SECTION 2
TECHNICAL APPROACH

2.1 DESIGN APPROACH

System design elements were selected to do the following:

- Meet fire flow and residual pressure requirements;
- Reduce maintenance requirements by specifying equipment already used and therefore proven by CSSA to be both functional and durable;
- Facilitate maintenance activities where maintenance is required;
- Provide looped redundancy;
- Minimize disinfection dead legs;
- Increase number of fire hydrant locations for fire protection of susceptible areas;
- Provide means for system wide leak detection, i.e., flow monitoring;
- Provide online residual free chlorine monitoring; and
- Allow for future expansion and add ons.

2.2 PRIMARY DESIGN CRITERIA

System components and design basis were the following:

- All new piping from 4-inch to 12-inch in diameter was AWWA C900 PVC Class 150 Size Dimension Ratio (SDR) 18 pipe;
- All fittings for C900 pipe were compact ductile iron per AWWA C153;
- Thrust blocks on all fittings except 11.25 and 22.5 degree elbows;
- All ductile iron components wrapped in AWWA C105 Polyethylene Encasement;
- All piping provided with tracer wire and polyethylene tracing tape;
- Four feet minimum cover;
- Resilient seated gate valves;
- Mueller Super Centurion 250 3-way fire hydrant;
- MegaLug mechanical joint restraints on all fittings; and
- T-handle ball valves at all service connections.

2.3 CONSTRUCTION APPROACH

Sequencing or phasing of the areas of the system to be rehabilitated was carefully done to achieve the following:

- Minimize outages especially in the residential areas of the Post;
- Reduce water use by combining hydrostatic pressure testing and disinfection task; and
- Minimize contamination risk by sequencing work so that static pressure would allow transfer of water from higher elevation to lower elevation sequence, but not from lower to higher elevations.

2.4 COST APPROACH

Construction costs were controlled in several ways including:

- Reused and or disposed of excavated materials onsite;
- Minimized outages to reduce deployment of water buffaloes;
- Located new pipe in same trenches as existing pipelines where feasible to reduce rock excavation costs; and
- Revised designs in the field to reduce runs and fittings.

2.5 INSPECTION AND TESTING APPROACH

Inspections were done concurrently with construction. Daily inspections included measuring trench depth and width, pipe and bedding heights, and overburden compaction. The new pipelines and new fire hydrants were tested to certify that the constructed system meets or exceeds all operational performance standards. Each newly commissioned water main was also disinfected and tested in accordance with State and Federal requirements and AWWA recommendations. Records of this testing are included in Appendix A.

A pre-final walk-through inspection was performed on every new segment approximately 2 weeks before construction activities were complete. The pre-final inspections ensured that:

- the system(s) has been tested,
- all performance standards have been met,
- all water quality, pressure, and fire protection tests have passed,
- all equipment was properly installed and labeled,
- all instruments are powered, calibrated and operating properly.

A pre-final inspection findings punch list was prepared by the construction manager during each walk-through. The installation subcontractor addressed each punch list item and made the necessary corrections to meet the project requirements.

The final inspection of each segment focused on the punch list items identified at the pre-final inspection. The final inspections were performed after all of the items had been adequately addressed.

Upon substantial completion of the entire system in September 2008, final acceptance inspections were conducted by CSSA Public Works personnel and the Parsons the Parsons construction manager.

2.5.1 Field Instrumentation

2.5.1.1 Water Flowmeters

Two Endress+Hauser Proline Promag 53W electromagnetic flowmeters with Modbus interface were installed at various locations around the site to monitor loop flow. One 10" model 2F-HL0B1RC 2BAAQ was installed near the storage tank and one 6" 1F-HL0B1RC2BAAQ was installed at the motor pool area in the main loop. The flowmeters were installed inside below ground meter boxes and have remote indicating transmitters stanchion-mounted near the meter boxes. The flowmeters have bi-directional flow monitoring capabilities, grounding rings and isolation valves. Ductile iron piping was used inside the meter boxes to assure rigidity and strength, especially in the event flowmeter removal is required at some point in the future.

2.5.1.2 Residual Free Chlorine Analyzers

Two Endress+Hauser Liquisys M CCM 253 Analyzer model EK1105 with a model CCS 140-N free chlorine sensor were installed, one at Building 201 and another at Building 93 to provide end of the system online chlorine residual measurements.

2.5.2 Instrument Integration into the SCADA System

SCI intergrated the new instrumentation into the existing RTUs and the SCADA system. All programming and configuration changes made at the SCADA server automatically display at the workstations. The overall appearance of the new displays is consistent with the existing system displays.

2.6 FINAL REPORTING

This document along with the daily field reports and the GIS updates comprise the final report for this project.