Summary: Water System Design Manual, 4th Edition

Chapter 1 – Introduction: Why we publish the manual, foundational principles for water system design (safety, risk, and reliability), the regulatory framework, and the roles and responsibilities engineers play in the design process.

Chapter 2 – Project Reports & Construction Documents: Information to assist design engineers in preparing complete engineering documents to submit for our review and approval.

Chapter 3 – Estimating Water Demands: Principles for evaluating historical water use for existing systems and estimating how much water a new or expanding system may use in the future. Separate sections for residential and nonresidential water uses.

Chapter 4 – Water System Capacity Analysis: Concepts and tools for determining a water system's service capacity based on physical, legal, and contractual limitations, such as water rights and intertie agreements.

Chapter 5 – Source of Supply: How to evaluate different drinking water supply sources for public water systems. Covers topics design engineers must consider when designing a new or modified water source, and the documentation they need to submit to get approval for using a source in the drinking water supply.

Chapter 6 – Transmission and Distribution Main Design: Guidance on hydraulic analysis, pipe sizing, and associated system elements such as valves. Builds from water system demand and capacity elements in Chapters 3 and 4.

Chapter 7 – Reservoir Design and Storage Volume: Guidance on sizing, site considerations, and specific reservoir design elements. Includes water quality and reliability aspects of treated water reservoir design.

Chapter 8 – Booster Pump Station Design: Describes requirements for minimum design pressures and reliability standards. Offers design guidance on booster pump stations, including elements such as pumping system capacity, location and site considerations, material selection, piping, and appurtenances.

Chapter 9 – Pressure Tanks: Covers design elements for bladder and hydropneumatic pressure tanks including location, sizing, and appurtenances. Discusses using cycle-control valves and variable frequency drives to reduce pressure tank volumes.

Chapter 10 – General Water Treatment: Covers basic groundwater, seawater, and surface water treatment. Includes alternative analysis, treatment technologies, and pilot studies. Specific topics include chemical feed systems, cross-connection risk in treatment plants, and residuals disposal.

Chapter 11 – Surface Water Treatment: Continues discussion of water treatment but focuses specifically on surface water treatment issues, such as treatment technologies and unique aspects of process monitoring and control.

Appendix A: Forms, Policies, and Checklists: Checklists for project reports and construction documents. Hyperlinks to the policies and forms most commonly needed for the DOH submittal process (Project Approval Application Form, Water Right Self-Assessment Form, and the Construction Completion Report Form).

Appendix B: Selected Guidelines: Guidance on miscellaneous topics, including wellfield designation, cycle control valves, variable frequency drives, and tracer studies.

Appendix C: List of Agencies and Publications: Contact information for agencies related to water system design.

Appendix D: Estimating Water Demand: Material for Group A systems on developing residential water demand vs. annual precipitation; estimating nonresidential demand; and maximum daily demand to maximum month average daily demand ratios

Appendix E: Recommended Pumping Test Procedures: Guidance on pump tests to satisfy source approval requirements. Includes establishing an estimate of a well's sustainable yield, adjustments needed in some hydrogeologic settings, and forms for pump-test data collection.

Appendix F: Submittal Outlines for Various Water Treatment Processes: Design considerations and submittal for common water treatment processes (chlorination, desalination, controlled fluoridation, removal of arsenic, nitrate, iron, and manganese).

Appendix G: Guidance for Leachable Contaminants Testing: Discusses application of a "leachable contaminants test," or "soak test," and procedures for conducting the test. Usually used when there are questions about the "quality of workmanship" associated with facility installation or materials in contact with drinking water.

Appendix H: Slow Sand Filtration: Design guidance for slow sand filtration projects.

Appendix I: Ultraviolet Disinfection: Discusses regulatory and technical issues that apply to ultraviolet disinfection. Includes a design checklist.