



SARATOGA SPRINGS  
*Water*

# A Case Study of Installing Secondary Water Meters

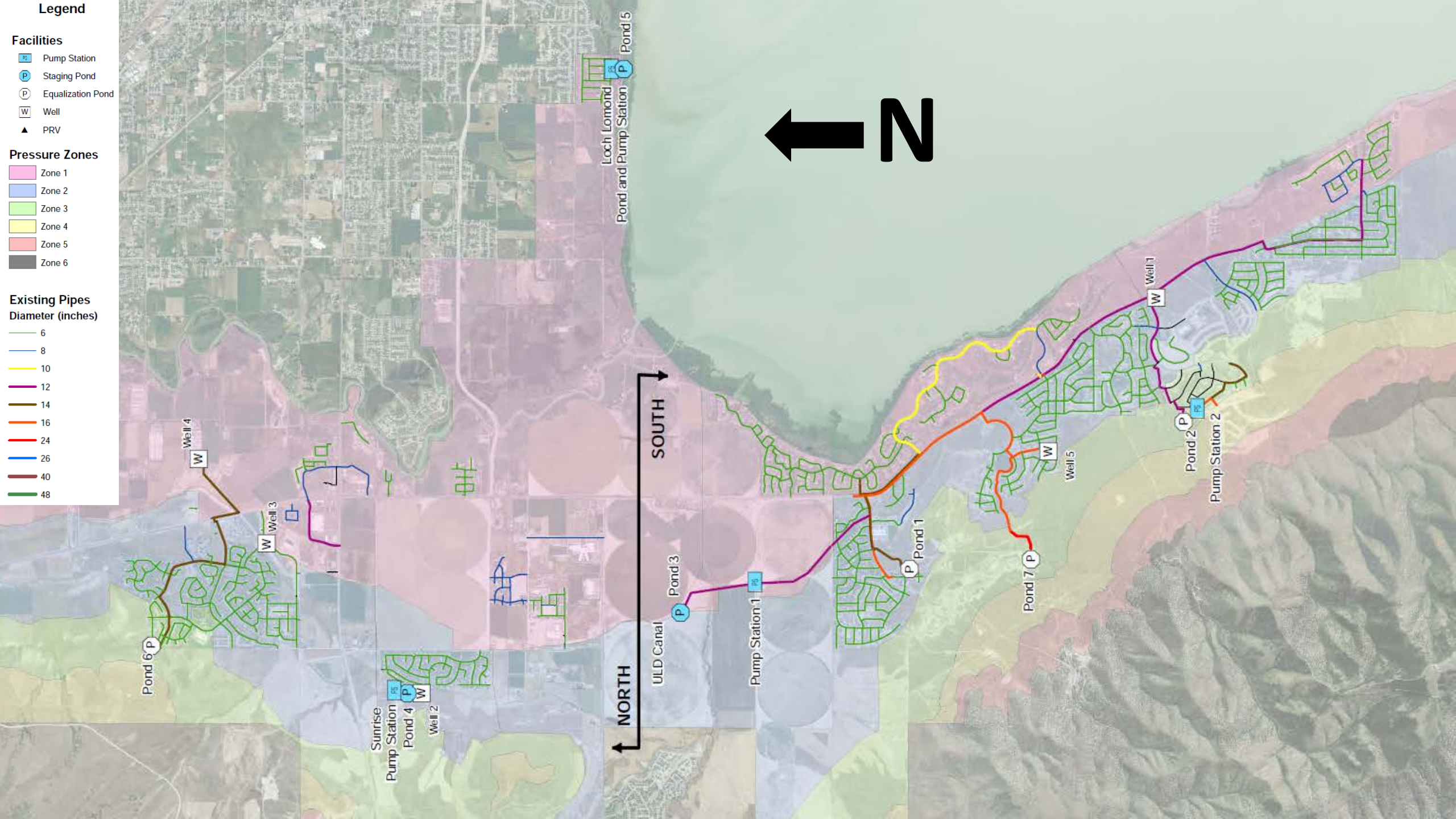
Mark Edwards  
Gordon Miner  
Steven C. Jones  
Matt Millis

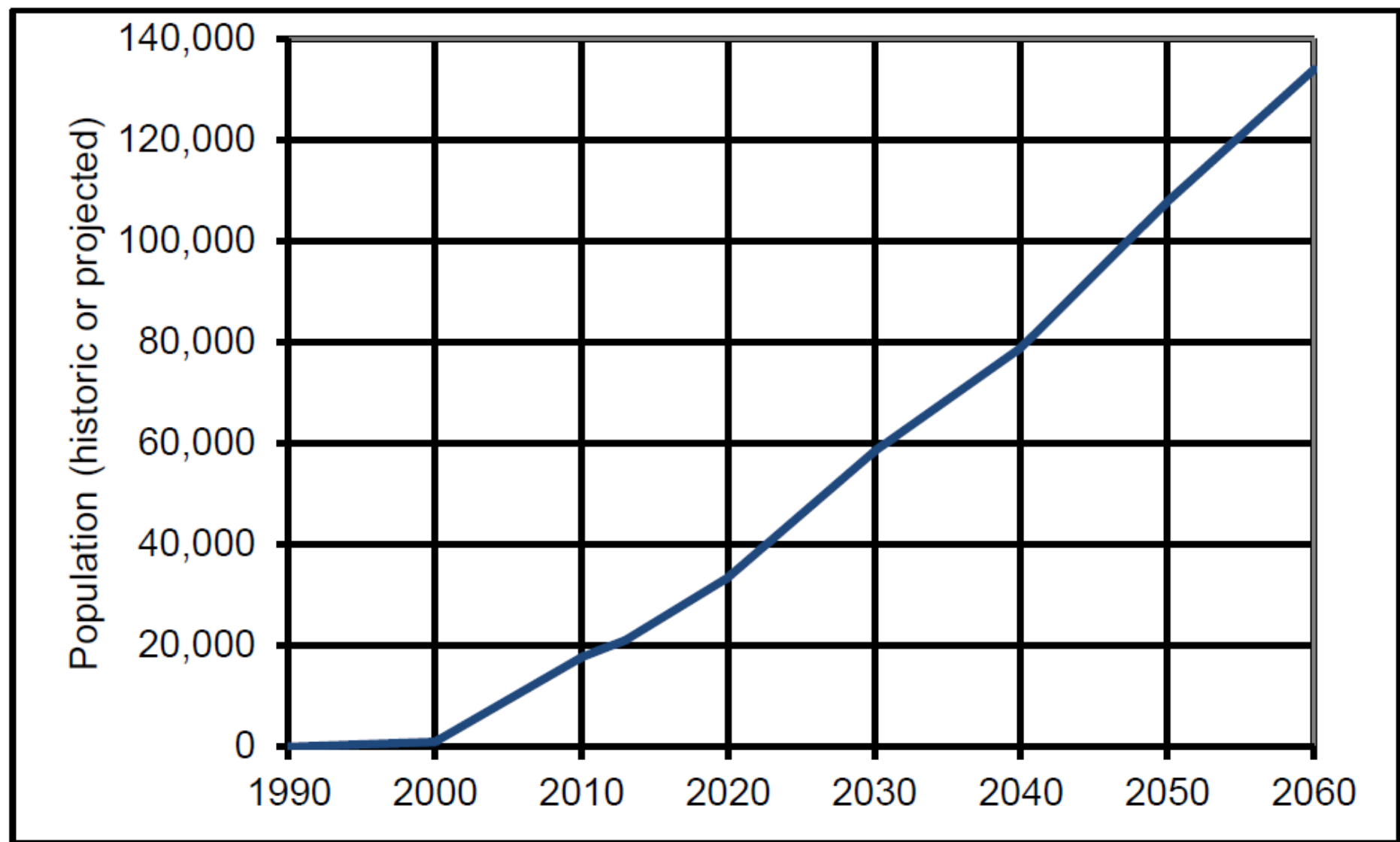
September 14<sup>th</sup>, 2016

**HANSEN  
ALLEN  
& LUCE<sub>INC</sub>**  
ENGINEERS

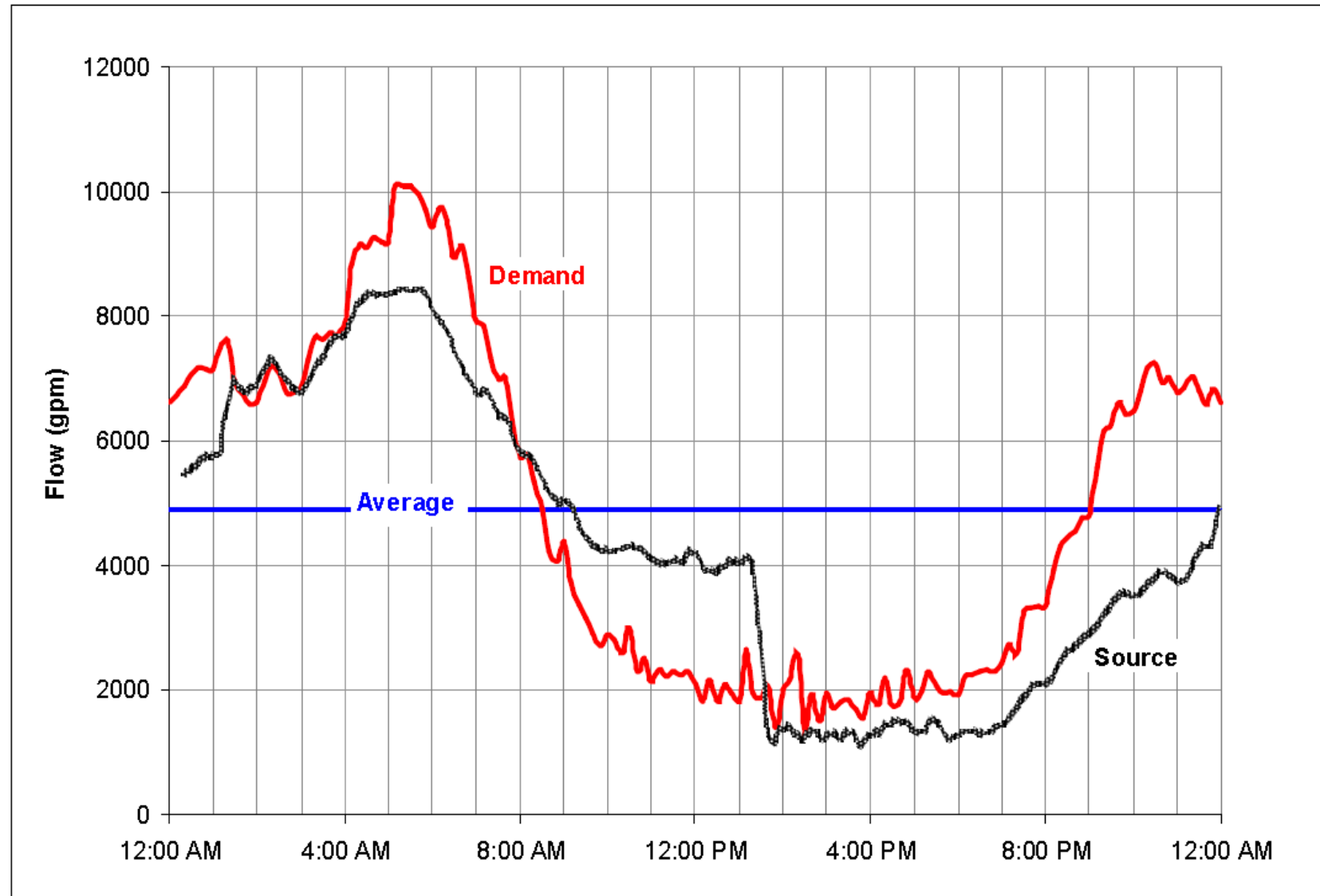
# **Saratoga Springs**

- Incorporated in December 1997
- Population in 2000 was a little over 1,000
- Current population about 27,000
- Separate secondary water system
- Well and canal sources
- Supplemented by the drinking water system with cross-overs
- No dry pipes





**Figure 1-1: Saratoga Springs Historic and Projected Population**  
(U.S. Census Bureau 2012; GOMB 2013)



### AVERAGE DAY DEMAND PER ERC (gpd)

	Indoor	Outdoor	Total
1999 AWWA Study	207	303	510
DWR 2001	204	345	549
DWR 2009	186	403	589
DWR 2009 (High)	222	1242	1464

State Standards	400	400	800
Draper	216	584	800
South Jordan	202	428	630
Midvale	236	368	604
Layton	283	341	624
Sandy	269	439	708
Spanish Fork	259	389	648
Blanding	207	244	451
South Salt Lake	225	221	446
GHID	273	298	571
Average	241	368	609

**Saratoga Springs in 2010 - 625 to 900**

## PEAK DAY DEMAND PER ERC (gpd)

	Indoor	Outdoor	Total
State Standards	800	800	1600
Draper	216	1627	1843
South Jordan	202	1656	1858
Midvale	236	1152	1388
Layton	283	1440	1723
Sandy	269	1950	2219
Spanish Fork	259	1814	2073
Blanding	207	893	1100
South Salt Lake	225	1062	1287
GHID	273	1109	1382
Average	241	1455	1653

Saratoga Springs in 2010 - 2650  
to 3800

## PEAK INSTANTANEOUS DEMAND PER ERC (gpd)

	Indoor	Outdoor	Total
State Standards	1120	1600	2720
Draper	302	3384	3686
South Jordan	283	3017	3300
Midvale	330	1628	1958
Layton	396	1764	2160
Sandy	377	3536	3913
Spanish Fork	363	2560	2923
Blanding	290	1140	1430
South Salt Lake	315	1787	2102
GHID	382	1391	1773
Average	338	2245	2583

Saratoga Springs in 2010 - 5300  
to 7000

## SECONDARY SYSTEM LEVEL OF SERVICE COMPARISON

	Spanish Fork		State Duty	Division of Drinking Water	Saratoga Springs Typical Metered	Recommended Level of Service
	Metered	Design				
<b>Average Yearly Demand (Source Capacity)</b> ac-ft/yr-irr ac	2.58	4.00	4.00	1.87	4.23	3.16
<b>Peak Day Demand (Source Production Rate)</b> gpm/irr ac	5.80	6.00		3.96	11.13	7.50
<b>Peak Instantaneous Demand (Transmission/Distribution)</b> gpm/irr ac	9.86	10.00		7.92	22.25	15.00
<b>Storage</b> gal/irr ac	2,600	9,487		2,848	8,011	9,216

The decision to put in water  
meters

- System running out of capacity
- System not designed for the demand being supplied
- Developers complaining about the City's lack of control over outdoor water use
- Engineers complaining about system deficiencies
- Operators complaining about source capacity and the amount of water required from the drinking water system
- Customers complaining about low pressure
- Level of service selected for IFFP assumed meter use to control usage
- Supportive City Council

# **PHASES**

- Planning and Strategy Phase
- Investigative Phase
- Pilot Project Phase
- Construction Strategy and Planning Phase
- Construction Phase

# **STRATEGY TEAM MEMBERS**

- City Manager
- Water Department key employees
- Project managers
- City Public Involvement personnel
- Public Involvement/relations consultant
- Utility billing personnel!
- Meter vendor
- Consulting Engineer
- Rate Analysis Consultant
- City Engineer
- GIS Administrator

# **Planning and Strategy Phase**

- Formulate a plan
- Decide on meter and assembly setup
- Decide on water rates and billing
- Set realistic timelines for each phase
- Get the word out early and often
  - Newsletters
  - City web page
  - Facebook
  - Open houses



# SARATOGA SPRINGS

*Utah*

[Home](#)[Business ▼](#)[Contact](#)[Departments ▼](#)[Government ▼](#)[Resident/Community ▼](#)[Transparency ▼](#)

## *In Resident/Community:*

- [About Us](#)
- [Area Directory](#)
- [Civic Events](#)
- [Commonly Used Forms/Applications](#)
- [Community Calendar](#)
- [Contact Us](#)
- [Elections](#)
- [Emergency Preparedness](#)
- [Frequently Asked Questions](#)
- [Helpful Links](#)
- [Library](#)
- [Maps](#)
- [News](#)
- [Pay Your Utilities](#)

## *Secondary Water Meter Project*

The City of Saratoga Springs will install secondary water meters in our community this summer. The new meters are part of a water conservation effort that will inform residents of their secondary water use. The new meters will also help determine secondary water use rates on a monthly basis.

### **Project Activities:**

- 48-hour notice will be given before work at each residence. A schedule of construction activities will be updated on the City website.
- A box cover, will be installed over the meter.
- The contractor will restore the area to its original state.
- Secondary water service should only be affected for a short period of time.

### **Project Benefits:**

- A new valve will be installed on all connections that receive a meter. A new valve will improve the City's ability to minimize service disruptions.
- Residents will receive a monthly water usage report.
- Meters will facilitate water conservation and allow the City to test the effectiveness of the conservation programs.

# Meter Selection

- City started installing meter assemblies in 2004 at all point of connections (POC)
- Staff spent years experimenting with meters
- Meters with internal measuring devices and moving parts wore out quickly
- City selected Badger E Series ultrasonic meter and register with integrated polymer bodies
- The City uses a mobile meter reading technology with ITRON Encoder Reader Transmitter (ERT)



## Investigative Phase

- Staff took weeks finding POCs and collecting data
- Used GPS data collector with integrated camera. (Show lot address for orientation in picture)
- Sampling of obstacles, ways POCs are connected to systems, number of valves and filters to be moved.
- Accurate GIS database important

## **Investigative Phase**

- City purchased meters from vender
- Created tight inventory tracking system
- City had manufacturer place bar code identifiers for every meter on pallet packaging
- City developed tracking sheet (very important to avoid billing issues)
- Inspectors verified each installation by checking meter and ERT serial numbers

## **Pilot Project Phase**

- Hired contractor to install meters in 6 target areas on a time and materials basis.
- Determined real costs for project bonding purposes.
- Worked with contractor to determine unit costs for several scenarios. (parts, labor, landscaping, concrete restoration)

# Pilot Project Phase

Lessons learned:

- Impossible to find all POCs before construction, many were difficult to find
- Dogs! Always ask permission to enter lots
- Contractors figured out installation quickly and moved fast.
- Inspectors had to work fast to find POCs, and to verify installation, backfill and landscape restoration.

# **Pilot Project Phase**

Lessons learned:

- You need a robust, formal and well planned Public Involvement Team





# **Construction Strategy and Planning Phase**

- Public Involvement (PI) Consultant Hired
  - Pilot project contractor had good input in PI plan
  - Contractors had to have employee dedicated to PI
  - Contractor hung door fliers 48 hours in advance and provided onsite resident interactions
  - PI consultant notified residents 7 days in advance, had a dedicated phone number and email for complaints and information
  - Contractor and PI consultant responsible for resolving all issues. Contract stipulated how quickly complaints are addressed. Inspectors follow up.

# **Construction Strategy and Planning Phase**

- The City was split into 6 zones and contractors were able to bid on one to all zones.
- 2 contractors were awarded 2 zones and 2 contractors were awarded 1 zone each.
- Have progress meetings weekly
  - Discuss timing of notices and installations
  - Review complaints, resolutions, problem avoidance

# Construction Phase

Lessons learned:

- Limit the time excavations can be left open, backfill quickly for safety. Cover and barricade all excavations left unattended, no longer than one day, never over a weekend.
- Even though the POC brass isolation valves were under 16 years old, they were mostly junk. Just plan on replacing these valves with plastic valves from the start!
- Start early in the irrigation season. Finish before October. We could not finish and testing for leaks had to wait until the following spring. Leaks showed up in the spring from April to July. Small lawn restoration issues didn't show up until late spring. The longer it went the more we struggled to get contractors back.

# Construction Phase

Lessons learned:

- Monitor social media, sometimes we picked up negative buzz about slow responses or unhappy residents
- Open space POC's were deeply buried for whatever reason. We should have built in a pay item for that. All excavations were hand dug and backfilled so we negotiated time and materials to raise the service line and install the meter assembly at grade.
- Best results came from contractors who used separate crews for the meter install and then crews for backfill and landscaping restoration.

# Construction Phase

Lessons learned:

- Monitor social media, sometimes we picked up negative buzz about slow responses or unhappy residents
- Open space POC's were deeply buried for whatever reason. We should have built in a pay item for that. All excavations were hand dug and backfilled so we negotiated time and materials to raise the service line and install the meter assembly at grade.











## **COST**

- \$3.6 Million
- About 4,000 meters installed
- About \$900 per meter

Changes Rate Structure

## Water Rate

- Council sought a rate structure that would immediately begin to charge users for their actual water usage
- Many connections were using more than double the allotment of water allocated through impact fees
- City was able to have reasonable rates for secondary despite being a new system because of blending the secondary water finances with the culinary finances
- Performed a revenue requirement analysis to balance the culinary and the secondary water rates

## **Water Rate**

- The Council provided a brief grace period with capped rates and bill communications to encourage users to reduce their annual use to avoid punitive water bills
- After two months, full tiered rates were put into place
- Each lot is assigned an allotment of water based upon lot size
- Bills are applied according to the amount of water used relative to the lot size

# Proposed Water Rate Structure

**Table A3: Current Pressurized Irrigation Rates**

Current Pressurized Irrigation			
Table No.	Base Fee		
701	Acre	\$	67.48
701	Half Acre		33.74
701	Third Acre		22.27
701	Quarter Acre		16.87

**Proposed Consumption Fee**

Pressurized Irrigation				
Allotment	Price per 1Kgal		Price per Acre	
Up to 75%	\$	0.35	Base Fee	\$ 65.00
Up to 100%		1.00		
Up to 150%		1.25		
Up to 200%		2.00		
Up to 250%		3.00		
Above 250%		3.80		

## Saratoga Springs Residential Irrigation Calculator

My lot size	0.25	acres
My old base rate	\$26.18	per month
My new base rate	\$16.25	per month

<b>My monthly water allotment</b>	<b>27.20</b>	thousand gallons
-----------------------------------	--------------	------------------

Water Usage	25	thousand gallons
Tier 1 (up to 75% of allotment)	\$7.14	\$0.35 per 1,000 gallons
Tier 2 (75% to 100% of allotment)	\$4.60	\$1.00 per 1,000 gallons
Tier 3 (100% to 150% of allotment)	\$0.00	\$1.25 per 1,000 gallons
Tier 4 (150% to 200% of allotment)	\$0.00	\$2.00 per 1,000 gallons
Tier 5 (200% to 250% of allotment)	\$0.00	\$3.00 per 1,000 gallons
Tier 6 (above 250% of allotment)	\$0.00	\$3.80 per 1,000 gallons

<b>Monthly Secondary Water Bill</b>	<b>\$27.99</b>
-------------------------------------	----------------

<b>Monthly savings during winter months</b>	<b>\$9.93</b>
---	---------------

Input your information into these cells



[To find your lot size on the County recods follow this link. Enter your address and then click on your lot to find your lot size to 3 decimal points.](#)

# Water Use Results

## *Use Less. Save More.*

In 2012, the City of Saratoga Springs conducted a water utility study. The study revealed that secondary water usage in Saratoga Springs is above the state recommended average. Installing water meters will allow for the City and residents to better understand secondary water usage, initiate water conservation efforts and plan for the future.



During the peak season, the average  $\frac{1}{4}$  acre lot uses approximately 2,100 gallons of water per day when the recommended daily use should average about 722 gallons per day. The current usage would be like filling 38 kiddie pools full of water versus only using 13 kiddie pools of water.

## Results By Connection

	2010 Actual (Single Family Average)	2010 Actual (Per Connection)	Level of Service (per Typical Single Family)	2014 Actual (Per Connection)	2015 Actual (Per Connection)	2016 Actual (Per Connection)
<b>Annual Average</b>	900 gpd (1 Ac-Ft)	625 gpd (0.7 Ac-Ft)	670 gpd (0.75 Ac-Ft)	490 gpd (0.55 Ac-Ft)	500 gpd (0.56 Ac-Ft)	NA
<b>Peak Day</b>	3,800 gpd	2,650 gpd	2,592 gpd	1,495 gpd	1,618 gpd	1,606 gpd
<b>Peak Instantaneous</b>	7,000 gpd	5,300 gpd	5,184 gpd	3,000 gpd	3,250 gpd	3,200 gpd

## Results By Irrigated Acre

	2010 Actual (Single Family Average)	2010 Actual (Per Connection)	Level of Service (per Irrigated Acre)	2014 Actual (Per Connection)	2015 Actual (Per Connection)	2016 Actual (Per Connection)
<b>Annual Average</b>	4.23 Ac-Ft	3.18 Ac-Ft	3.16 Ac-Ft	2.50 Ac-Ft	2.54 Ac-Ft	NA
<b>Peak Day</b>	11.1 gpm	8.4 gpm	7.5 gpm	4.7 gpm	5.11 gpm	5.07 gpm
<b>Peak Instantaneous</b>	22.3 gpm	16.7 gpm	15.0 gpm	9.5 gpm	10.3 gpm	10.1 gpm

## AVERAGE DAY DEMAND PER ERC (gpd)

	Indoor	Outdoor	Total
1999 AWWA Study	207	303	510
DWR 2001	204	345	549
DWR 2009	186	403	589
DWR 2009 (High)	222	1242	1464

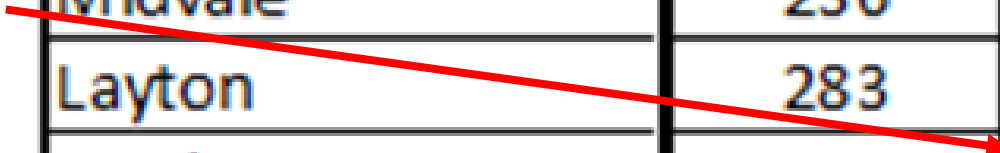
Saratoga  
Springs  
500 gpd

State Standards	400	400	800
Draper	216	584	800
South Jordan	202	428	630
Midvale	236	368	604
Layton	283	341	624
Sandy	269	439	708
Spanish Fork	259	389	648
Blanding	207	244	451
South Salt Lake	225	221	446
GHID	273	298	571
Average	241	368	609

## PEAK DAY DEMAND PER ERC (gpd)

	Indoor	Outdoor	Total
State Standards	800	800	1600
Draper	216	1627	1843
South Jordan	202	1656	1858
Midvale	236	1152	1388
Layton	283	1440	1723
Sandy	269	1950	2219
Spanish Fork	259	1814	2073
Blanding	207	893	1100
South Salt Lake	225	1062	1287
GHID	273	1109	1382
Average	241	1455	1653

Saratoga  
Springs  
1618 gpd



## PEAK INSTANTANEOUS DEMAND PER ERC (gpd)

Saratoga  
Springs  
3250 gpd

	Indoor	Outdoor	Total
State Standards	1120	1600	2720
Draper	302	3384	3686
South Jordan	283	3017	3300
Midvale	330	1628	1958
Layton	396	1764	2160
Sandy	377	3536	3913
Spanish Fork	363	2560	2923
Blanding	290	1140	1430
South Salt Lake	315	1787	2102
GHID	382	1391	1773
Average	338	2245	2583

## SECONDARY SYSTEM LEVEL OF SERVICE COMPARISON

	Spanish Fork		State Duty	Division of Drinking Water	Saratoga Springs Typical Metered	Recommended Level of Service
	Metered	Design				
<b>Average Yearly Demand (Source Capacity)</b> ac-ft/yr-irr ac	2.58	4.00	4.00	1.87	<b>2.54</b> <del>4.23</del>	3.16
<b>Peak Day Demand (Source Production Rate)</b> gpm/irr ac	5.80	6.00		3.96	<b>5.11</b> <del>11.13</del>	7.50
<b>Peak Instantaneous Demand (Transmission/Distribution)</b> gpm/irr ac	9.86	10.00		7.92	<b>10.3</b> <del>22.25</del>	15.00
<b>Storage</b> gal/irr ac	2,600	9,487		2,848	8,011	9,216



Questions?