

**WATER DISTRIBUTION SYSTEM
MASTER PLAN UPDATE
2003**

FOR

CITY OF SIOUX FALLS, SOUTH DAKOTA

Executive Summary

In May of 2002, the City of Sioux Falls and Ulteig Engineers, Inc. entered into a contractual agreement to conduct a study of the City's Water Distribution System. The purpose of the study was to provide the City with an update to the previous water system master plans completed in 1992 and 1998. As part of this study, Ulteig Engineers reviewed several key documents including but not limited to the following:

- The current capital improvements program (CIP) developed from the previous master plan updates
- The City's existing and proposed growth management plan
- The current Lewis & Clark Rural Water System Engineering Report and
- The proposed sanitary sewer facilities plan.

In addition to the aforementioned document reviews a thorough assessment was conducted on the City's existing:

- Hydraulic water model and modeling software
- Pressure zone boundaries and corresponding hydraulic gradients
- Water storage facilities
- Pumping facilities and
- Transmission and distribution piping.

Sioux Falls personnel provided much of the information regarding the existing distribution and storage facilities. A copy of the City's GIS water system coverage, previous hydraulic water model, SCADA system data and historical data were all obtained. This data was used in the development of the new hydraulic water model.

H2OMAP Water was the hydraulic modeling software recommended for use in this study. This modeling software operates as a stand-alone module, but is patterned in a GIS format. We feel that this will allow for a seamless integration between H2OMAP Water the City's current GIS software.

The City's existing GIS water system coverage was the database utilized in the development of the new model. Once the data was compiled for all of the existing facilities, an extensive pressure and flow-testing program was carried out in order to calibrate the newly created model. City personnel assisted Ulteig Engineers during all of the field-testing. Once the model met calibration criteria and a level of confidence was reached with the model output, Ulteig Engineers began to analyze the City's existing water distribution and storage facilities. Recommendations for improvements were based on the current system's deficiencies and the anticipated future population growth in the Sioux Falls metropolitan area. In addition to the recommendations, an itemized list of probable costs was compiled. This list is intended to provide City Personnel with budget costs for future planning and development of the water distribution system capital

improvements program.

RECOMMENDED IMPROVEMENTS

General

As a result of the hydraulic analyses that were conducted during this study, deficiencies within the existing water distribution system were identified and recommendations were made for short-range and long-range improvements. The short-range improvements are intended to meet the City's needs through the year 2010. The year 2010 was chosen as a target year because of the timing associated with the proposed Lewis and Clark Rural Water System. City Personnel have indicated that if the proposed Water System does become a reality, there would likely be no pipeline in place until 2009-2012. Also, it should be noted that many of the major transmission pipelines, between the Water Purification Plant and the West and South Reservoirs were delayed until 2011-2015. These two storage facilities could receive the majority of the water from the Lewis and Clark Supply and thus major upgrades of transmission piping from the Water Purification Plant would not be necessary.

In addition to the short-range and long-range recommendations for improvements, we developed probable costs for the City's long-range capital improvement program. This program will provide City Personnel with budgeting guidelines for improving system deficiencies, replacing aging and under sized equipment and for improving the overall operating efficiency of the water distribution system. It should be noted that all of these recommendations and capital improvements are based on projected population growth and water demands. We feel that our projections and recommended short-range improvements through the year 2010 can be made with a reasonable amount of accuracy; however, uncontrollable factors such as population projections and location of population can drastically effect the results of a master plan. Thus, long-range recommendations may have to be curbed or accelerated in the future to meet these uncontrollable factors.

Short Range Improvements

The recommendations for short-range improvements, to the City's distribution and storage facilities, were forecasted for the years 2003 through 2010. These recommendations were designed to improve system-operating pressures and to provide effective, efficient movement of water from the Water Purification Plant to points of distribution. These improvements were made by expanding pumping and storage facilities and by replacing and/or increasing the size of several distribution and transmission pipelines throughout the City. Listed in the following table is our recommendations for short-range improvements.

Summary of Short-Range Improvements (2003-2010)

Year Summary of Recommended Short-Range Improvements

2003-2005 Add 3.0 MG of elevated storage in the High pressure zone

2003-2005	Add or replace various transmission and distribution piping
2003	Startup existing Tuthill Pump Station for interim use
2003	Study the fire flow requirements in the Northwest pressure zone
2004	Add pumping capacity at the Northwest Booster Station
2005-2007	Add pumping capacity at the South Pumping Station
2007-2008	Add pumping capacity at the West Pumping Station
2008-2010	Add 1.0 MG of elevated storage in the Northwest pressure zone

Long-Range Improvements - Lewis And Clark Rural Water System Alternative

The recommendations for long-range improvements, to the City's distribution and storage facilities, were forecasted for the years 2011 through 2025. These recommendations are intended to expand upon the recommended short-range improvements and to provide the City with options for adequate storage and distribution facilities based on the outcome of the proposed Lewis and Clark Rural Water System. Indications are that by the year 2010 the City will have some direction as to whether this treated water supply option will be possible.

If the proposed Rural Water System does become a potential water supply source for the City of Sioux Falls, and it enters the City in the southwest corner at the intersection of I-29 and I-229, we recommend that the water be distributed to the existing storage facilities in those areas (South and West Reservoir). In our opinion, piping the water from Lewis and Clark to the Water Purification Plant does not appear to be an efficient way of utilizing this source.

The major demands, projected for the City, will occur in the High pressure zone, along the proposed pipeline route. It is our opinion that keeping the water in these areas and developing blending strategies with City water at the High zone Reservoirs would be the most economical way to utilize this source.

Design Years Improvements

2011-2025

- New 1.0 MG Cactus Heights Elevated Tank
- New 1.5 MG Southeast Elevated Tank
- Modifications at South Pump Station
- Modifications at West Pump Station
- Expansion of East Reservoir
- Expansion of South Reservoir
- Add or replace various Transmission and Distribution Pipelines ('11-'15)
- Add or replace various Transmission and Distribution Pipelines ('16-'20)
- Add or replace various Transmission and Distribution Pipelines ('21-'25)

Long-Range Improvements – Sioux River Alternative

The proposed long-range improvements listed in this section are the facilities that will be required between the design years 2011 and 2025 if the proposed Lewis and Clark Rural Water System is not constructed

**Design Years Improvements
2011-2025**

New 1.0 MG Cactus Heights Elevated Tank

New 1.5 MG Southeast Elevated Tank

Modifications at North Pump Station

Modifications at South Pump Station

Modifications at West Pump Station

Expansion of East Reservoir

Expansion of South Reservoir

Add or replace various Transmission and Distribution Pipelines ('11-'15)

Add or replace various Transmission and Distribution Pipelines ('16-'20)

Add or replace various Transmission and Distribution Pipelines ('21-'25)