

# **Charleston CPW's Experience in Developing a State-of-the-art Distribution Operations and Maintenance Manual**

**By:**

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Uniformity, consistency, reliability... operational qualities that every manager and supervisor wishes to observe from their associates. The answer: development of an operations and maintenance manual! The Charleston Commissioners of Public Works (CPW) has developed and implemented the use of such a manual, which has proven to be beneficial in many operational and administrative areas.

In 1996 the Water Distribution Department of the Charleston CPW embarked on a mission: to consolidate existing procedures, permanently inscribe our associates experiences and knowledge in document form to benefit new and existing associates, and to overall improve our operational efficiency.

## **Why Develop an Operations Manual?**

With each difference subsection of our department using written, unwritten and assumed work procedures, there existed a lack of consistency in how we did business. In areas where there existed no written work instructions, there was limited uniformity with how work tasks and methods were conducted. In areas where work procedures had been written and were being used, they were sometimes incomplete and lacking critical steps. Also, there existed significant information used by almost every associate in the department, which was often not readily available for reference.

## **Development:**

A Business Strategy Team was formed which identified and evaluated the responsibilities of the Water Distribution Department. The team determined that there should be five subsections of the department as follows: (1) Maintenance, (2) Preventive Maintenance, (3) Technical Support, (4) New Installations, and (5) Administration. Five teams were then created to evaluate more thoroughly the departmental responsibilities, and to identify the steps required to meet those responsibilities. The initial vision was to assemble and collate the teams' conclusions into a comprehensive manual to improve operational activities. Also, it was envisioned to use the manual as a training tool to improve our associates' skills and knowledge.

Team members were grouped based upon their expertise, with additional members added to provide "thinking outside of the box", or fresh ideas on how the department did business. Through "brainstorming" sessions and teamwork the members put their thoughts and experiences on paper in the pursuit of a better way of approaching our operational activities. The team members candidly discussed the existing ways the activities were accomplished, and discussed new approaches to achieving the objectives.

As the team members gelled through interaction, past experiences were shared and new ideas were fashioned. Through consensus the procedures or "*standard operating instructions*" (SOI's) were formally established. Drafts were brought to the subsequent meetings for final approval by the team, and finally by the Superintendent.

What ensued was a final product that was comprehensive, detailed and well structured. The procedures included labor, equipment and material requirements, activity numbers, work preparation steps, various work steps, and work completion steps. Also included were diagrams, tables, pictures, etc. to further clarify the work instructions, and to ultimately make the job easier to accomplish. Later revisions included revision numbers, effective dates, approvals, related documents, and environmental impacts.

Each supervisor and technician was issued a complete manual to provide quick, front-line access to all operations within the department, and for use during instructional sessions and cross training sessions. In today's competitive market, one-dimensional skills are no longer desired. A work associate must be versatile and multi-talented to be fully productive and viable.

### **Manual Structure:**

The CPW Water Distribution Operations Manual is currently broken into seven sections, as follows: Introduction, Maintenance, Preventive Maintenance, Technical, New Installations, Administration and Appendix. A Table of Contents proceeds the above sections. Within each section are subsections which include SOI's grouped by like tasks. Also, at the beginning of each subsection is a definition page which generally describes the scope of each SOI.

#### Introduction:

The Introduction section is comprised of the CPW Mission and Vision statements, the Water Distribution Department's goals and objectives, the Environmental Management Systems Policy, a brief history of CPW, a detailed description of CPW's water system, an organizational chart, and finally task flow charts for each departmental section.

#### Maintenance:

The next section is the Maintenance Section which is divided into seven subsections as follows: Distribution Failure Control, Water Main Excavation and Backfill, Water Main Repair, Water Service Operations, Distribution Valve Repair and Replacement, Transmission Valve Repair and Replacement, and Hydrant Repair and Replacement.

Highlights of these sections include response to emergency situations, main-break investigation, excavation sloping and shoring, and site restoration. All types of water main and service repairs are addressed in these sections, in addition to large water service repair and confined space entry.

#### Preventive Maintenance:

Section 3 is the Preventive Maintenance Section, which consists of three subsections as follows: Valve Preventive Maintenance and Inspection, Hydrant Preventive Maintenance and Inspection, and a Special Programs section. Transmission valve preventive maintenance and inspection and operation of power valve operators are also addressed in these sections.

The Special Programs section details five sections as follows: Water Service / Meter Box Preventive Maintenance, Vehicle / Equipment Preventive Maintenance, Water Distribution System Deficiency Observation, Unidirectional Flushing (UDF) Program, and Conventional Flushing.

#### Technical Support:

Section 4 is the Technical Support Section, which includes five subsections as follows: Customer Service, Distribution System Testing, Technical Activities, Technical Projects, Drawings and Records. Highlights of these sections include detailed customer service assistance, turbidity and chlorine testing, "C" - Value and fire flow testing, and measuring device testing and calibration.

Utility locating and leak surveying and detection are included in these sections, with water main pigging and major pressure-loss investigation procedures. Special projects are focused on through procedures covering internal projects, conflict resolution projects, new system plan reviews, and maintenance bond inspections. Other areas included in these sections are cost estimating, contractor bidding, drawing preparation, and database maintenance.

#### New Installations:

Section 5 is the New Installations Section which consists of three subsections as follows: Water Main / System Installation, Water Service Installation, and Water Main Tapping. Highlights of these subsections include water main and appurtenance installation, pressure testing, and bacteriological testing. Water

service installation includes procedures for installation of all size services, and the water main tapping section includes procedures for use of large tapping machines, and tapping of concrete pressure pipes.

**Administration:**

The Administration section, section 6, includes five subsections as follows: General Administration, Payroll, Data Compilation, Accounting, and New Water Service tracking. Highlights of the General Administration subsection includes procedures on document control, damage claims, performance evaluations, leave records, incident reporting, asphalt and concrete patching, purchase order tracking, and other communications.

Other subsection highlights include procedures on payroll, monthly departmental reports, main-break tracking, customer concern tracking, training tracking, and new service tracking. Accounting procedures include inventory accountability and productivity measurement.

**Appendix:**




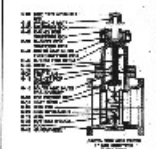
The Appendix section includes details and drawings on small and large service installations, hydrant installations, main modifications, valve and valve box installations, and blow-off installations. The Water Distribution Department's *Productivity Measurement Program (PMP)* is detailed in this section of the manual, to include procedures, task codes and point values. A special product section is included which includes literature on new products in use, details and diagrams. And finally, the South Carolina Department of Transportation (SC DOT) Traffic Control Manual is included to provide crews with complete information on setting up cones, signs, lane blocking, etc.

**SOI Structure:**

Within each SOI is a wealth of information. The first segment of each SOI includes a title, SOI number, corresponding requirements, section and subsection numbers, revision level, effective date, and name of persons that prepared and approved the SOI. The next segment discussed the purpose, scope and responsibilities of the SOI to provide the reader with a general understanding of the job tasks, and specific personnel responsibilities of the project. Also included in this section are specific regulatory requirements involved within the task.

The next segment provides the supervisor or person executing the task with detailed labor, equipment and material requirements to successfully and cost-effectively accomplish the project scope. The following segments include work preparation steps, work details and work completion instructions. The last segment discusses the positive environmental impacts to properly following the procedures, and the negative environmental impacts of deviation from the approved instructions. Finally, a list of related documents are included.

**SOI General Layout**

|   |                        |   |
|---|------------------------|---|
|  Water Distribution Department<br>Operations and Training Manual<br>Standard Operating Instructions |                        | <b>EMS Sensitive</b><br>  |
|   |                        | <i>Page:</i>  |
| <b>Corresponding Requirements:</b>  | <b>Revision:</b>       | <b>Prepared By:</b>   |
|   | <b>Effective Date:</b> | <b>Approved By:</b>   |
| <b>Activity:</b>  |                        | <b>Section:</b>   |
| <b>No:</b>  |                        | <b>Subsection:</b>  |
| <b>Purpose:</b>   |                        |   |
| <b>Scope:</b>   |                        |   |
| <b>Responsibility &amp; Authority:</b>  |                        |   |
| <b>Work Preparation:</b>  |                        |   |
| <b>Labor:</b>   | <b>Equipment:</b>      | <b>Material:</b>  |
| <b>Work Steps:</b>  |                        |   |
| <b>Pictures, Tables, Diagrams:</b>  |                        |   |
|   |                        |   |
| <b>Work Completion:</b>   |                        |   |
| <b>Environmental Impacts:</b>   |                        |   |
| <u>Positive impacts of following the SOI's:</u>   |                        |   |
| <u>Environmental consequences of deviating from the SOI's:</u>  |                        |   |
| <b>Related Documents:</b>   |                        |   |

This is an "UNCONTROLLED" copy of a "CONTROLLED DOCUMENT"

**Accessibility:**

Associates whose jobs are primarily centered in an office atmosphere access the manual electronically, and associates who work in a "field" atmosphere are issued a complete manual within a binder. This manual is to be kept in the associates' vehicle at all times for ready access. Each manual is numbered and is considered a "Controlled Copy". This means that as a group of updates are scheduled for formal distribution, each numbered manual will automatically receive the updates. Associates are prohibited to make duplicate copies of the manual, as the user will not know what procedure is up-to-date and not.

The manual is made available on the "Intranet" system, which provides all associates and departments instantaneous accessibility. The Intranet system includes Web pages with links to all areas of the manual, and cross-links are included within Activities (SOI's) to provide a rapid method of acquiring information.

**Updating:**

For a manual this complex, an updating system must be established to keep the latest revisions of documents in the hands of those who need them most. Associates are encouraged to initiate relevant changes to the manual. A "Document Updating Form" with approvals is used to initiate changes.

As a new update is approved the electronic copies are updated for immediate availability. Old versions are moved to an "Obsolete" file. When a group of Activities are prepared for distribution, a meeting is scheduled for all associates with a "Controlled Copy" of the manual. Administrative personnel assist manual holders with updating of their manual. Also, a sheet is inserted in the front of the manual showing all changes that have ensued to the manual. Manuals are updated quarterly and/or semi-annually, depending on the number of changes that have occurred.

**Benefits:**

Our manual now provides the consistency we desire through standardization of our processes. Associates follow one set of standard methods which are written for everyone and anyone to understand. Specific instructions are incorporated into each procedure to address responsibility, promote accountability, and to establish supervisory controls. Labor, equipment and material requirements are included on each activity to eliminate confusion and guesswork. Also, emergency operation of equipment is addressed to provide rapid responses in critical situations. Also included are paragraphs discussing the positive and negative impacts each activity has on the environment.

The operations manual has proven to be a tremendous tool for training new associates during their orientation period, and for keeping our associates familiar with and up-to-date on our operational and maintenance procedures. The manual is referred to often and heavily relied on when performing training.

Details, schematics, and tables are included to provide our front-line workers with pertinent information to aid in making repairs and installing new system appurtenances. Diagrams and photos are included to make available visual examples of materials and equipment, further aiding the associate(s) with maintenance and operational activities.

**Conclusion:**

An operational manual is an awesome resource, which provides uniformity in a water operation. If made readily available to all associates, a manual can be used for training, operational and maintenance repairs, installation proceedings, responsibility and accountability, supervisory controls, emergency operation, and a one-stop total operational reference.