field hydrants, etc.) 4.5 Inspection Roads 4.6 Land Requirements and Decommissioned Canals Figures. Typical Drawings	The existing material will be reorganized as indicated. The types of control structures for pipe distribution systems will be discussed. Also, a new section on land requirements, including suggestions on use of land freed up if canals are replaced by pipelines is proposed.
CHAPTER-5. PIPE IRRIGATION NETWORK DESIGN	5.1 Introduction (approach) 5.2 Pipe Sizing and Pipeline Costs 5.3 Capital and Energy Costs, and Total Life Cost 5.4 Design Optimization (consider total life costs; also considering pipeline layouts and how revising the layouts can reduce costs by reducing lengths of larger diameter and costly pipes). 5.5 Software programs 5.6 Sample Designs Annex VI. Sample Layouts and Designs for Pipe Systems	This Chapter will be reorganized to focus on pipe sizing, capital and discounted energy costs, and design optimization. Some material will be moved (e.g., the classification of PIN systems, and the types and choice of pipes is moved to Chapter 1, while layout planning is discussed in Chapter 2, and water hammer in Chapter 3). Sample designs are discussed with details given in an Annex. (Note: the original Chapter 10 PIN Example is covered here.).
CHAPTER-6. INTAKE AND DESILTING ARRANGEMENTS	6.1 Introduction 6.2 Outlets from Reservoirs (types, desilting arrangements) 6.3 Outlets from Canals (Types, trash screens, sediment chambers) Figures. Sample Design Drawings	In addition to discussion of outlets from reservoir, additional material is added to cover the smaller outlets from canals.
CHAPTER-7. PUMPS AND PUMPING FACILITY	7.1 Types of Pumps 7.2 Pumps Selection 7.3 Pumping Control Systems 7.4 Pipework and Devices 7.5 Filtration and Other Considerations 7.6 Civil Works (for pumping chamber, pump house, etc) 7.7 Power Requirement and Supply Figures. Sample Design Drawings	Relatively minor changes are proposed, with some additional material, for example for the pumping facility including for a pumping chamber, and so on.
CHAPTER-8. MODERNISATION OF MM SCHEME	8.1 Introduction 8.2 Command Area Change 8.3 Flow Variation and Cross Regulators	This is a new Chapter to cover the implications of modernization of MM canal systems with pipes.

Chapter	Proposed Sections	Remarks
WITH PIPES AND IMPLICATIONS	8.4 Sediment Basins 8.5 Balancing Storage 8.6 Telemetry and SCADA (refer Chapter 9) 8.7 Repurposing of Canals Figures. Sample Design Drawings	The focus is for a typical modernization plan where the larger canals (main, branches, etc.) are retained, with the smaller canals replaced with PIN systems.
CHAPTER-9. FIELD AUTOMATION AND CONTROL	9.1 Introduction 9.2 Telemetry Systems 9.3 SCADA Systems Annex VII. SCADA Equipment	This Chapter will be expanded to cover options, from low-cost telemetry systems to full comprehensive SCADA systems.
CHAPTER-10. INSTITUTIONAL ARRANGEMENTS AND OPERATION AND MAINTENANCE	10.1 Introduction 10.2 Operation 10.3 Maintenance (pumps, sediment, trash, pipe blockages, valves, etc) 10.4 Other Management Activities (crop monitoring, etc.) 10.5 Buildings, Facilities, and Equipment 10.6 Institutional Arrangements, Staffing Requirements, Capacity Development, and Management Contracts Figures. Sample Design Drawings	The original chapter 8 for O&M will be expanded and covered in Chapter-10. In additional to check lists for O&M, other management roles will be discussed, also buildings, facilities, equipment, institutional arrangements, and so on.

Note: The old Chapter 11, Outlet to Field covering pipe systems from 50 ha to 5,000 ha, had good material which overlaps with other chapters. This material has been moved covered and is covered in other Chapters/ sections.

ANNEXES

Annex I. Pipe Diameters and Characteristics (uPVC, HDPE, etc.)

Annex II. Review of Pipe Irrigation Systems in India and Internationally

Annex III. Crop precipitation deficits (typical)

Annex IV. FAO programs Climwat and Cropwat

Annex V. Irrigation Application Methods, Efficiencies, and Indicative Costs

Annex VI. Sample Layouts and Designs for Pipe Systems

Annex VII. SCADA Equipment