> "Water is the lifeblood of our bodies, our economy, our nation, and our well-being."
>
> – Dr. Stephen L. Johnson
> *US EPA Administrator (2005-2009)*

Photo courtesy of Skeye i

Ames
Water Treatment Plant

CITY OF Ames™

History of the
Water Treatment Plant

Until 1887, Ames operated without a water utility. As many buildings at this time were constructed out of wood, a number of fires occurred in the city. This led to the City successfully petitioning the railroad for a connection to its water tank.

On July 9, 1891, the Ames City Council approved a motion to construct a water tower, purchase an engine, and install mains and hydrants along Main Street.

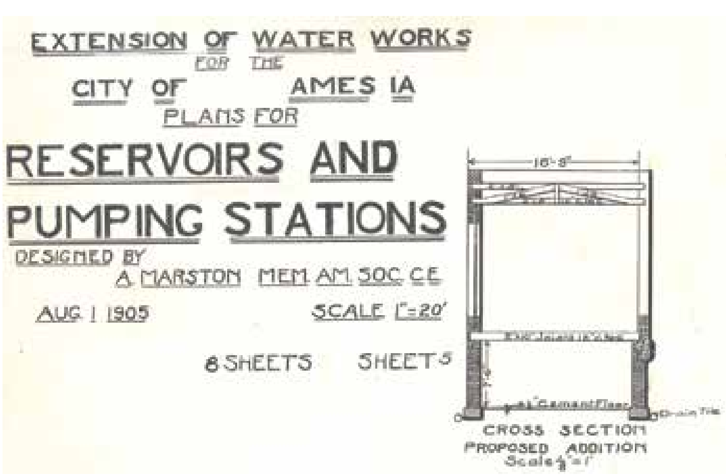
Improvements to the Ames Water Utility began in the 1920s, eventually resulting in the backbone of the treatment plant at 300 E. 5th Street. A 1.1 million gallon ground storage reservoir was built in 1924. Shortly after this, chlorination of the water began.

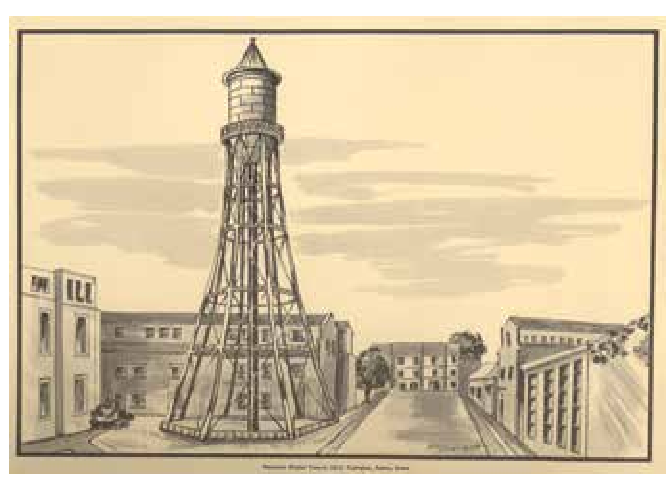
Cascade aerators were added between 1924 and 1927. Aeration and settling that occurred in the storage reservoir allowed for iron removal. Aeration and settling was desired then, and continues to be used today because of the levels of iron that exist in the groundwater aquifer that provides source water to the Ames water utility.

In April 1927, the Ames City Council bid the construction of a filtration plant. The filtration plant was designed to take advantage of the infrastructure already at the existing site. This resulted in a rated capacity of 2 million gallons per day (MGD).

Very early in its history, the Ames water utility was becoming known for high quality water. On June 17, 1929, an Iowa Department of Health inspector performed a sanitary survey of the water plant. In the report it was noted, "It is with pleasure that we certify to the safety of a water supply such as this, since we consider it one of the better water plants in the state."

In 1930, Ames City Engineer C.C. McCarthy began researching and eventually made the case for lime softening. On March 2, 1931, City Manager John Ames submitted a detailed report to the Ames City Council. In this report, he described some of its benefits such as laundry soap savings, plumbing costs savings, savings on fuel and fabric life, as well as elimination of the need/desire for home water softeners. At the time, there was skepticism about the cost savings as well as a possible change in the taste of the water. These concerns were ultimately forgotten as no appreciable difference in taste could be noticed, and many of the economic benefits were realized.





Left: Pump Station Drawing 1906, designed by Anson Marston, the first dean of Engineering at Iowa State University.
Right: The Marston Water Tower, still standing on the Iowa State campus, once had a twin water tower at the original Ames Water Treatment Plant.

Clockwise from top left: Water Treatment Plant 1932-1949, 1953 Main Repair, 1954 Main Repair, Water Treatment Plant 1955

In the years since, numerous plant studies have occurred and improvements have been made to increase the capacity of the treatment plant. Its capacity was increased from 2 MGD to 3 MGD, then from 6.5 MGD to 9 MGD, and again to 11 MGD. Ground storage and elevated storage tanks have been constructed, additional filters have been built, and new groundwater wells have been drilled. A 2008 study determined that the future needs of the Ames community could not be met by the current plant site at 300 E. 5th Street, and a new water treatment plant was needed at a new site.

Learn more about the Ames water utility in the book "History of the Ames Water Department 1892-2015" by Harris Seidel.

Fun Fact:

How long does it take the water to reach your house?

It can take anywhere from several hours up to two weeks for water to reach your house, depending on how much water customers are using.

New Plant Timeline

Fun Fact:

How many pounds of rebar did it take to build the plant?

It took 3,000,000 pounds of rebar to build the plant.

2008 · 2009 · 2010 · 2011 · 2012 · 2013 · 2014 · 2015 · 2016 · 2017

8/12/2008
A team from FOX, HDR and Barr Engineering hired to evaluate facility

10/30/2008
Water Treatment Plant Evaluation Open House

5/1/2009
Existing Plant Condition Evaluation Completed

5/6/2009
Water Plant Project Public Meeting

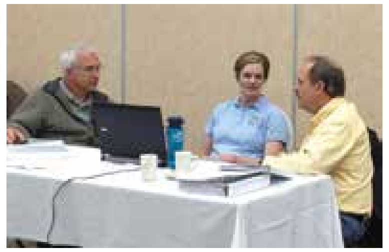
5/19/2009
Workshop with City Council

7/14/2009
Decision from Council to Move Forward with a New Plant at a New Site

12/13/2011
Land Acquisition Finalized

1/17/2012
Green Project Reserve Grant Award for Leadership in Energy Environmental Design (LEED), estimated $6.5 Million Award

U.S. GREEN BUILDING COUNCIL LEED USGBC



5/1/2012
Value Engineering of New Plant Design

4/14/2014
Design of New Water Treatment Plant Completed

10/14/2014
Award of Water Plant Construction to Knutson Construction

10/16/2014
Groundbreaking at New Water Treatment Plant Site

3/3/2015
Award of Water Plant Pipeline Construction to S.M. Hentges & Sons

1891 AMES • IOWA 125 YEARS WATER UTILITY 2016

7/9/2016
125th Anniversary of Utility

7/27/2017
New Water Plant online

Water Treatment

Process

The City of Ames has one of the best public water supplies in the world. To make this happen, trained professionals work 24 hours a day to provide you with the best possible water.

From the Well

The Ames Water Plant provides treatment to ensure a safe, palatable supply of drinking water for its customers. Have you ever wondered how the underground water supply gets to you? It all begins when well water enters the treatment plant through an aerator. This vents dissolved gases to the atmosphere that would contribute undesirable taste and odor and interfere with subsequent treatment steps. Dissolved iron combines with oxygen in the air to form rust particles that are removed in a later treatment step.

Lime Added to Remove Hardness

The water then flows into solids contact units where lime is added to raise the pH. In the center column, or solids contact zone, the lime forms solid particles which remove calcium and magnesium, minerals that contribute to hardness. At this point, a polymer is added to promote particle settling.

Hardness Settles Out

The water then travels to the clarification zone of the solids contact unit where the insoluble calcium and magnesium particles settle to the bottom. These residuals, commonly known as sludge, flow to a lagoon and are allowed to dry. The residuals are recycled to farm fields as a soil conditioner.

Clean, Filtered Water

Next, the water enters recarbonation tanks where carbon dioxide gas is diffused through the water to stop the softening reaction. After recarbonation, polyphosphate is added to stabilize the water and reduce scale build-up on the filters. Water is then filtered through beds of anthracite coal and sand. These filters remove fine suspended particles.

To Your Home

Finally, in accordance with recommendations from the U.S. Department of Health and Human Services and the U.S. Environmental Protection Agency, fluoride is added to the water for dental protection just prior to distribution to the community.

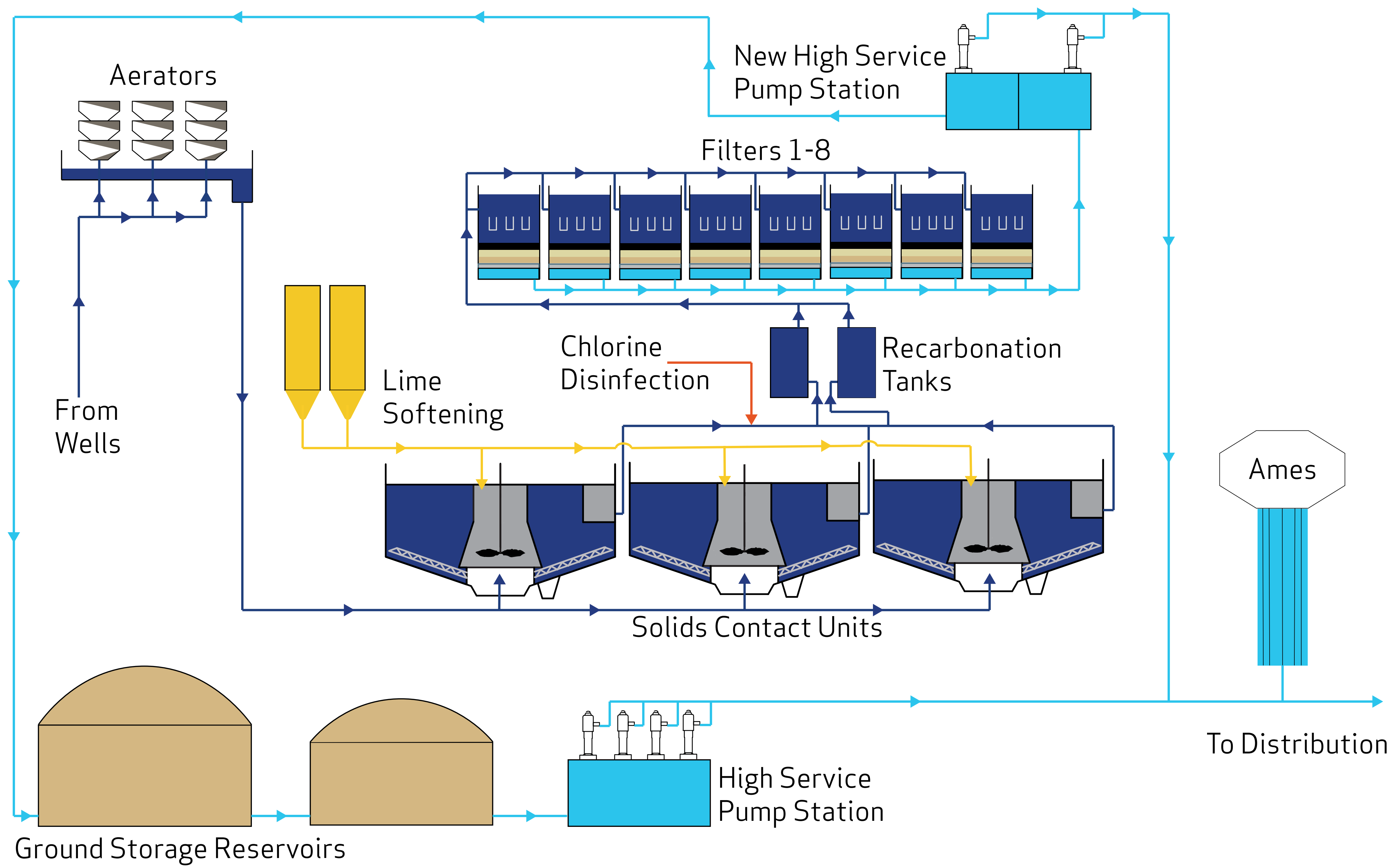
DESIGN PARAMETERS

Finished Water Capacity	15.0	MGD
Raw Well Water Required	16.7	MGD
New Building (including plant) Footprint	115,135	Sq ft.
Plant Portion Footprint	65,623	Sq ft.
Solids Contact Unit Diameter	58	FT
Depth of Filter Cells	20	FT
Emergency Generator	1,500	KW
Project Cost	$69.2	million
Design Population (2033)	75,000	

Fun Fact:

How many cubic yards of concrete make up the plant?

There are 17,000 cubic yards of concrete in the plant.



Leadership in Energy and Environmental Design

Clockwise from top left: Solids Contact Unit, Phosphate Pump, Cascade Aerators, Pipe Gallery, Conferenc Room, Operator Marc Empson in new laboratory.

Each year the federal government provides capitalization funds to Iowa's Drinking Water State Revolving Fund (SRF). This loan program offers attractive loan terms for infrastructure projects and is the primary source of financing for the new Ames Water Plant.

Under Congressional direction, at least 20% of the federal funds provided to states each year need to be used to address green infrastructure, water or energy efficiency improvements, or other environmentally innovative activities.

In 2011, staff from the Ames Water Plant submitted an application to the Iowa Department of Natural Resources, proposing to construct the new treatment facility (which was still under design) as a LEED-certified building. In early 2012, the City was awarded a competitive "Green Project Reserve" grant in the form of loan forgiveness. The amount of the grant was defined as 20% of the cost of the building shell (that is, exclusive of the treatment process-related equipment), which amounts to approximately $6.5 million.

At the time of its completion, the Ames facility is the largest LEED-certified drinking water treatment plant in Iowa.

Key LEED design elements include the following:

- A white roof was used to reduce the heat island effect.
- Water efficient landscaping serves to filter stormwater runoff while reducing the water footprint of the facility.
- Water efficient plumbing provides a 33% reduction over baseline water use.
- 88% of construction waste was recycled and diverted from the landfill.
- Materials for the new plant have 20% recycled content and 20% of total materials came from regional resources. New wood used was certified in accordance with the Forest Stewardship Council's guidelines which encourage environmentally responsible forest management.
- The heating and cooling system passes the raw water entering the plant through a geothermal heat exchanger, providing a significant reduction in energy over a conventional chiller system.

Fun Facts:

How many total feet of pipe make up the plant?

Over 20,180 feet (approximately 45 football field lengths) of various size diameter pipe was used to connect the City's well field to the new plant and connect finished water to the storage and high service pumping at the old plant site.

How much power is required to operate the plant?

A 1500 kW diesel Caterpillar Generator will provide the new plant with full backup power in the event of a power outage.





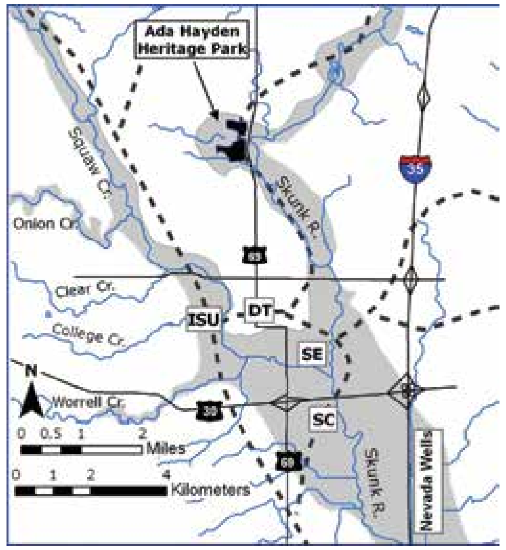
Source Water

Drinking water systems cannot exist without a water supply provided by nature. In Ames, the drinking water supply comes from the Ames Aquifer.

The Ames Aquifer is a long-ago buried river channel that was filled in with sand and gravel during the last ice age. Because most of the material in this buried channel is coarse gravel, the formation holds a large quantity of water that can flow through it rapidly.

The aquifer is recharged in three ways as it moves through Ames. First, rainfall soaks down through the ground into the buried sand and gravel. Second, the aquifer is recharged from Squaw Creek and Skunk River as they flow over the aquifer. Finally, the porous nature of the gravel allows groundwater from the north to flow underground through Ames.

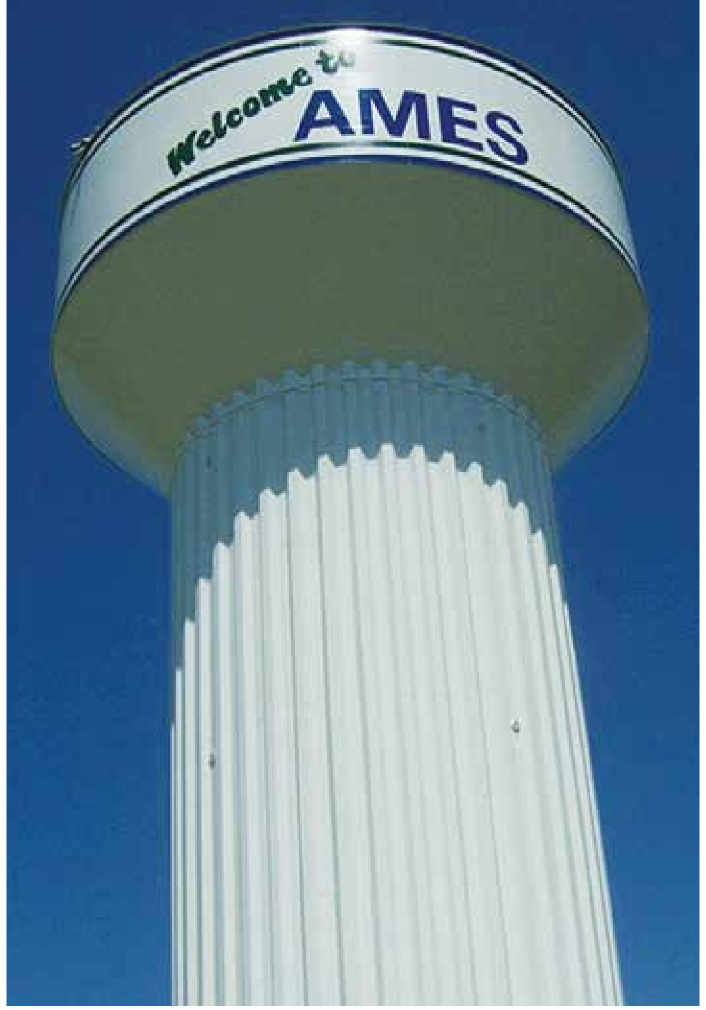
The word "aquifer" comes from the Latin "aqua ferre," which means "to bear water."



Well Map

The Ames Water Plant pulls water out of the aquifer from a network of 22 wells spread over four distinct well fields. These wells range in depth from 76' to 146', and range in capacity from 200 gallons per minute to as much as 1,200 gallons per minute. In addition, three new wells in a new well field are currently under design and anticipated to be active by 2018.

During periods of intense drought, the Ames Water Plant can pump water out of the lake at Ada Hayden Heritage Park and place it into the South Skunk River. As this water flows downstream, it pools behind the low head dam in North River Valley Park. The dam is strategically located over a primary recharge area for the aquifer. As the water from the riverbed seeps down and refills the aquifer, it is naturally filtered by the sand.




Distribution

Water is pumped to more than 18,000 Ames homes and businesses through 250 miles of water mains ranging in size from 4 to 24 inches in diameter. The Water Plant serves Iowa State University, Xenia Rural Water, and the National Centers for Animal Health. Ames has three water towers, fondly named BRET, (Bloomington Road Elevated Tank), SAM (State and Mortenson Elevated Tank), and MAC (Mortensen and County Line Road Elevated Tank). The elevated tanks provide 4 million gallons of storage and an additional 7 million gallons of storage is located near the existing high service pump station.

Ames was split into two pressure zones in 2003 to help maintain pressure throughout the community. More than 3,600 valves in the system help isolate mains in the event of a main break or construction. Approximately 2,900 fire hydrants are used to help flush the system and provide access to water in the event of a fire.

The new plant provides 5 MGD of pumping capacity and can be used alone or in combination with the 16 MGD of pumping capacity at the old plant site.

Fun Facts:

How much electrical wire is in the new plant?

A total of 850,000 feet of wire was used in the new plant. This is enough to stretch from Ames to Pella and back again.

How long did it take to build the new water plant?

It took 2 years, 8 months, 12 days and 12 hours, 12 minutes of construction for the plant to produce water to the distribution system.

Contributors

CITY OF AMES

MAYOR
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CITY COUNCIL MEMBERS SERVING BETWEEN 2009-2017
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Bronwyn Beatty-Hansen
Amber Corrieri
Jeremy N. Davis
Ryan F. Doll
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Jami Larson
Riad G. Mahayni
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HDR Inc.
Barr Engineering

PRIME CONTRACTOR
Knutson Construction

SUBCONTRACTORS
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Alpro Acoustical Systems
Architectural Arts
ASI Signage
Automatic Systems Company
Bolton & Menk, Inc.
Carboline
Commercial Construction Products
Con-Struct Inc.
Construction Specialties
Coreslab Structures Inc.
Des Moines Steel Fence Co.
East Moline Glass
Environmental Solutions of Iowa
Epco Ltd., Inc.
GP Enterprises
Harris Rebar/Ambassador Steel
Heartland Millwrights
HME, Inc.
Integrity Test & Balance
Iowa Pump Works
J & K Contracting
Jensen Builders, Ltd.
Jim's Carpet One
Kadee Industries, Inc.
Manatts, Inc.
Midwest Automatic Fire Sprinkler
Modern Control Services
Mona Composites, LLC
NYSTROM
Overhead Door Company of Des Moines
Performance Contracting Inc.
Peri Formwork Systems
Pierce Sales, Inc.
Premier Edge, LLC
RDP Technologies
Schammel Electric, Inc.
Schumacher Elevator Co.
Seedorff Masonry
SGA Coating Consultants
SGH Inc.
Shank Constructors, Inc.
Spec Ten
Superior Crane
Surface Sealers
Terry & Sons Painting, Inc.
TK Roofing & Sheet Metal, Co.
TomCo Systems
Tresco Industries Ltd.
US Erectors, Inc.
Vessco Inc.
Westech Engineering
Wynn O. Jones & Associates, Inc.
Zimmer and Francescon, Inc.

SUPPLIERS
Algoma Hardwoods
Architectural Arts
Automatic Systems Company
Carlisle SynTec/T&K Roofing
Columbia Elevator Products
Coreslab Structures/PDM Precast
Country Landscapes
Cretex
DeZurik
East Moline Glass
Fairbanks Morse/Zimmer & Francescon
Hach
Harris Rebar
HD Waterworks Supply
HME Inc
Iowa Pump Works/ABS Pumps
Kennedy Valve
Manatts
Midland Concrete Products
Mott Manufacturing
Moultrie/HME
Onyx-Rotork
Overhead Door
RDP Technologies
SCI
Shank
Storey Kenworthy
Tomco Systems
Tresco
Vessco
WesTech Engineering
Zimmer & Francescon/Vogelsang

AERIAL PHOTOS
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