Conservation 8:30 am

How the City of Spokane is Making Water Efficiency as Routine as Recycling

MAKING WATER EFFICIENCY AS ROUTINE AS RECYCLING

ANNIKKI CHAMBERLAIN
Mimir Water
& **KRISTEN ZIMMER**
City of Spokane

MIMIR WATER

WATER WISE SPOKANE

Which Came First? The Habit or the Routine?

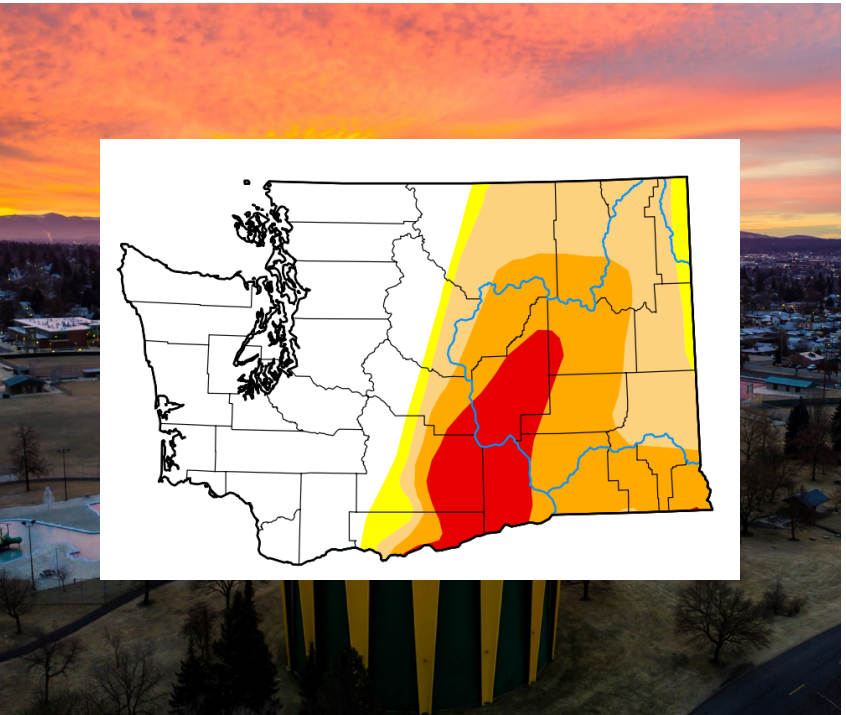
Routines that Grow

Habit Stacking

All Properties Have Routines

City of Spokane

FACTS & FIGURES



SPOKANE WATER SYSTEM 2019 FACT SHEET

SUPPLY

7
WELL STATIONS
14 WELLS
27 WELL PUMPS

26
BOOSTER STATIONS
72 PUMPS

34
STORAGE RESERVOIRS
103 MG CAPACITY

24
PRESSURE ZONES

DISTRIBUTION

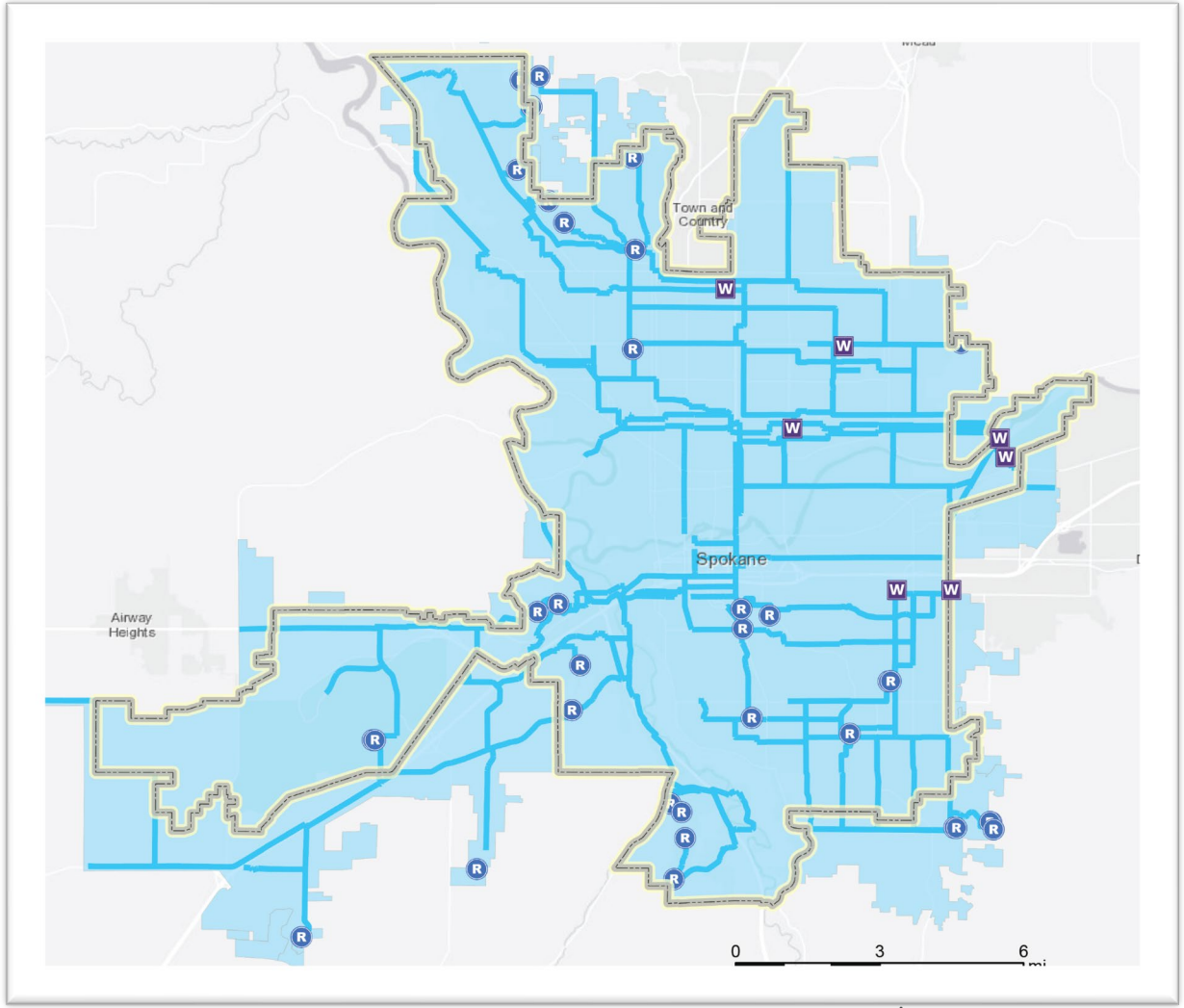
250,000
POPULATION SERVED

24
BILLION GALLONS PUMPED ANNUALY
30 MGD WINTER
180 MGD SUMMER

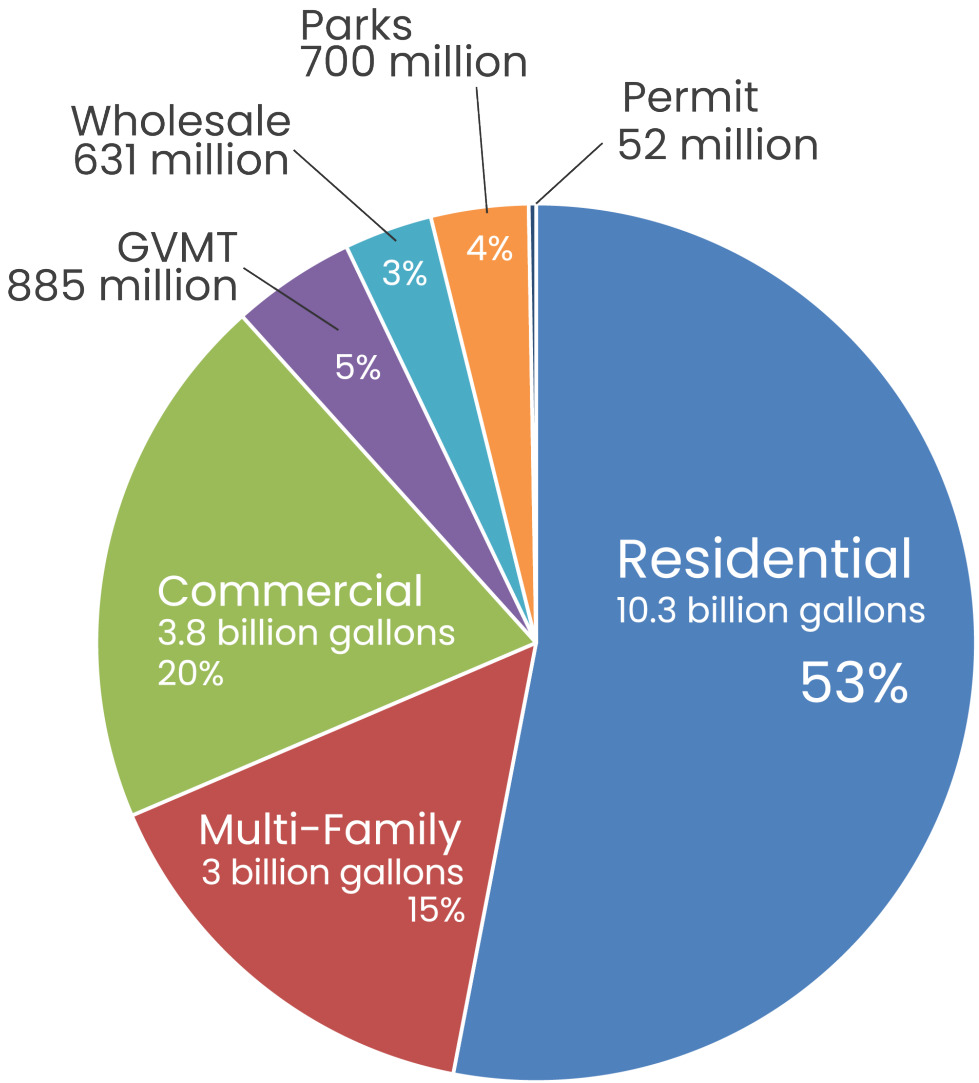
1,100+
MILES OF WATER MAIN

80,000
SERVICE CONNECTIONS

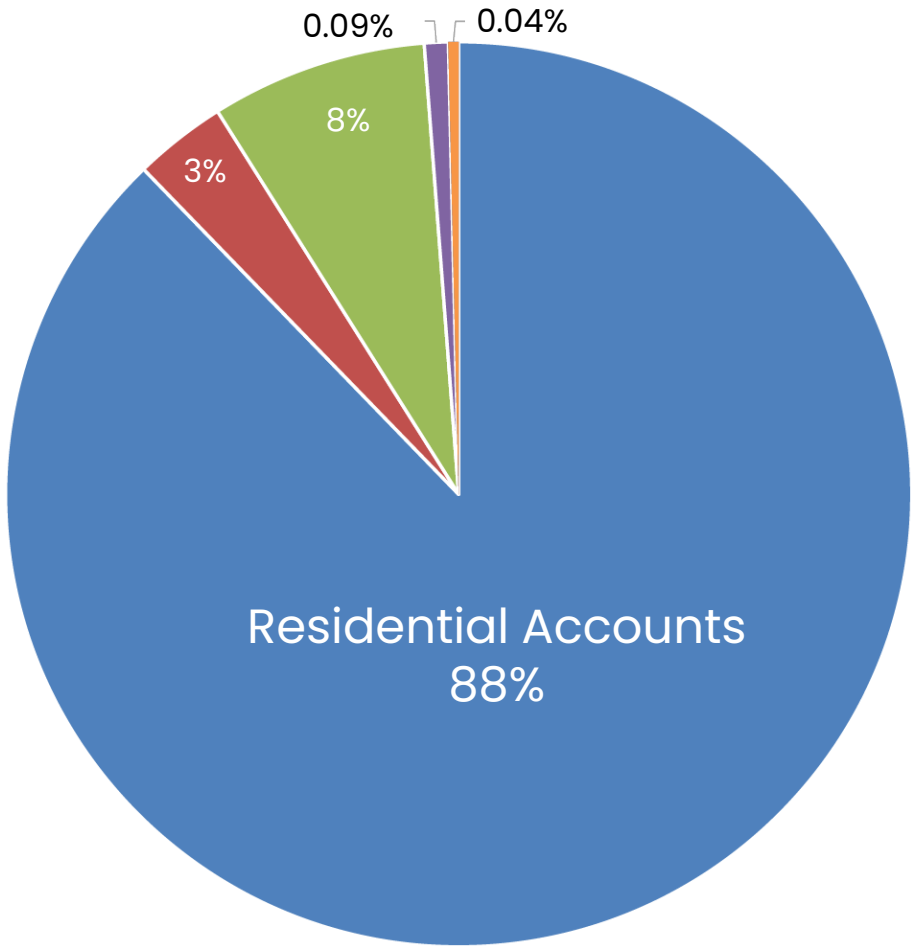
7,558
FIRE HYDRANTS

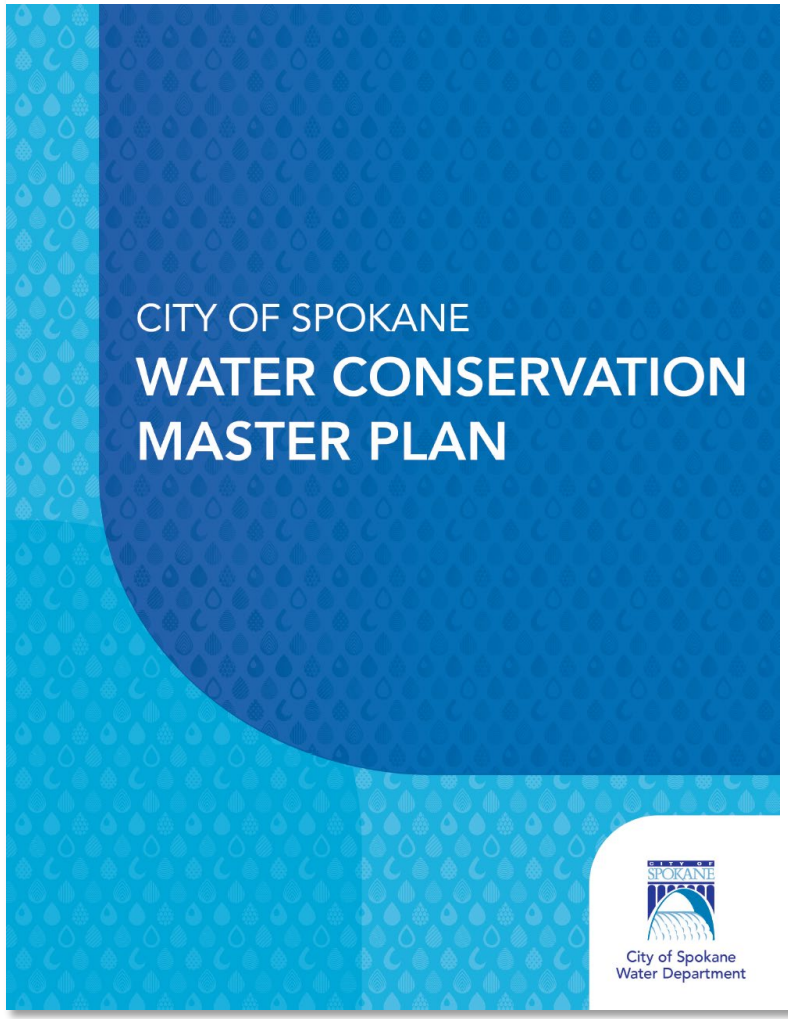


2021 Purchased Water by Customer Sector



Accounts/Sector Split





The variety of water conservation activities provides an opportunity to reduce demand while minimizing customer sacrifice and have been selected based on their pumping reduction potential for a reasonable cost.

VISION: Reliable, Sustainable, Resilient Water Supply
Spokane water customers and City facilities are using water efficiently, new development construction is designed to minimize water use, and fixtures in existing developments have been upgraded to maximize water efficiency.

Goals	Key Performance Indicators	Strategies
Service Area Growth without Additional Pumping (total overall base consumption). *Annual consumption decreases from 2018 levels despite population and economic growth.*	Annual: 10 million gallons conserved for all participants	S2-S5
	Annual Residential (SF/MF): 5,000 gallon reduction per participating connection	S3-S4
	Annual City: 2 million gallon reduction for all city-owned properties	S5
	Annual Commercial: 200,000 gallon reduction per participating connection	S4
	Annual: 30 education events	S8
	Annual: 1,400 rebates issued	S2-S4, S8
	Long-Term: Conserved 500 million gallons by 2030	S1-S8
	Long-Term: 5% reduction in per capita consumption by 2030	S1-S8
Reduction in Seasonal Demand Peaks (outdoor consumption)	Annual: Reduction in MDD (maximum day demand) during active growing season	S1-S3, S5-S8
	Long-Term: 15% reduction in seasonal peak demand by 2030	S1-S8

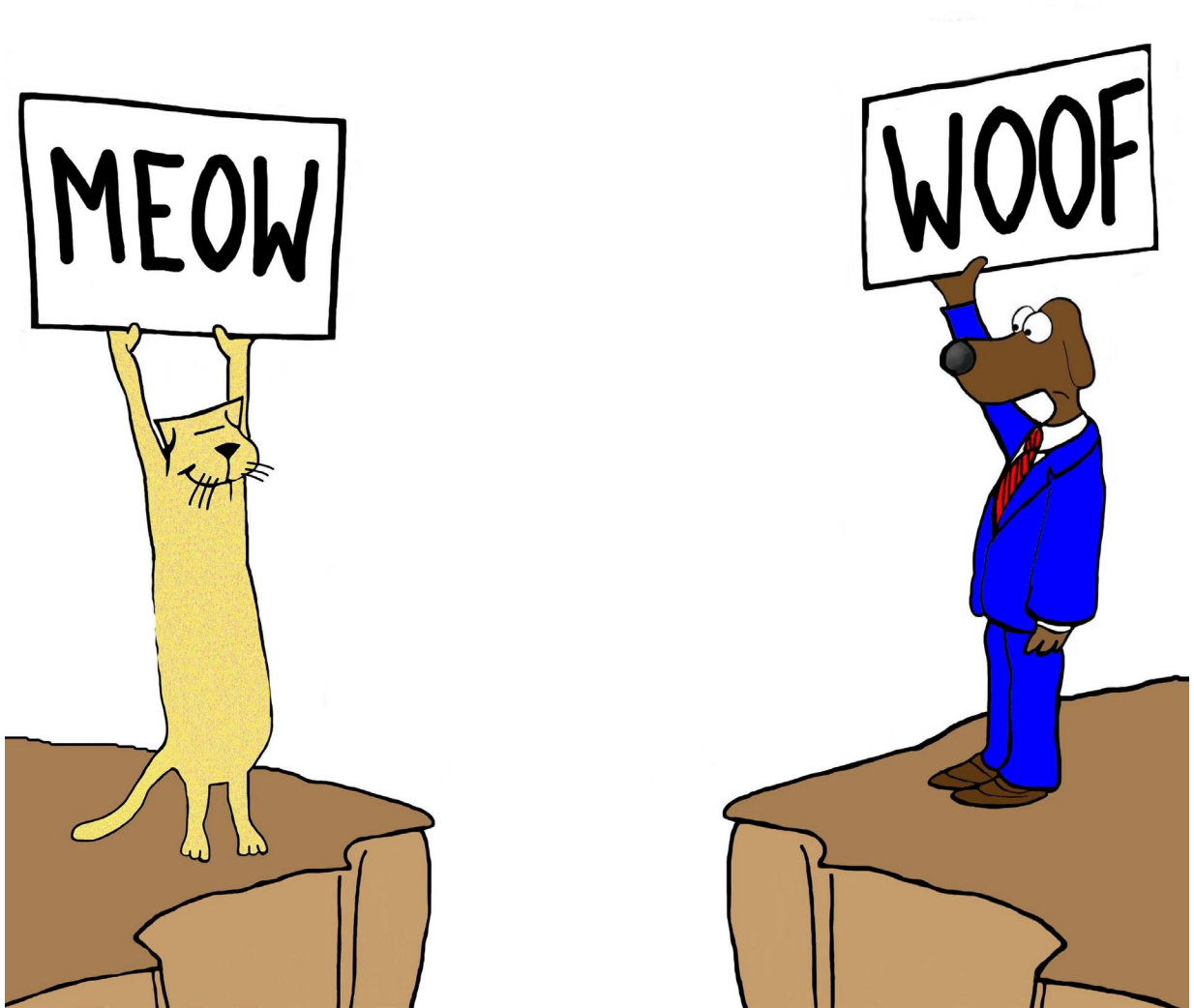
MDD: Maximum day demand is the quantity of water supplied during the highest-use day of the year

CORRESPONDING STRATEGIES	
S1	Target pressure zones with highest impact (could be due to cost of distribution, risk exposure, system capacity, redundancy, etc)
S2	Work with high water users within all customer classes to maximize results
S3	Financial Incentives for Outdoor Conservation
S4	Financial Incentives for Indoor Conservation
S5	City-Owned Facility Program
S6	Development Policies Targeting Responsible and Consistent Growth
S7	Technological Advancements: Enhanced data accuracy and monitoring
S8	Education and Technical Assistance

WATER CONSERVATION MASTER PLAN

COMMERCIAL GOALS & STRATEGIES

Are We Speaking Different Languages?



Getting to Know the Customer

First Impressions are Everything

Understanding What is Relevant

SUMMARY: 501 N RIVERPOINT BLVD, SPOKANE, WA

This property can reduce irrigation water costs by approximately $700 per year and maintain a healthy landscape. The water budget determines landscape water need based on landscape area, vegetation type, and local weather. Preliminary results suggest the water being applied to the landscape is over twice as much as needed. While overwatering is common for several reasons, following the **Next Steps** will put your property on the fast track to efficiency.

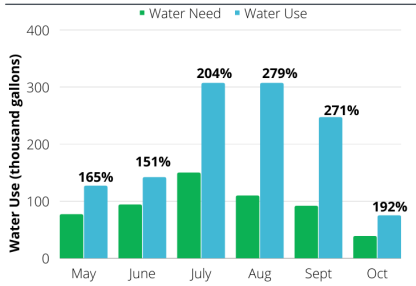
KEY METRICS

0
Cost

$700+
Annual Savings

643,000
Gallons Savings

WATER BUDGET RESULTS



Water Need	Water Use	Extra Use	Extra Cost
561,000 gallons	1,204,000 gallons	643,000 gallons	$928

NEXT STEPS

1. **Upgrade Irrigation Controller**
   Schedule a free irrigation controller evaluation and, if needed, upgrade to a weather-based irrigation controller for free through the City of Spokane Water Wise Rebates.
2. **Find and Fix**
   Schedule a free irrigation system inspection during spring start-up to find and fix leaks and breaks and fine-tune your irrigation controller and water schedule.
3. **Monthly Monitoring**
   This property is enrolled in Waterfluence, an online water budget program. During the summer, your team will get a Water Budget update every month via email to track the progress toward efficiency!

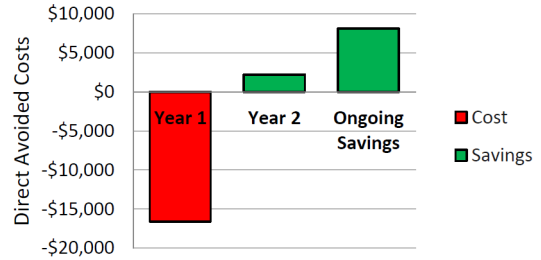
Irrigation Meter Installation Project

Due to the current water meter configuration water used for irrigation costs $2.89/unit[1]. Installing 2 irrigation meters will reduce the cost of irrigation water to $1.08/unit. In addition, current irrigation water use is estimated to be 3x more than irrigation water need, further exacerbating irrigation costs. Installing irrigation meters will reduce irrigation water costs by 63% and allow for efficient water management. The payback period is estimated to be less than 2 years and will result in an estimated cost reduction over $8,000 per year.

Project Details

Project Cost (install 2 irrigation meters)	**$14,605 Meter Fees** + $2,000 excavation costs*
Ongoing Annual Savings	**$8,100** (1.3 million gal)
Payback Period	**>2 years**

Payback Period

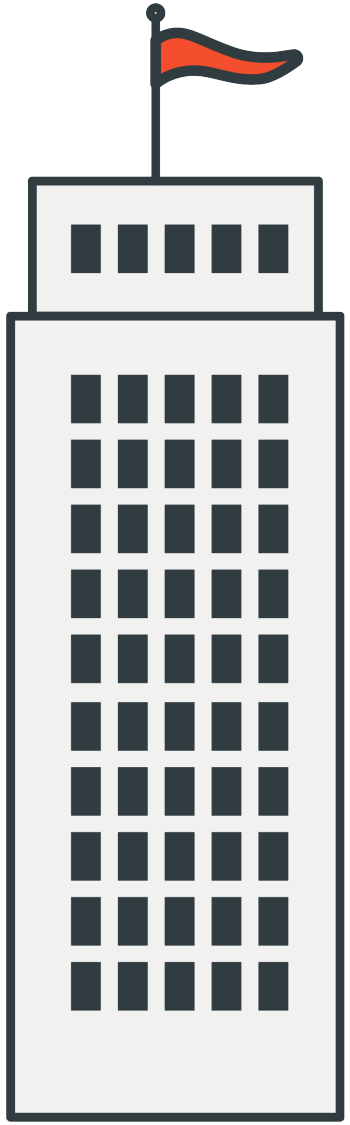


Re: Tap/Meter Fees

These plans are still in review so the estimate below cannot be necessarily accurate. I have determined the following fees would be applicable:

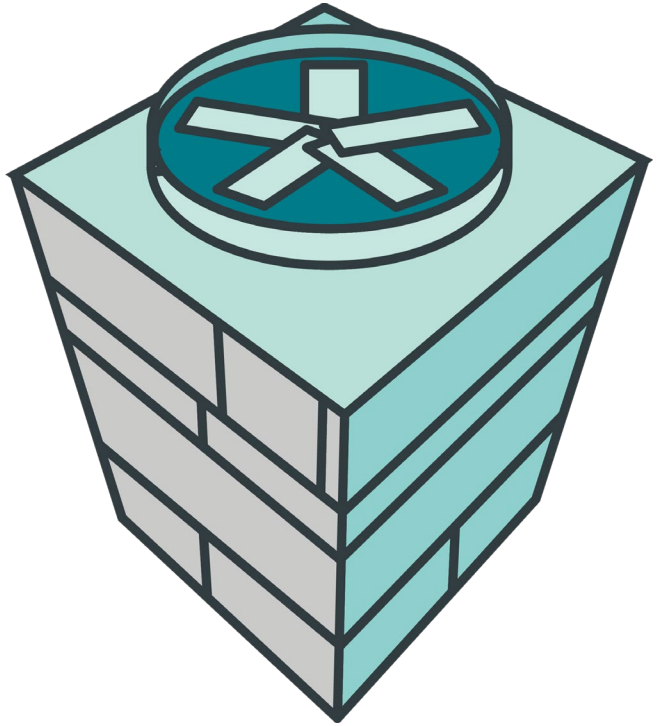
	Cost	Extended Cost
2" Tap	$1,414.14	$2,828.28
2" Irrigation Meter Only	$2,403.74	$4,807.48
Commercial GFC for 2" Tap	$3,485.00	$6,970.00
	Total:	$14,605.76

Organize…



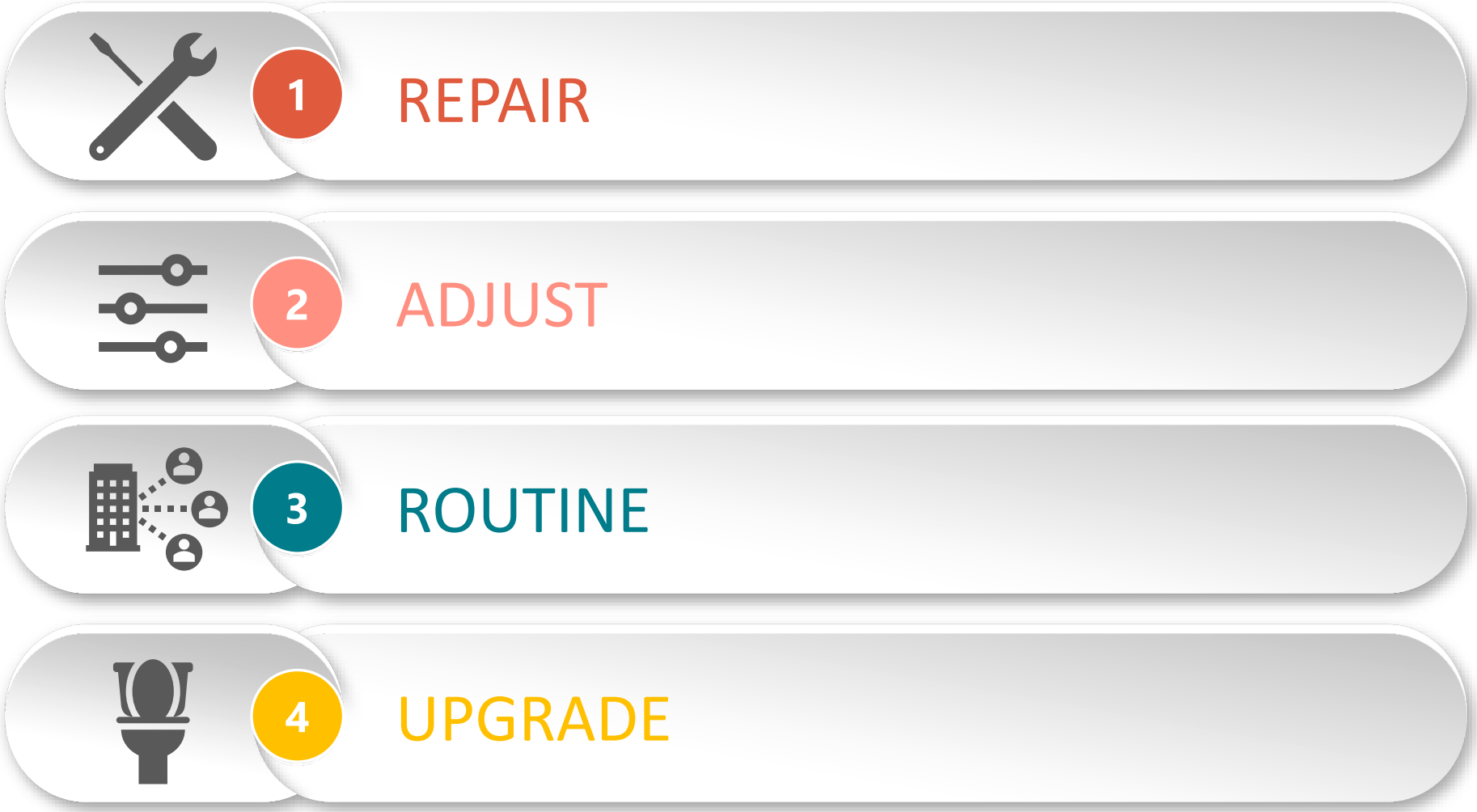
INSIDE

OUTSIDE



COOLING

And Prioritize!

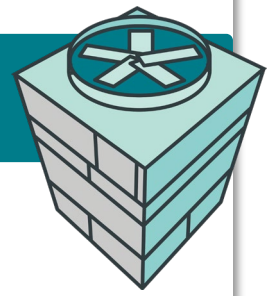


PROPERTY

INSIDE

OUTSIDE

COOLING



REPAIRS

ADJUSTMENTS

ROUTINES

UPGRADES

REPAIRS

ADJUSTMENTS

ROUTINES

UPGRADES

REPAIRS

ADJUSTMENTS

ROUTINES

UPGRADES

Implementation…is Complex!

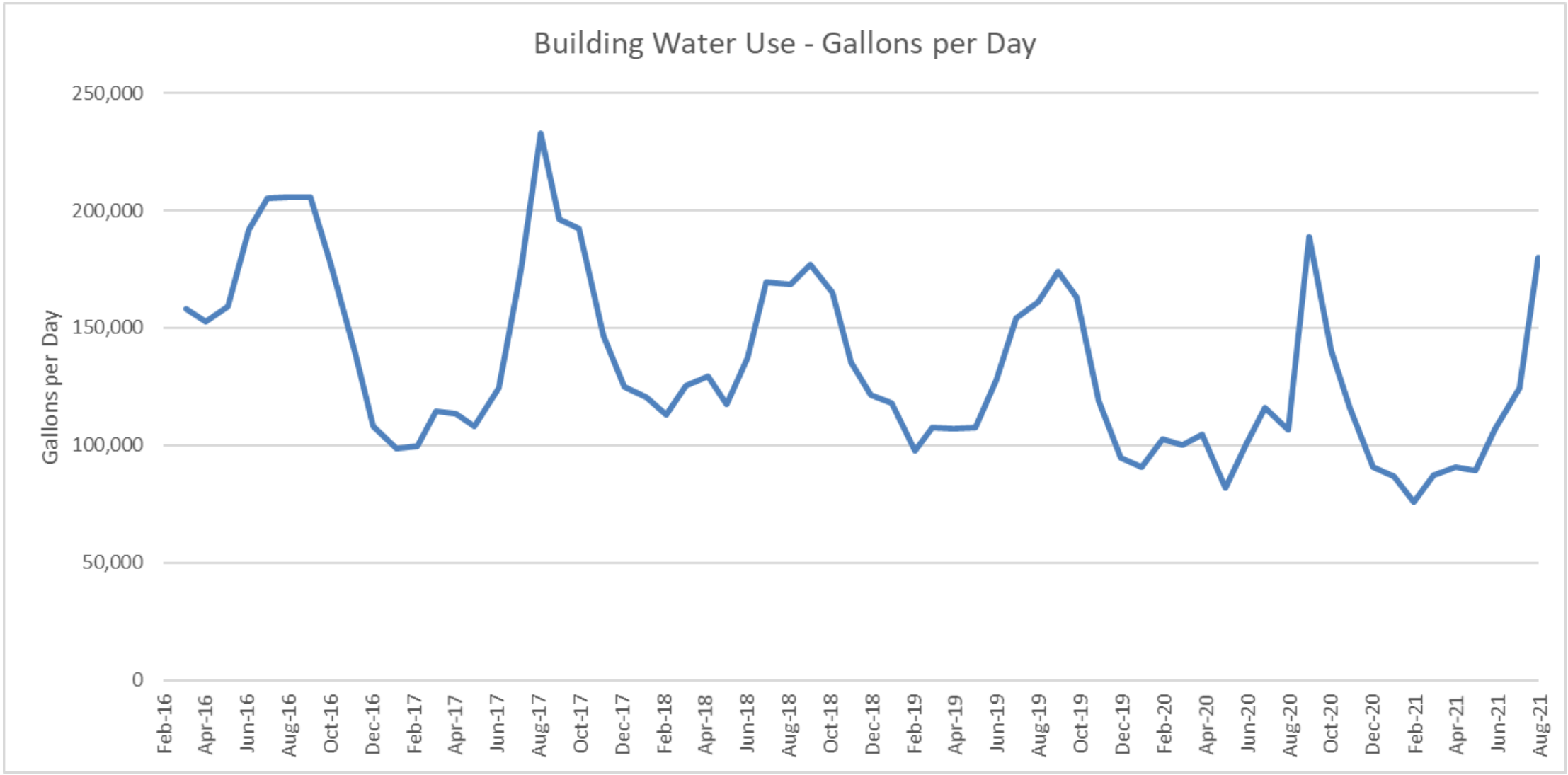
Whiteboard Activity

Case Studies

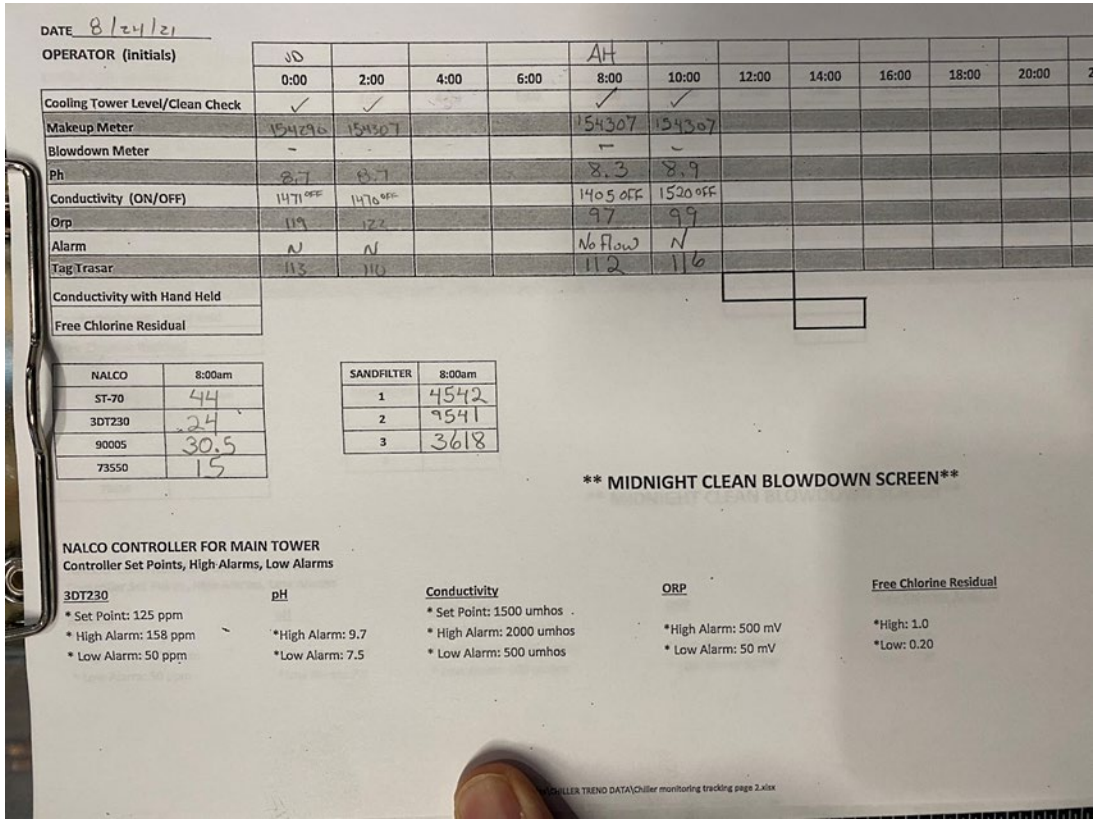
2021

REPAIR

REPAIR: Hospital Example



REPAIR: Hospital Example



DATE 8/24/21

OPERATOR (initials)	JD				AH							
	0:00	2:00	4:00	6:00	8:00	10:00	12:00	14:00	16:00	18:00	20:00	
Cooling Tower Level/Clean Check	✓	✓			✓	✓						
Makeup Meter	154296	154307			154307	154307						
Blowdown Meter	-	-			-	-						
Ph	8.7	8.7			8.3	8.9						
Conductivity (ON/OFF)	1471 OFF	1476 OFF			1405 OFF	1520 OFF						
Orp	119	122			97	99						
Alarm	N	N			No Flow	N						
Tag Trasar	113	110			112	116						
Conductivity with Hand Held												
Free Chlorine Residual												

NALCO	8:00am
ST-70	44
3DT230	24
90005	30.5
73550	15

SANDFILTER	8:00am
1	4542
2	9541
3	3618

** MIDNIGHT CLEAN BLOWDOWN SCREEN**

NALCO CONTROLLER FOR MAIN TOWER
Controller Set Points, High Alarms, Low Alarms

3DT230
* Set Point: 125 ppm
* High Alarm: 158 ppm
* Low Alarm: 50 ppm

pH
*High Alarm: 9.7
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Conductivity
* Set Point: 1500 umhos
* High Alarm: 2000 umhos
* Low Alarm: 500 umhos

ORP
*High Alarm: 500 mV
* Low Alarm: 50 mV

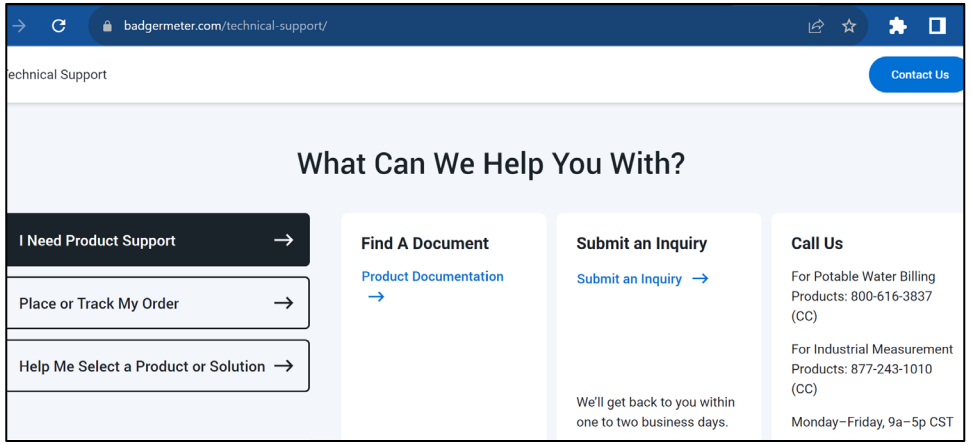
Free Chlorine Residual
*High: 1.0
*Low: 0.20

...ONITORING TRENDS DATA\Chiller monitoring tracking page 2.xlsx

Day	2020	Meter Read	Water Use (gallons per day)	2021	Meter Read	Water Use (gallons per day)
1-Jul	7/1/2020	25079	178	7/1/2021	112722	1206
2-Jul	7/2/2020	25377	298	7/2/2021	113581	859
3-Jul	7/3/2020	25854	477	7/3/2021	114467	886
4-Jul	7/4/2020	26351	497	7/4/2021	115383	916
5-Jul	7/5/2020	26887	536	7/5/2021	116260	877
6-Jul	7/6/2020	27485	598	7/6/2021	117181	921
7-Jul	7/7/2020	27949	464	7/7/2021	118064	883
8-Jul	7/8/2020	28328	379	7/8/2021	118829	765
9-Jul	7/9/2020	28889	561	7/9/2021	119640	811
10-Jul	7/10/2020	29454	565	7/10/2021	120483	843

REPAIR: Hospital Example

REPAIR: Hospital Example



PCE Pacific is pleased to offer the following quotation for your consideration. Please carefully review materials of construction, conditions of service and all details, including specifications stated or on attachments, to verify our understanding of your requirements. Product availability and quoted lead times are subject to change prior to sale.

Item	Description	Qty	Unit Price	Total Price	Lead Time to Ship
1	BADGER PROGAMMING KIT FOR HR-E-LCD. P/N 68468-001	1	$192.00	$192.00	1-2 WEEKS ARO
			Total:	$192.00	

Shipping: Best Way Parcel **Delivery Terms:** FCA - Billed

Payment Terms: Net 30 **Pricing Valid:** 30 Days

A 3% convenience fee will be added for credit card payments

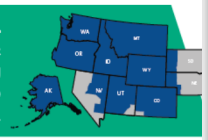
Please refer to quote #BW28994 on PO and address your order to:

PCE Pacific, Inc.
22011 26th Ave SE
Bothell, WA 98021 US
P (800) 321-4723 F (425) 487-1114

APPLIED CONTROL Emerson Impact Partner

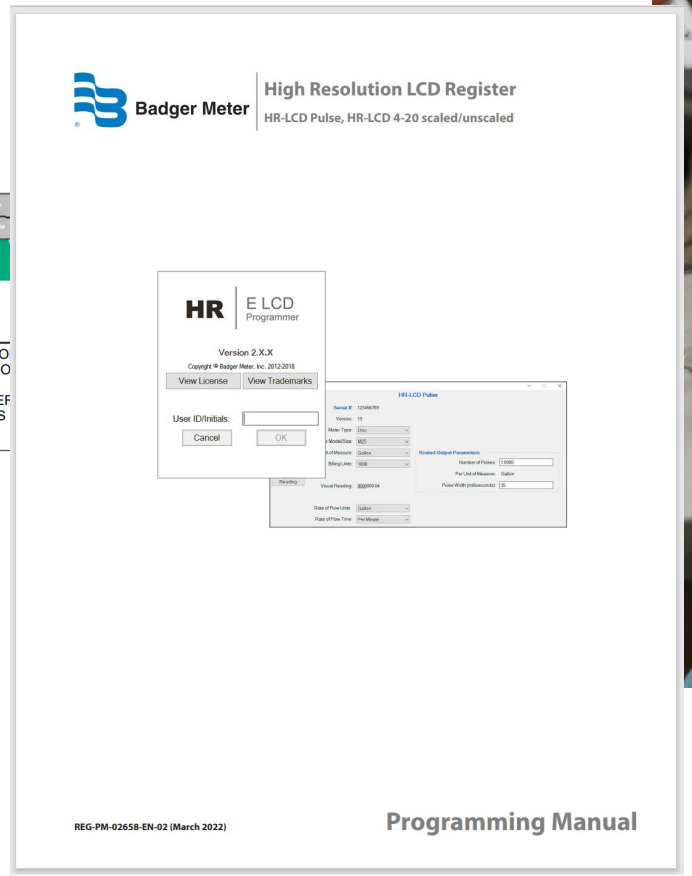
PCE PACIFIC Emerson Impact Partner

The Power of One.
Applied Control & PCE Pacific are merging to provide enhanced support to customers we're proud to serve.



For current information on the status of this merger, please visit our website www.pcepacific.com.
If you have questions about this quote call us at 425-487-9600.

UNLESS PREVIOUSLY NEGOTIATED TERMS AND CONDITIONS OF SALE BETWEEN BOTH PARTIES APPLY, THIS PROPOSAL INCO
HEREIN AND MAKES A PART HEREOF BY REFERENCE"PCE PACIFIC, INC. STANDARD TERMS AND CONDITIONS FOR THE SALE O
CONSULTING SERVICES" WHICH ARE AVAILABLE ON OUR WEBSITE AT https://www.pcepacific.com/lp/pcetc/.
BY PURCHASING OR ACCEPTING DELIVERY OF GOODS OR CONSULTING SERVICES PURSUANT TO THIS PROPOSAL THE BUYEF
BE BOUND BY PCE PACIFIC, INC. STANDARD TERMS AND CONDITIONS FOR THE SALE OF GOODS AND CONSULTING SERVICES
OTHERWISE AGREED TO IN WRITING BY BOTH PARTIES



REPAIR: Hospital Example


ADJUST
REPAIR

ADJUST: Cooling Tower Transparency

Example 1

Today's Findings

Main Tower

- The tower is online and running. Calibrations were made to the pH and conductivity. All pumps have been primed.

Free Tower

- The passivation and cleaning started Wednesday, May 12 and was finished on Friday, May 14th. A total of 15 gallons of cleaner and passivation chemical was used in the tower loop. This did not run through the heat exchanger, this was bypassed.
- The tower was then drained and refilled with fresh water and not chemical was added.
- The trasar controller will be installed this year.
- 2 new Prominent pumps have been installed with new chemical lines. See pics below.

[redacted] will then begin working their water safety plan.

E-data 5/17/2021 12:00:00 AM

Sample Point	pH @ STP	Conductivity @ STP (µS/cm)	3DT - Tagged (ppm)	M Alkalinity @ STP (ppm as $CaCO_3$)	Free Chlorine (ppm as Cl_2)
Main Tower	**8.90** 8 - 9.5	**788.00** 500 - 1000	**122.00** 100 - 145	**120.00** 0 - 600	**0.20** 0 - 2

Example 2

Cooling Systems

Test		BAC TOWER					
		MAKE-UP WATER	COOLING TOWER				
Conductivity		285	1,280				
(µS/cm)	Control Range		300-1,600				
pH		7.80	8.98				
(SU)	Control Range		8.20-9.50				
Total Alkalinity		115	420				
(ppm CaCO3)	Control Range		250-700				
Calcium Hardness		4	20				
(ppm CaCO3)	Control Range		0-120				
PTSA			146.00				
(ppb)	Control Range						
Skin Temperature			110				
	Control Range						
LSI			1.28				
	Control Range		0.75-2.50				
Cycles			4.49				
	Control Range						
Feedwater Meter		4,427,690					
	Control Range						
Notes		6425gpd					

ADJUST: Cooling Tower Transparency

Property Operator
Set Expectation

Conservation Staff
Evaluate and Inform

Cooling Tower
Service Provider
Transparent Operation

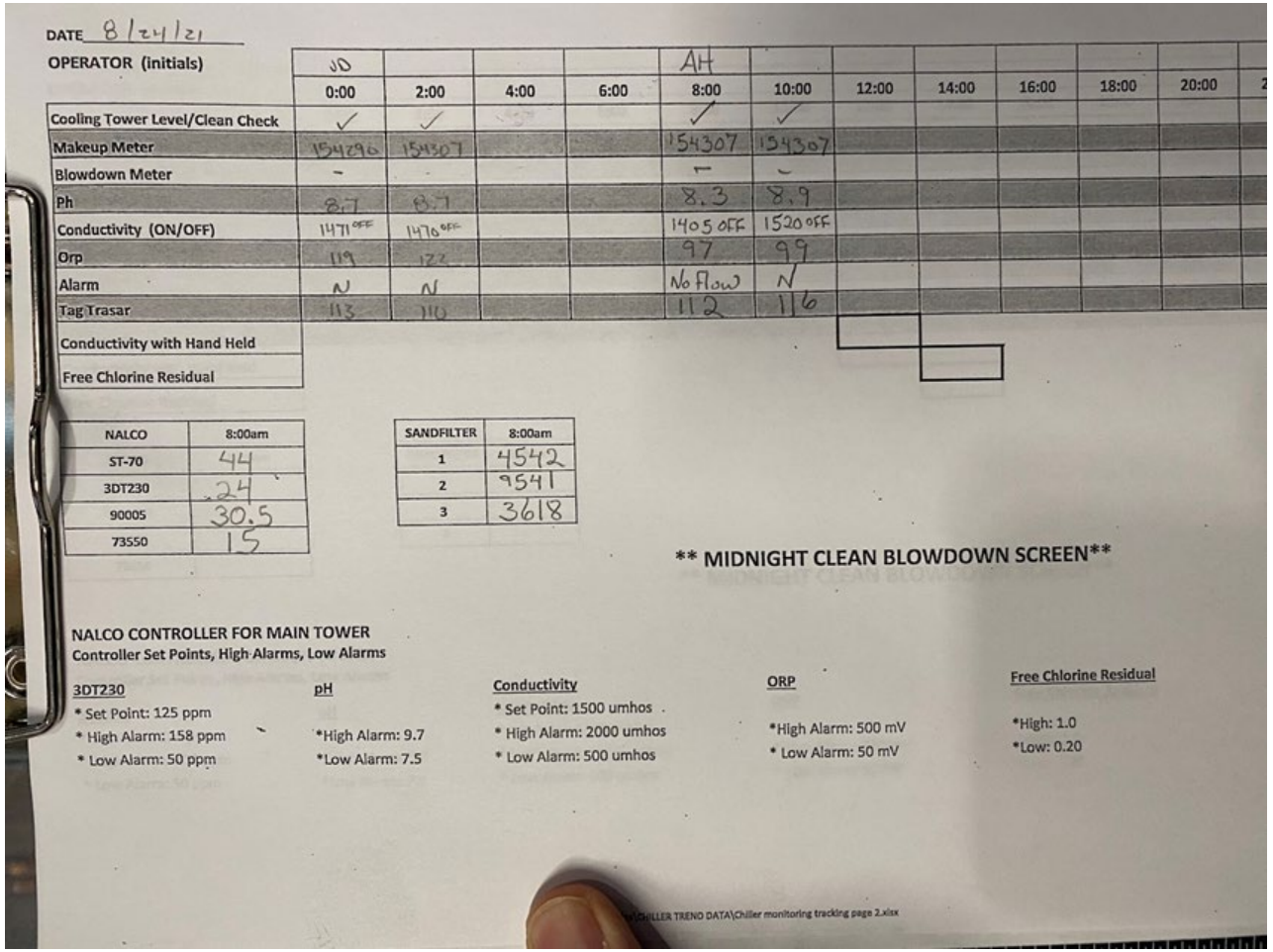
Limiting Variable
Define Water Quality Limitation

Maximum Efficiency
Define Cooling Tower Efficiency Benchmark

Observed Efficiency
Report Observed Efficiency with Explanation


ROUTINE
ADJUST
REPAIR

ROUTINE: Submeter Pilot Study



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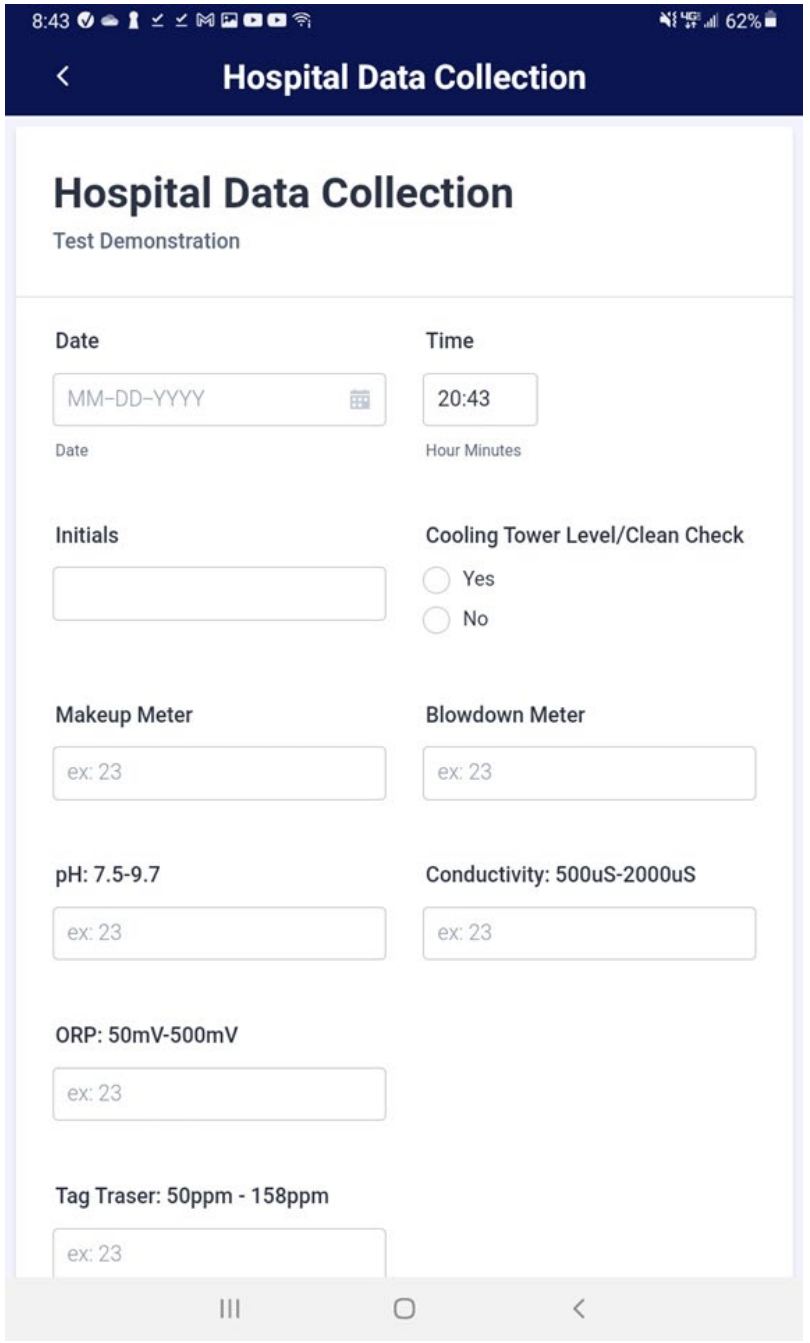
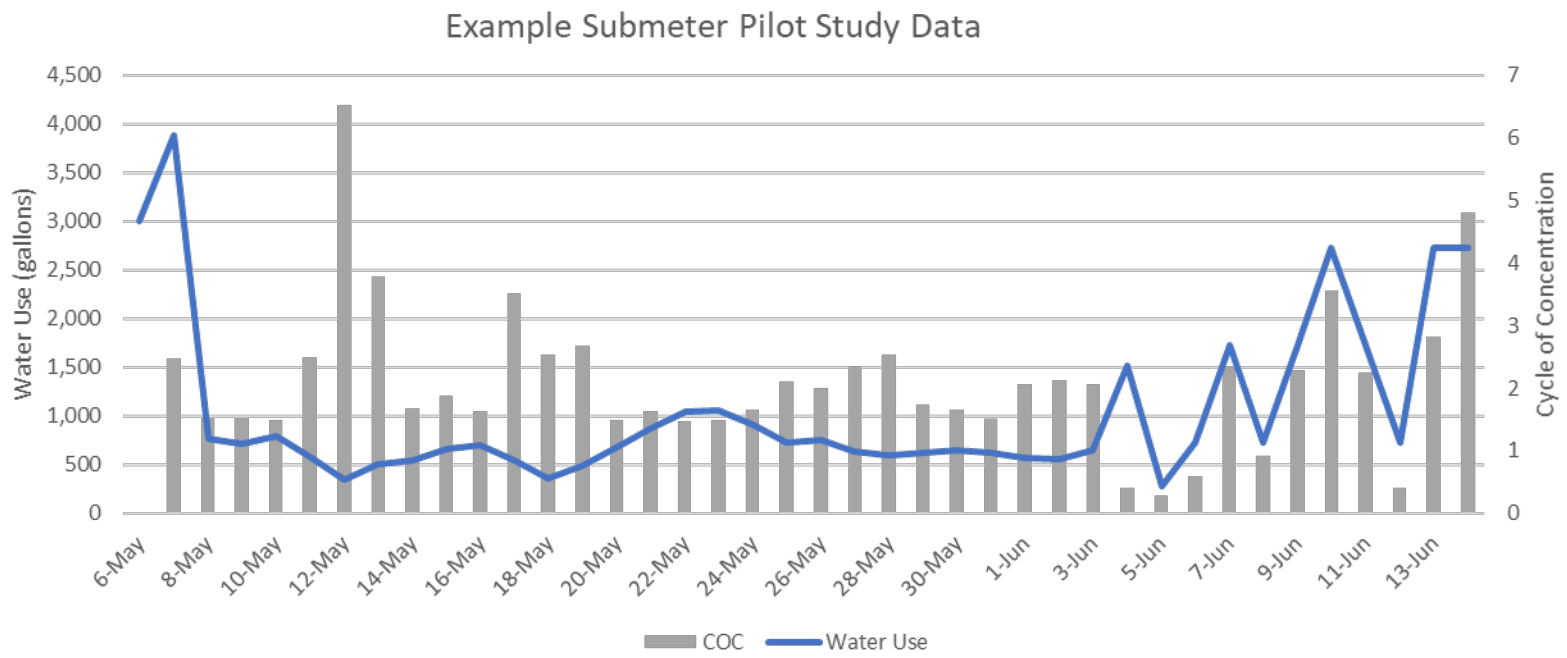


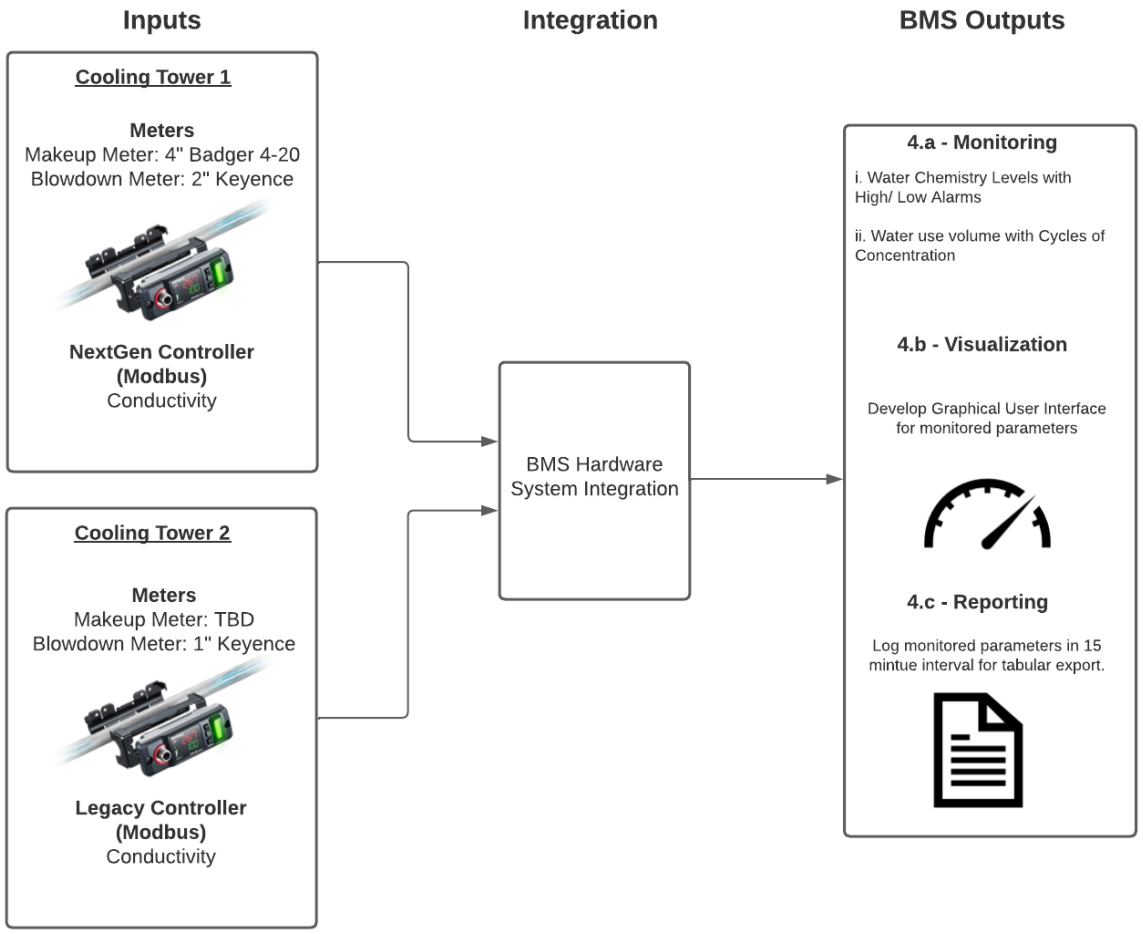
ROUTINE: Su

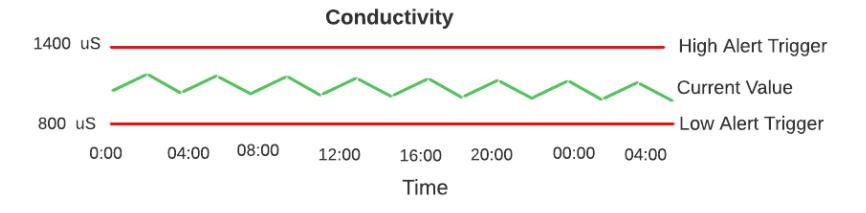
	Submission Date	Cooling T...	Makeup Meter	Blowdown Meter	pH: 7.5...	Conducti...	OR...	Tag Traser: 50ppm
1	Apr 14, 2022	Yes		250	7	1500	100	
2	Apr 5, 2022	Yes	1254	25				
3	Mar 29, 2022							
4	Mar 29, 2022	Yes	52463	4521	8	1000	100	
5	Mar 29, 2022	Yes	42571	5478	8	1500	100	
6	Mar 29, 2022	Yes	15548	4584	8	1500	150	
7	Mar 29, 2022	Yes	4542					
8	Mar 29, 2022	Yes	12456	2542	8	500	499	
9	Mar 25, 2022		12354					
10	Mar 22, 2022	Yes	87412	5214	8	1542	150	
11	Mar 22, 2022	Yes	5243	2513	8	1452	452	

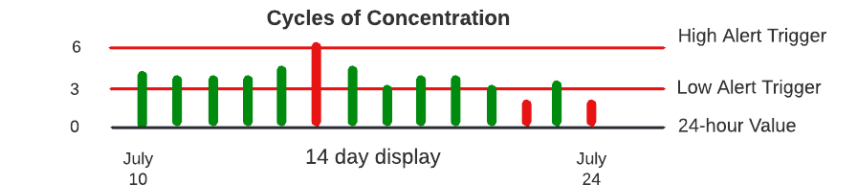



UPGRADE
ROUTINE
ADJUST
REPAIR

UPGRADE: Submeter Pilot Study



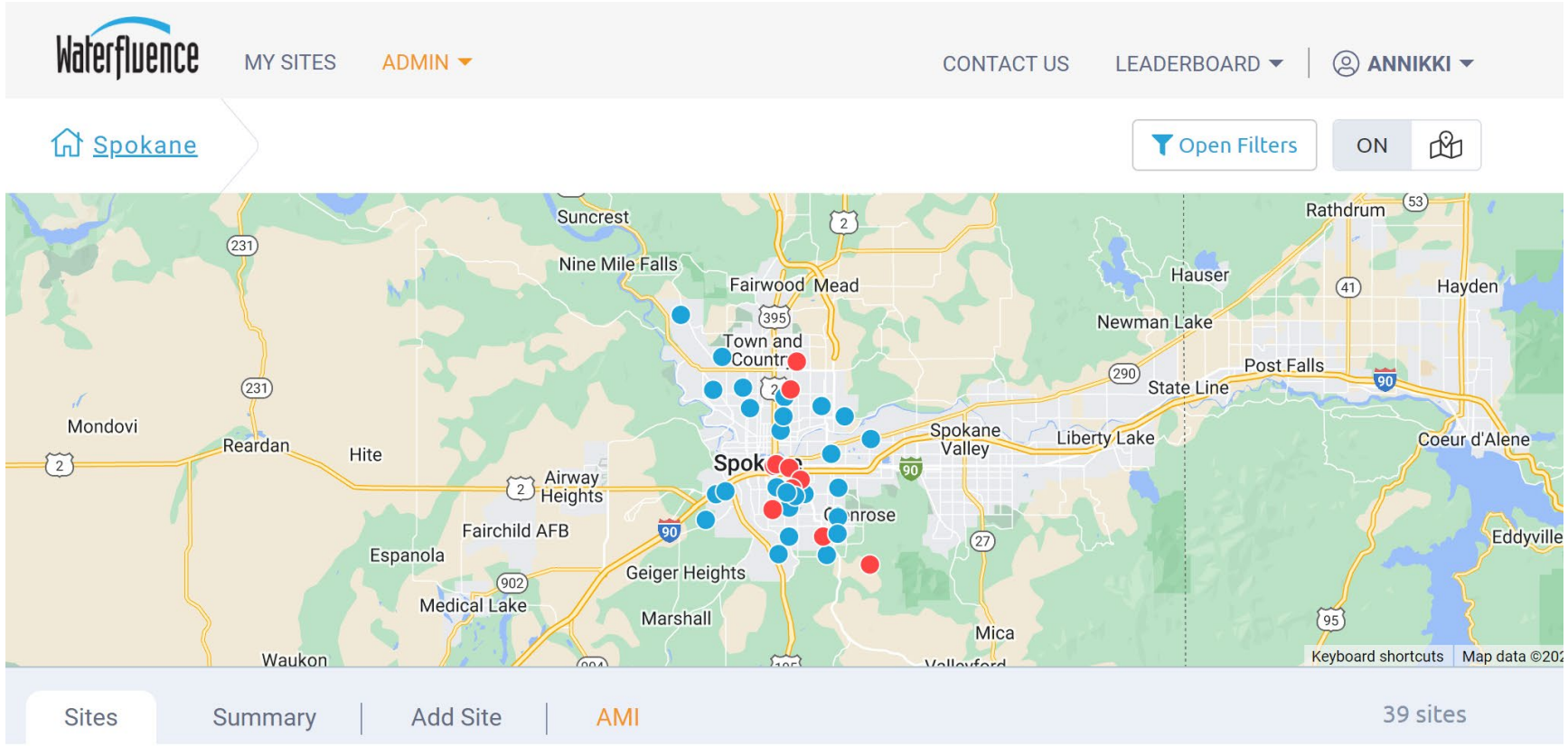




UPGRADE: Weather Based Irrigation Controllers

1. Water budget
2. Payback
3. Site Assessment
4. Technician Engagement
5. Order Set up
6. Programming
7. Fine-tuning

UPGRADE + ROUTINE: Waterfluence



Annual Performance

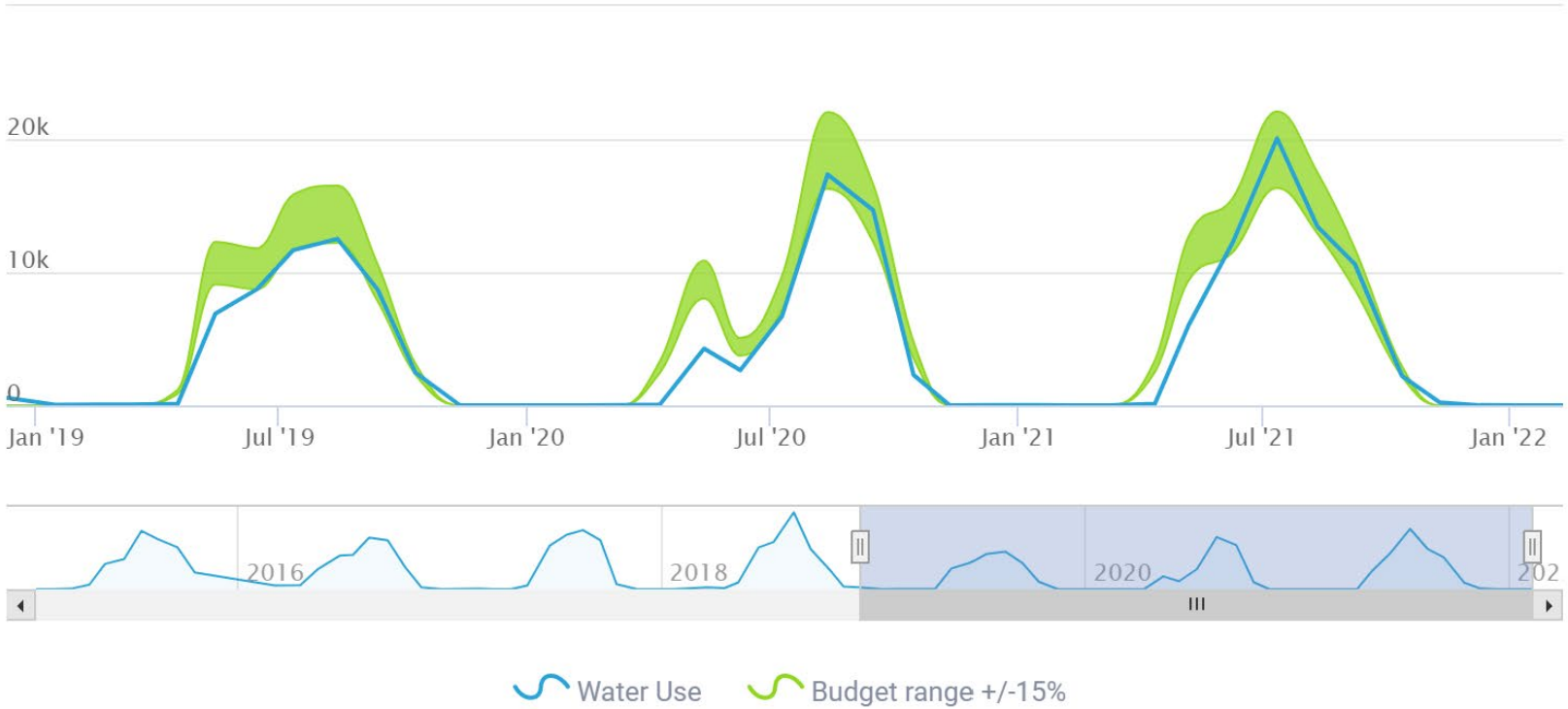
Name	Budget	Seasonal	Score	$ Lost	Alerts	Admin
The Creek at Qualchan Golf *in Spokane* Spokane Parks	99%	87%	91	$11k		Rec *never* Golf Acres 76.0

Annual Performance

87%	91%	98	$1.6k	2.2'	2.5'
Budget	Seasonal	Score	Lost $	Applied	Budget

Applied water as % of budget in last 12 months

Monthly Water Use



Charts

- **Monthly 100 Ft3**
- Monthly Inches
- Annual 100 Ft3
- Annual Feet
- Annual Stats

Irrigation Map

Edit Map

Updated 2 days ago

Shrub
0 ft²

Turf
2,974,624 ft²

Polygon

Area: 203,661 ft²

Type: Turf

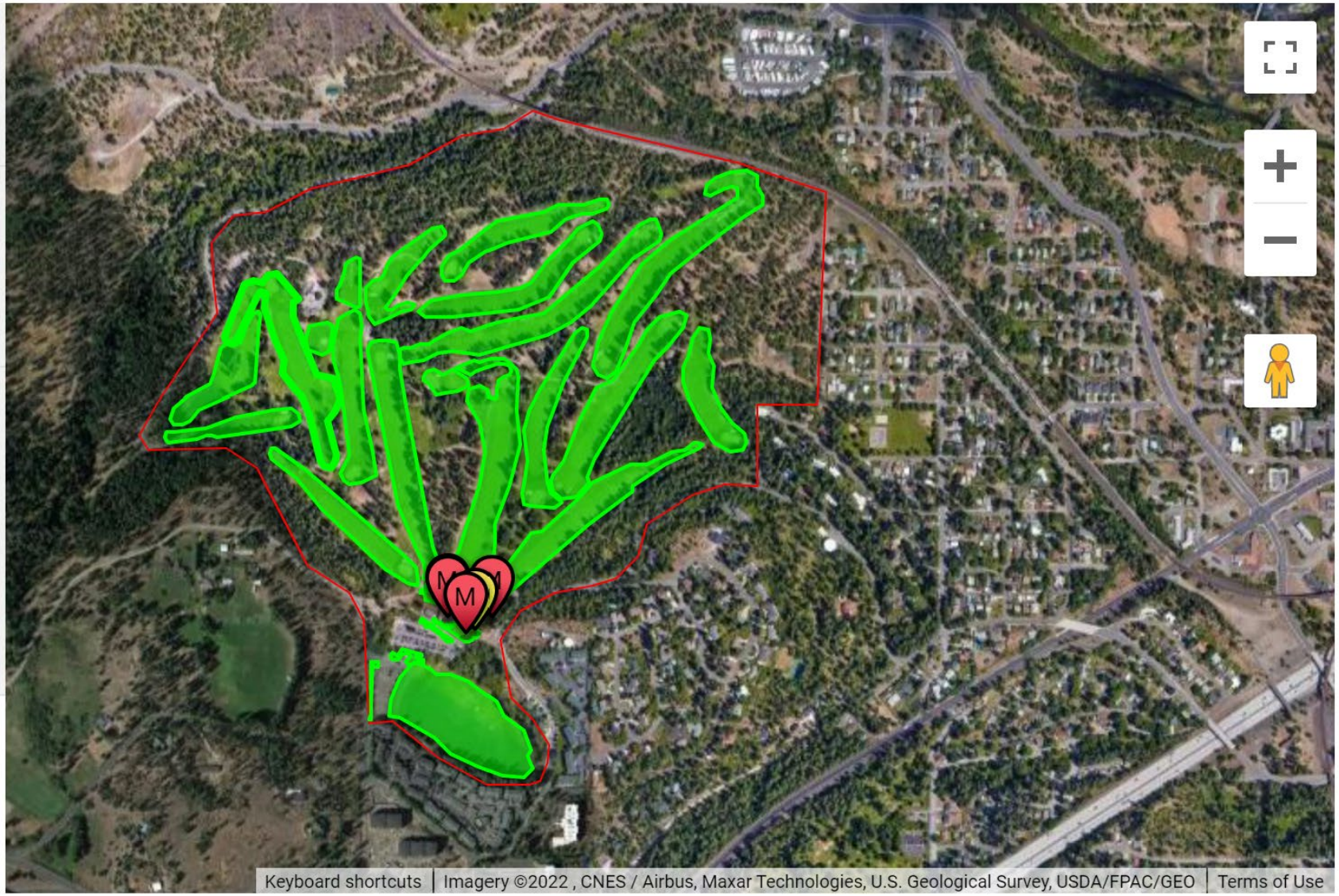
Controller: A

Zone:

Notes:

Print

Satellite | Map



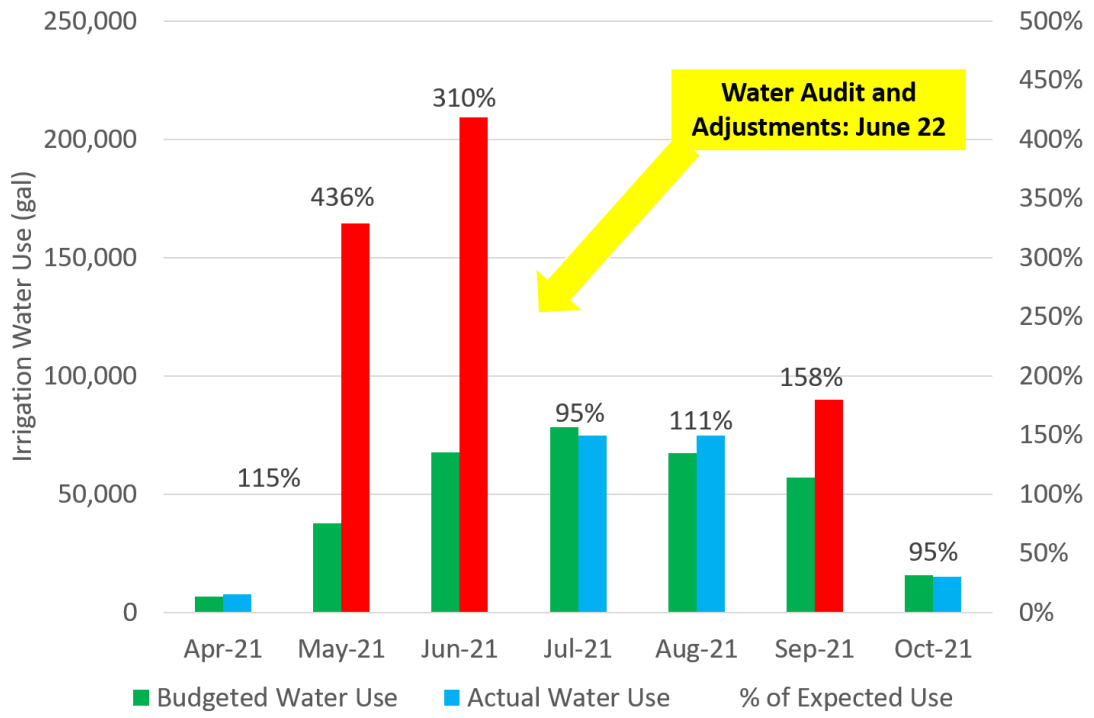
THE MOTHERLOAD OF EFFICIENCY

REPAIR-ADJUST-UPGRADE-ROUTINE:
City Owned Facility Program

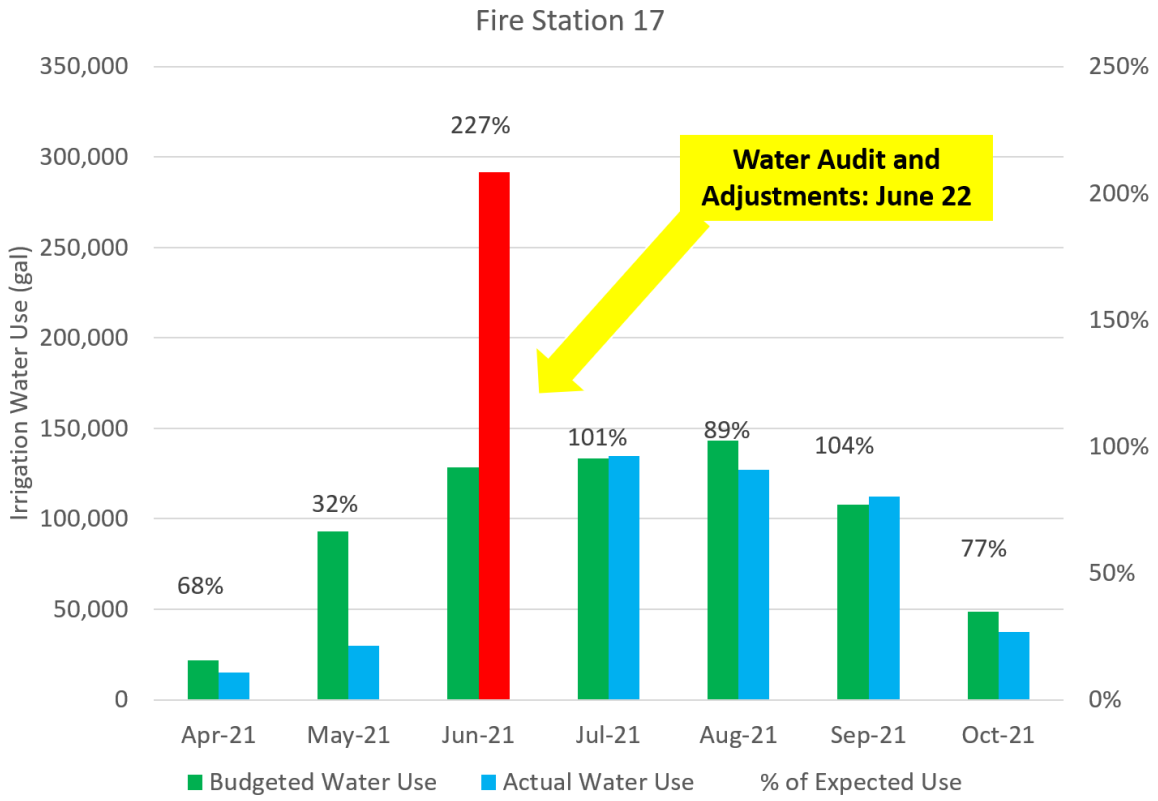
Spokane Fire Department

Irrigation Audits, Repairs, Adjustments, and Upgrades of Stations 16 and 17

› 900,000-gallon savings!



REPAIR-ADJUST-UPGRADE-ROUTINE:
City Owned Facility Program



STATION 17 – AUGUST 2021

Next Steps: Fire Department Program

GOAL

- Maintain 120% of Water Budget
- Establish Leak Detection Routine
- Install Weather Based Irrigation Controllers

TIMELINE

Summer 2022

ACTIONS

- Conduct efficiency assessments
- Assign Ownership
- Conduct Training
- Utilize Water Wise Rebate Program

Lessons Learned

Prioritize

Help operators achieve their goals.

Add Operational Value

Improve operations and water efficiency.

Communication

Keep it simple, keep it relevant, and keep it to 30 minutes.

Habit-stack

Use existing routines to build water efficiency habits.

Technical Support

Do the leg work to find solutions. It will get easier the more you do!

Iterate

Be creative. Find a way around roadblocks.

2021 COMMERCIAL WATER EFFICIENCY PROGRAM

18

PROPERTIES ENROLLED

Providence Sacred Heart
Providence Holy Family
Providence St Luke's
Kiemle Hagood
Wells Fargo Financial Center
Washington Trust Financial
The Flour Mill
Chase Financial Center
Riverpoint One
Lewis and Clark High School
Water Department Sites
Fire Stations
and more!

16

WATER CONSULTS

conducted for commercial water customers including landscape watering and cooling system efficiency.

19

WATER EFFICIENCY PROJECTS

are active for irrigation and cooling water efficiency. Project results are expected to occur starting in summer 2022!

40

PROPERTIES

are enrolled in a monthly landscape watering efficiency program: Waterfluence

15

PARKS EVALUATED

to determine watering efficiency. The study found the Parks Dept is quite efficient and identified efficiency projects for 2022!

1.5

MILLION GALLONS SAVED

by the Fire Department with efficient watering. Station 16 and 17 efforts saved over 900,000 gallons.

2022

PROGRAM EXPANSION

to continue our focus on supporting a thriving city, local business success, and resilient natural resources.

WATER WISE SPOKANE

MIMIR WATER

THANK YOU!

ANNIKKI CHAMBERLAIN
annikki@mimirwater.com
Mimir Water

&

KRISTEN ZIMMER
kzimmer@spokanecity.org
City of Spokane

Conservation 9:45 am

Water curtailment Planning and Outreach- Approaches in Oregon

Municipal Water Curtailment Planning and Outreach – Approaches in Oregon

Adam Sussman

April 28, 2022

GSI Water Solutions, Inc.

Agenda

- Municipal Water Curtailment Plan Overview
- Curtailment Stages
- Curtailment Triggers
- Curtailment Actions
- Outreach: Conservation, Drought, and Curtailment

Municipal Water Curtailment Plan Overview

Water Curtailment Plans and WMCPs

Water Management and Conservation Plans (WMCPs)

- Many municipal water providers in Oregon are required to develop an WMCP
- Required in new water right permits and water right permit extensions approved by the Oregon Water Resources Department (OWRD)

WMCPs include:

- Water Supplier Description
- Water Conservation
- **Water Curtailment Plan**
- Water Supply

Required Elements of Water Curtailment Plans

- Curtailment episodes in the past 10 years
- Current capacity limitations
- Curtailment stages (at least three)
- Curtailment triggers under each stage
- Curtailment actions under each stage

Curtailment Stages

Stages of Water Curtailment

- At least three stages required by OWRD
- Oregon water providers often have 4 stages
- Higher the stage, more curtailment needed
- Highest stage: typically focused on meeting basic public health and safety needs

Examples of Stages

Stage 1

- Water Alert
- Water Supply Shortage Warning
- Water Shortage Advisory/Alert

Stage 2

- Water Warning
- Moderate Water Supply Shortage/Alert
- Voluntary Curtailment
- Serious Water Shortage
- Water Shortage Alert/Advisory

Stage 3 (or 4)

- Severe Water Shortage
- Critical Water Supply/Shortage
- Mandatory Curtailment
- Severe Curtailment
- Water Emergency
- Emergency Water Shortage

Curtailment Triggers

Triggers of Water Curtailment Stages

- Water supply conditions that necessitate water curtailment measures
- Quantitative, easy to measure, and practical triggers are key!

What About Comparing Supply to Demand?

- Examples:
  - Rolling X-day average of supply is X percent of demand
  - Water treatment plant daily production compared to demand
- Could be complicated to track
- Could there be easier indicators?
  - Storage: Good indicator, can check easily if levels are dropping

Examples Of Helpful Triggers

Reservoir or tank storage capacity/levels:

- Percent of full capacity
- Percent of historical levels
- Declining trend or failure to refill

Examples of Helpful Triggers

- Drought Index values
  - Palmer Index: used for measuring drought conditions
  - Surface Water Supply Index: describes the status of water resources
- Infrastructure disruptions/ failures/damage
  - From materials issues, natural disasters, sabotage
- Water source flows
- Source contamination
- Algal blooms
- Fire in the municipal watershed
- Power failure
- Wholesale supplier ceases serving water
- Activation of an alternative source needed

Drought Declarations

- Potential issues if a trigger:
  - Municipal water supply may be fine despite the drought declaration
- State may require implementation of a Water Curtailment Plan
  - ORS 536.720
- Suggested Water Curtailment Plan approach:
  - Address drought declarations separately from triggers
  - In drought declaration statement, include such actions as:
    - Assessing whether curtailment measures are needed
    - Acknowledge ORS 536.720
    - Encouraging customers to conserve water

Curtailment Actions

Curtailment Actions for Each Water Curtailment Stage

Curtailment Actions vs. Stewardship Actions

- Want to implement curtailment actions only when needed
- In curtailment plan, consider a distinct outreach approach from other outreach efforts/campaigns

Stage 1 Curtailment Action Examples

Municipal	Customer
• Ask customers to decrease water use • Describe current water situation • Activate a team that addresses curtailment • Reduce water use for street sweeping, hydrant flushing, irrigation of large turf areas, etc. • Communicate with other water providers • Communicate with wholesale customers	Voluntarily reduce water use

Stage 2 Curtailment Action Examples

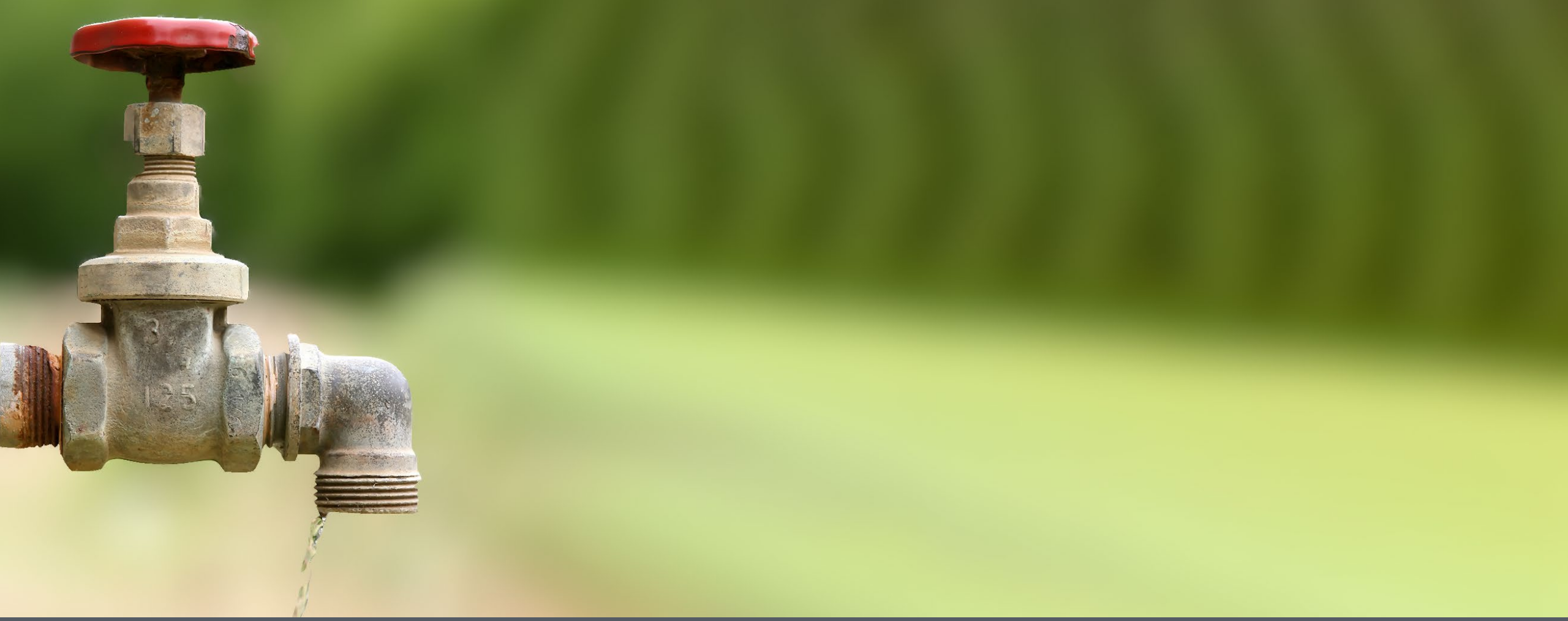
Municipal	Customer
• Communicate voluntary and mandatory water use restrictions to customers • Initiate greater outreach efforts • Prohibit water use for certain activities: construction, vehicle washing (except for health and safety), washing impervious surfaces • Stop flushing hydrants, water needs, etc. • Communicate with large water users	Follow voluntary or mandatory restrictions: • Restrict irrigation to certain times of day • Restrict washing impervious surfaces, filling pools and ponds (except the fish), washing cars • Reduce water use in businesses • Postpone new landscaping

Stage 3 Curtailment Action Examples

Municipal	Customer
• Water city parks and outdoor areas sparingly or selectively • Communicate mandatory water use restrictions to customers	Follow mandatory restrictions: • Essentially no outdoor irrigation • Potential exceptions: commercial sod farm, new landscaping, etc. • No washing impervious surfaces, filling ponds and pools (except if fish), washing cars, etc. • Commercial customers must minimize their non-essential water use

Stage 4 Curtailment Action Examples

Municipal	Customer
• Implement an Emergency Response Plan • Communicate with other water providers • Communicate with emergency management and public health agencies • Secure and deploy emergency water supply to customers, if needed • Communicate the water situation and water use restrictions to customers	• Only water use for human consumption, fire suppression, and health and safety needs • Only commercial water use for critical functions, like fire protection



Outreach: Conservation, Drought, and Curtailment

Questions?

Adam Sussman
GSI Water Solutions, Inc.
asussman@gsiws.com
541.257.9006

GSI Water Solutions, Inc.

Conservation 10:15 am

The whole Conservation Picture: Tracking and reporting Multiple Programs

The Whole Conservation Picture:
Tracking and Reporting Multiple Programs

Rochelle Gandour-Rood, Program Specialist
Jennifer Cummings, Business Analyst

TACOMA WATER
TACOMA PUBLIC UTILITIES

Introductions

TACOMA WATER
TACOMA PUBLIC UTILITIES

Rochelle Gandour-Rood

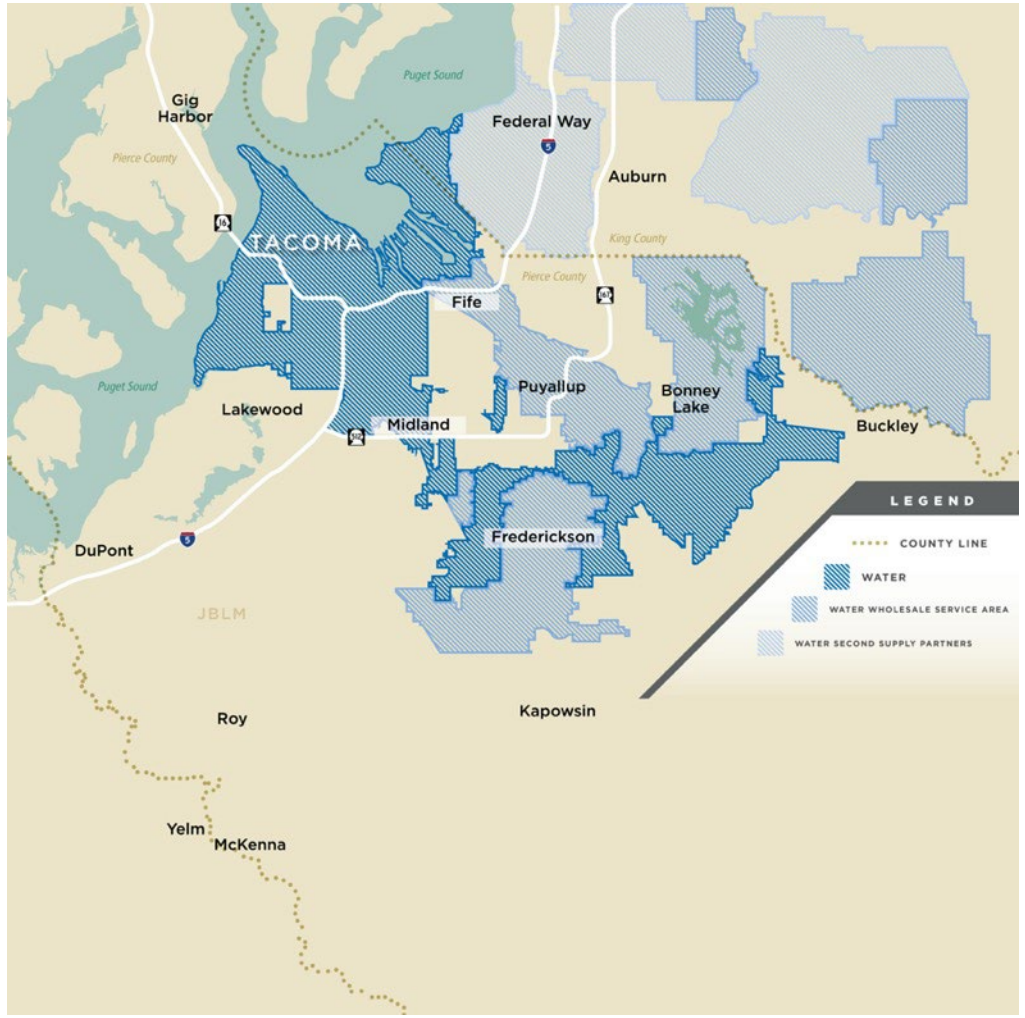
Environmental educator, game-maker.

Jennifer Cummings

Business analyst, problem solver, data nerd.

Tacoma Water

TACOMA WATER
TACOMA PUBLIC UTILITIES



- **108,075 total customers**
- **People served:**
  - **Directly served: 377,759**
  - Wholesale: 322,290
  - Partner areas: 240,927
- **Water Sources:**
  - Green River is >95%
  - Local wells provide <5%

Conservation Programs

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- Community outreach
- Youth education
- Commercial site visits
- Multifamily giveaway
- Water savings kits
- Smart controller rebate

Smart Irrigation Residential Rebate

Overview

Using a weather-based irrigation controller can reduce water waste and lower your utility bill. A smart controller automatically adjusts the watering schedule based on local weather data, soil and plant types to create a customized watering schedule. Some smart controllers respond to a small weather sensor installed on your property while others get information from local weather stations. Many smart controllers are Wi-Fi enabled and connect to your mobile device. Smartphone users can then access, operate and monitor their irrigation system from anywhere.

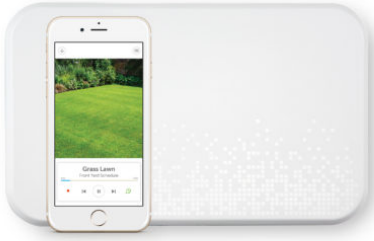
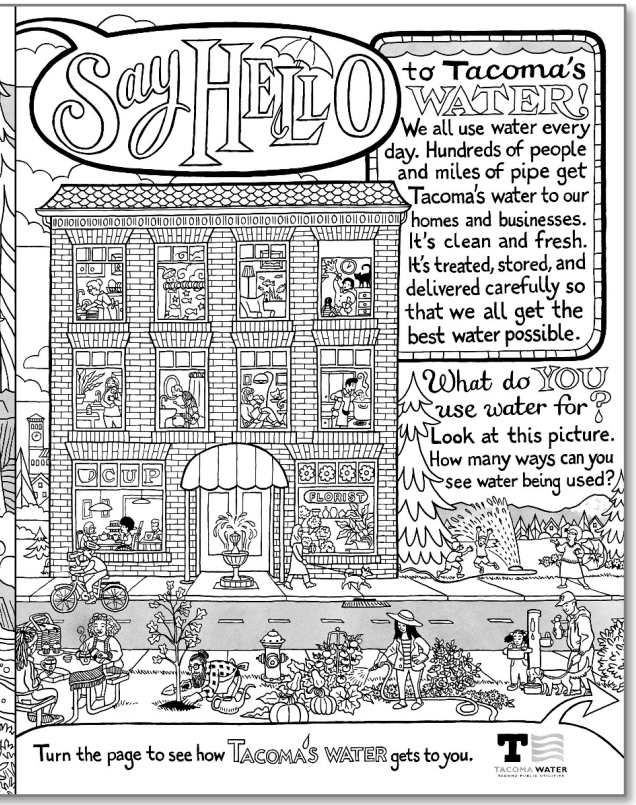


Image courtesy of Rachio

Smart Irrigation Rebate Details*



Smartsheet

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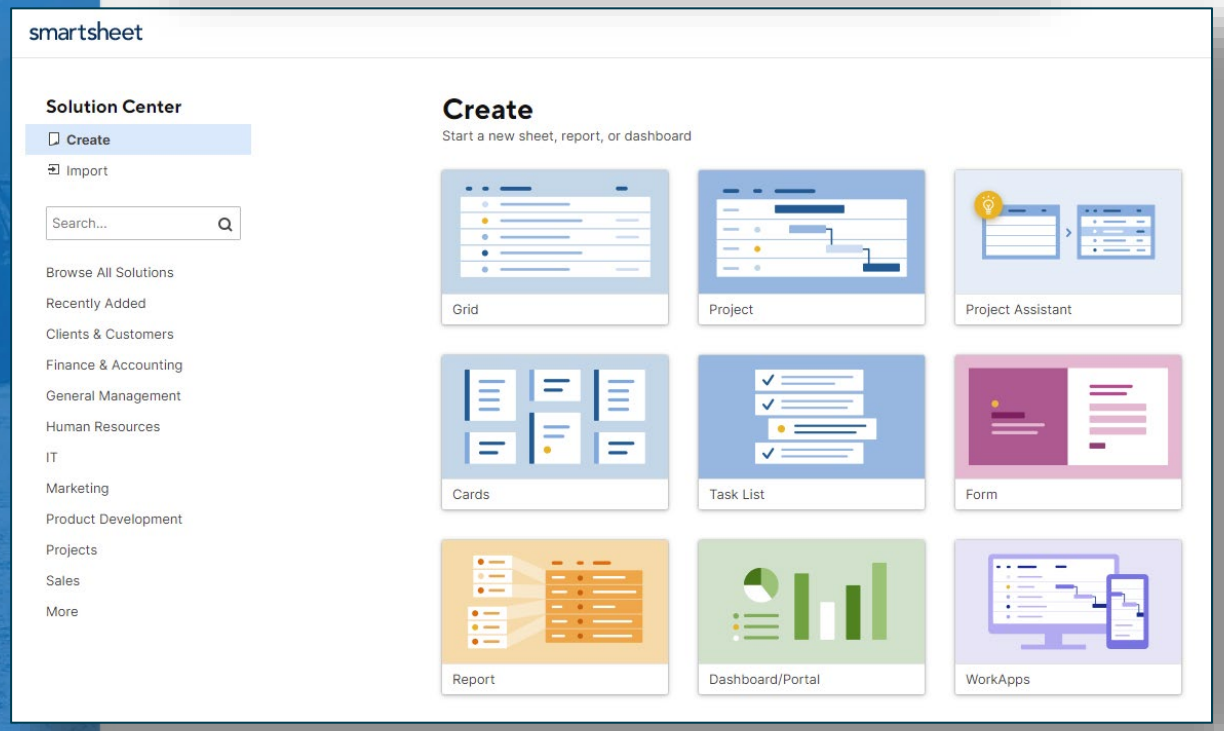

- Software as a Service
- Collaborate, plan, track, and report on work in real time
- Workflows and automations
- Forms and notifications
- Enterprise solution
- Intuitive and user friendly

Tableau

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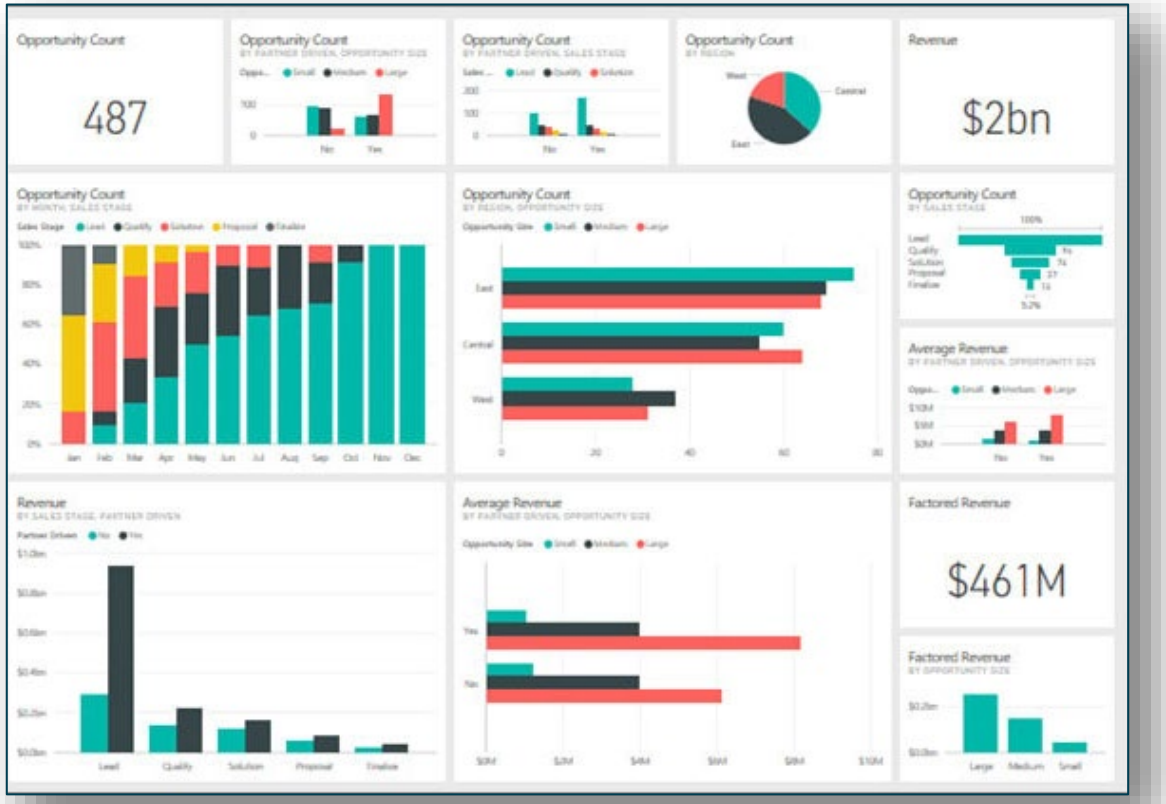
- Data visualization software
- Connect to numerous data sources
- Translate complex data into business-friendly visuals
- Enterprise solution
- Live data connection enables real-time analysis



The Problem

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- **We needed to:**
  - Track program activity
  - Track inventory
  - Be able to take a program snapshot at a moment's notice
- **We would also like to:**
  - Measure the efficacy of our programs
    - Do folks actually save water?
    - Are we meeting our goals?
  - Assess the equity of our program implementation

The Solution:

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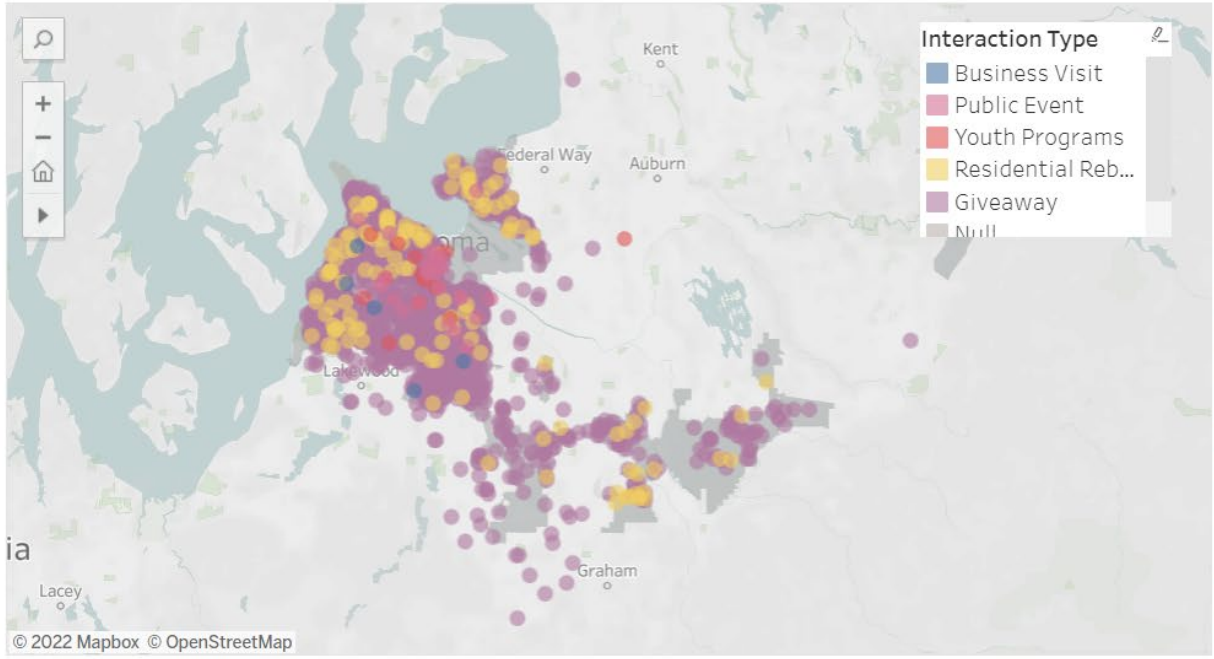
Giveaways
2,921
Events
98
Home Visits
8
Business Visits
6
Multifamily Giveaways
6
Rebates
136

Date 1/14/2019 4/4/2022

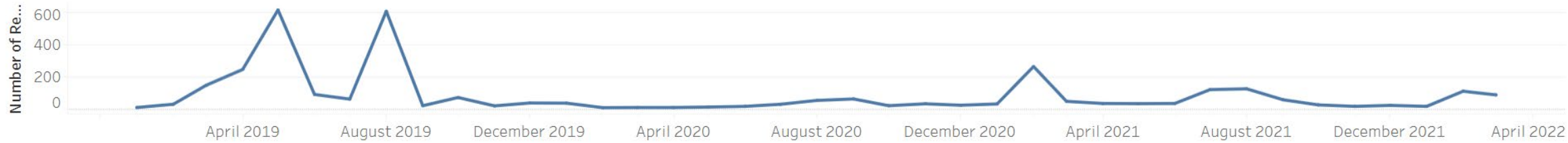
Conservation Interactions Map



Interaction Type Description
- [x] (All)
- [x] Null
- [x] Business Visit
- [x] Commercial Rebate
- [x] Giveaway
- [x] Home Visit
- [x] Multifamily Giveaway

Number of Items Given Away

Interaction Trend



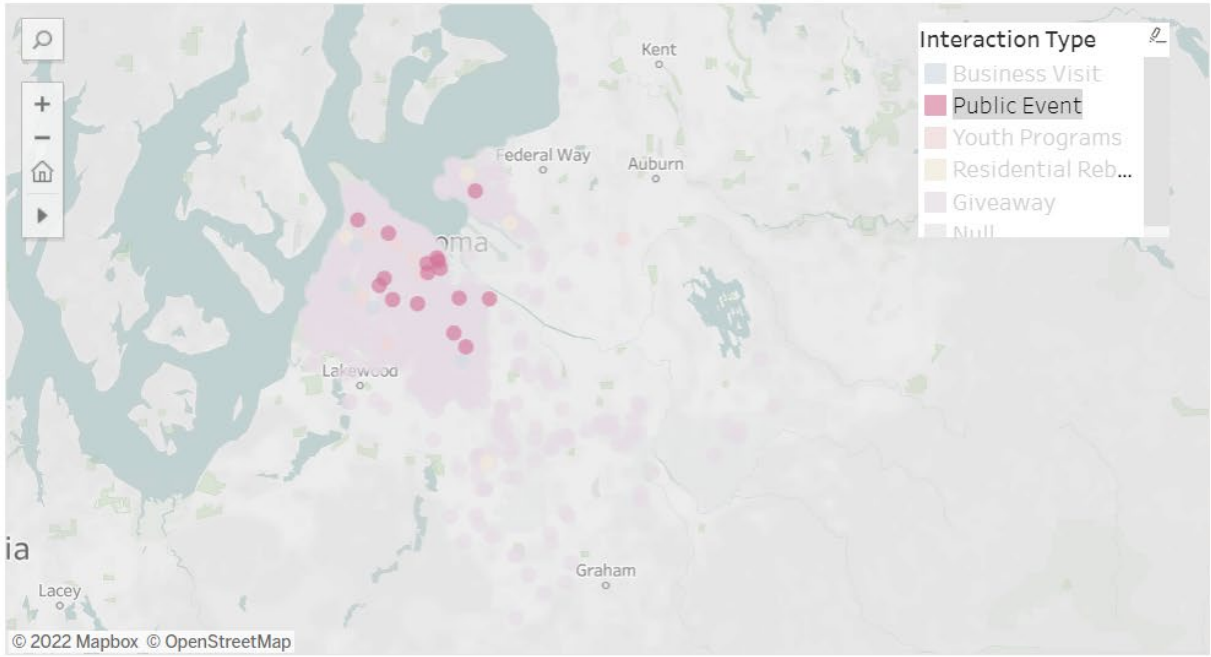
The Solution:

TACOMA WATER
TACOMA PUBLIC UTILITIES

Giveaways
1,870
Events
33
Home Visits
8
Business Visits
4
Multifamily Giveaways
5
Rebates
5

Date 1/14/2019 1/1/2020

Conservation Interactions Map



Interaction Type Description
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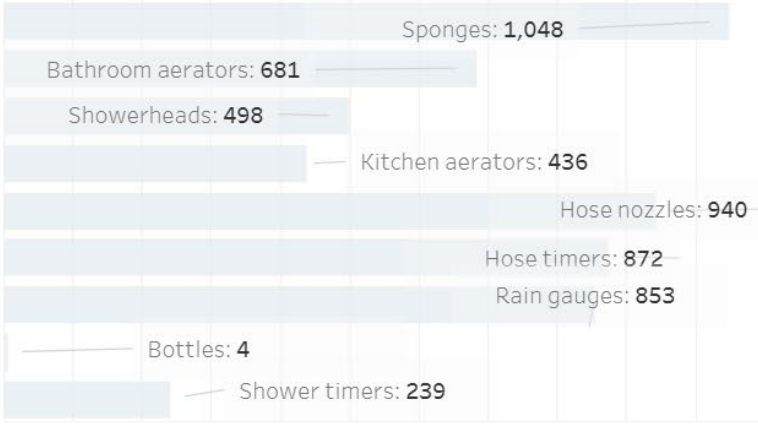
- [x] Giveaway
- [x] Home Visit
- [x] Multifamily Giveaway

Number of Items Given Away



Interaction Trend

Behind the Scenes: The Data

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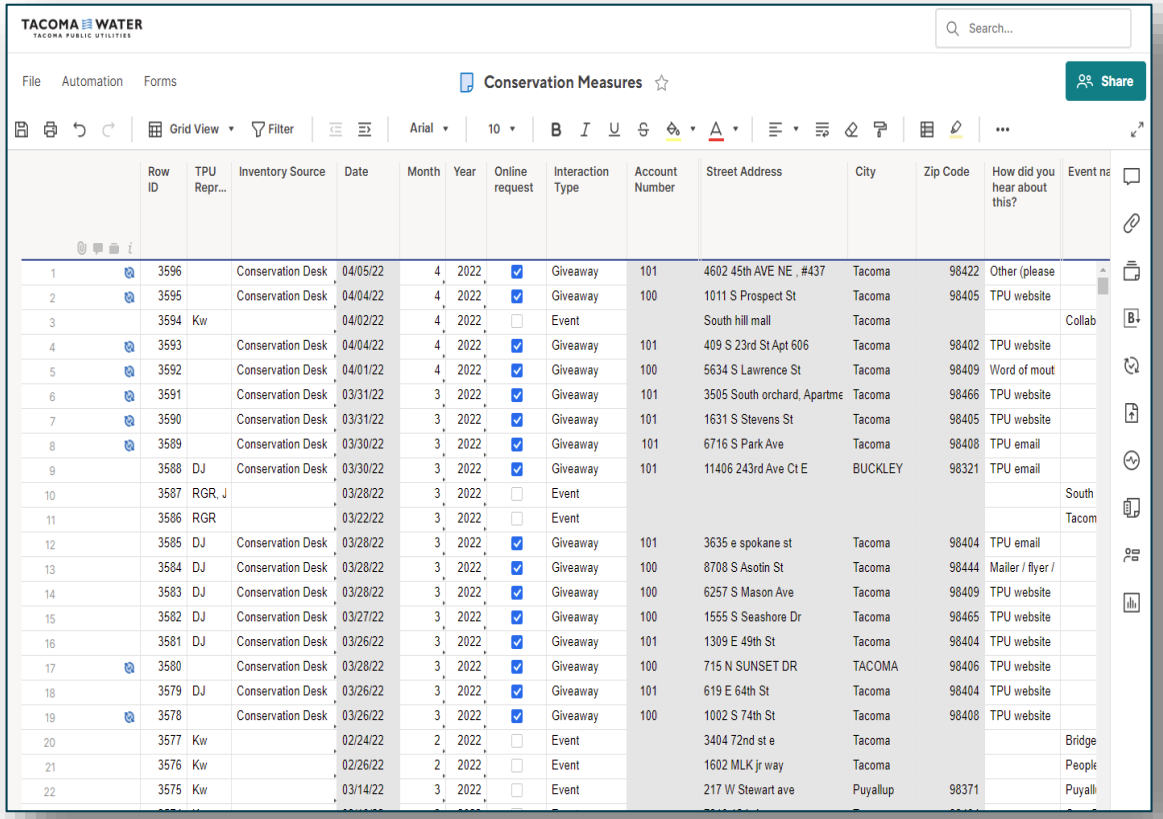
TACOMA PUBLIC UTILITIES



	Row ID	TPU Repr...	Inventory Source	Date	Month	Year	Online request	Interaction Type	Account Number	Street Address	City	Zip Code	How did you hear about this?	Event na
1	3596		Conservation Desk	04/05/22	4	2022	☑	Giveaway	101	4602 45th AVE NE , #437	Tacoma	98422	Other (please	
2	3595		Conservation Desk	04/04/22	4	2022	☑	Giveaway	100	1011 S Prospect St	Tacoma	98405	TPU website	
3	3594	Kw		04/02/22	4	2022	☐	Event		South hill mall	Tacoma			Collab
4	3593		Conservation Desk	04/04/22	4	2022	☑	Giveaway	101	409 S 23rd St Apt 606	Tacoma	98402	TPU website	
5	3592		Conservation Desk	04/01/22	4	2022	☑	Giveaway	100	5634 S Lawrence St	Tacoma	98409	Word of mout	
6	3591		Conservation Desk	03/31/22	3	2022	☑	Giveaway	101	3505 South orchard, Apartme	Tacoma	98466	TPU website	
7	3590		Conservation Desk	03/31/22	3	2022	☑	Giveaway	101	1631 S Stevens St	Tacoma	98405	TPU website	
8	3589		Conservation Desk	03/30/22	3	2022	☑	Giveaway	101	6716 S Park Ave	Tacoma	98408	TPU email	
9	3588	DJ	Conservation Desk	03/30/22	3	2022	☑	Giveaway	101	11406 243rd Ave Ct E	BUCKLEY	98321	TPU email	
10	3587	RGR, J		03/28/22	3	2022	☐	Event						South
11	3586	RGR		03/22/22	3	2022	☐	Event						Tacom
12	3585	DJ	Conservation Desk	03/28/22	3	2022	☑	Giveaway	101	3635 e spokane st	Tacoma	98404	TPU email	
13	3584	DJ	Conservation Desk	03/28/22	3	2022	☑	Giveaway	100	8708 S Asotin St	Tacoma	98444	Mailer / flyer /	
14	3583	DJ	Conservation Desk	03/28/22	3	2022	☑	Giveaway	100	6257 S Mason Ave	Tacoma	98409	TPU website	
15	3582	DJ	Conservation Desk	03/27/22	3	2022	☑	Giveaway	100	1555 S Seashore Dr	Tacoma	98465	TPU website	
16	3581	DJ	Conservation Desk	03/26/22	3	2022	☑	Giveaway	101	1309 E 49th St	Tacoma	98404	TPU website	
17	3580		Conservation Desk	03/28/22	3	2022	☑	Giveaway	100	715 N SUNSET DR	TACOMA	98406	TPU website	
18	3579	DJ	Conservation Desk	03/26/22	3	2022	☑	Giveaway	101	619 E 64th St	Tacoma	98404	TPU website	
19	3578		Conservation Desk	03/26/22	3	2022	☑	Giveaway	100	1002 S 74th St	Tacoma	98408	TPU website	
20	3577	Kw		02/24/22	2	2022	☐	Event		3404 72nd st e	Tacoma			Bridge
21	3576	Kw		02/26/22	2	2022	☐	Event		1602 MLK jr way	Tacoma			People
22	3575	Kw		03/14/22	3	2022	☐	Event		217 W Stewart ave	Puyallup	98371		Puyall

- Centralized data storage for comprehensive reporting
- Data from multiple programs
- 88 different attributes to capture
- Various input sources
- Smartsheet solution to capture and store the data

Behind the Scenes: The Process

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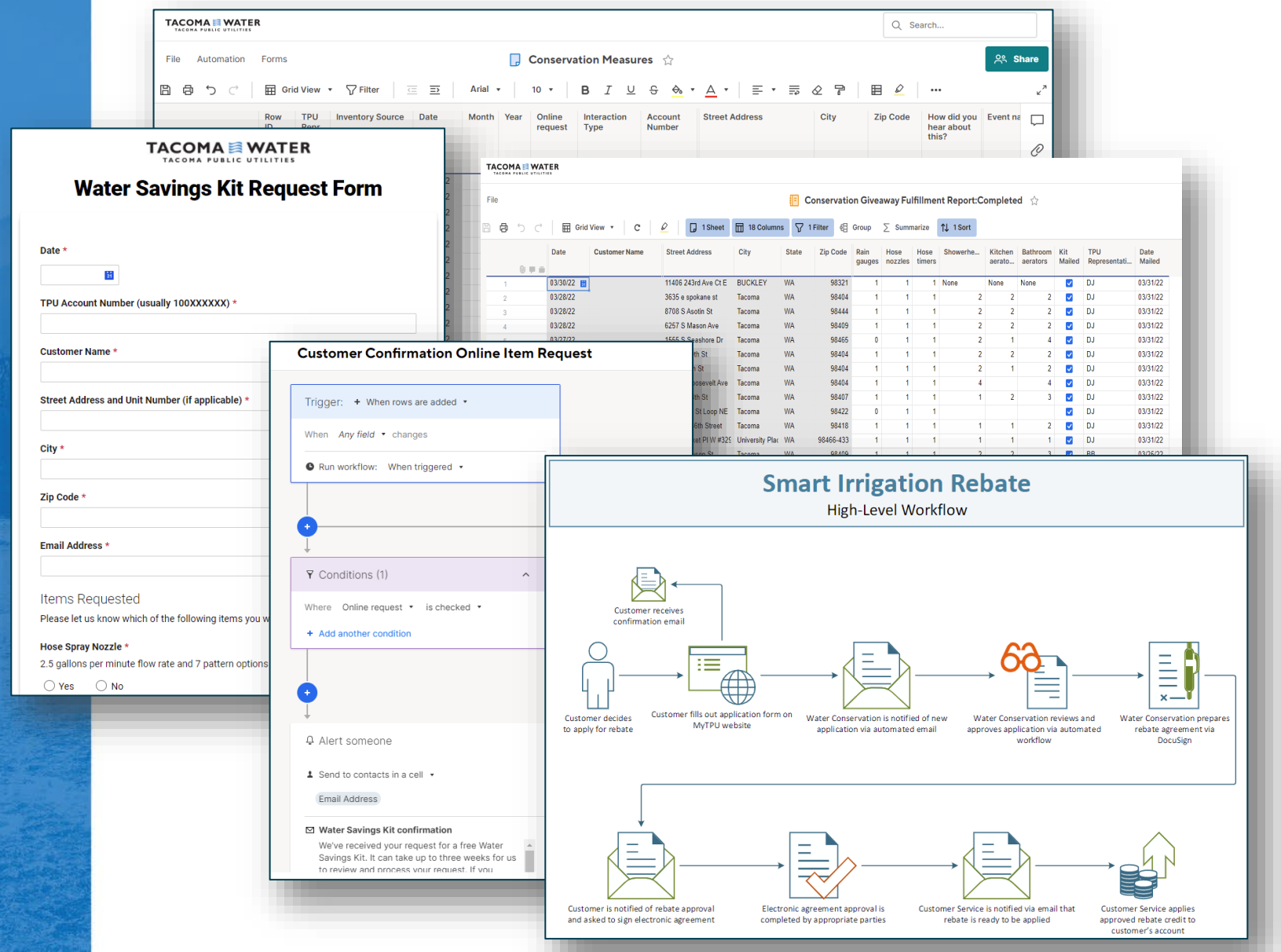

- Forms for data entry
- Targeted reports for different audiences
- Automated workflows & notifications
- Semi-automated processes
- All facilitated through Smartsheet!

Case Study: COVID Pivot

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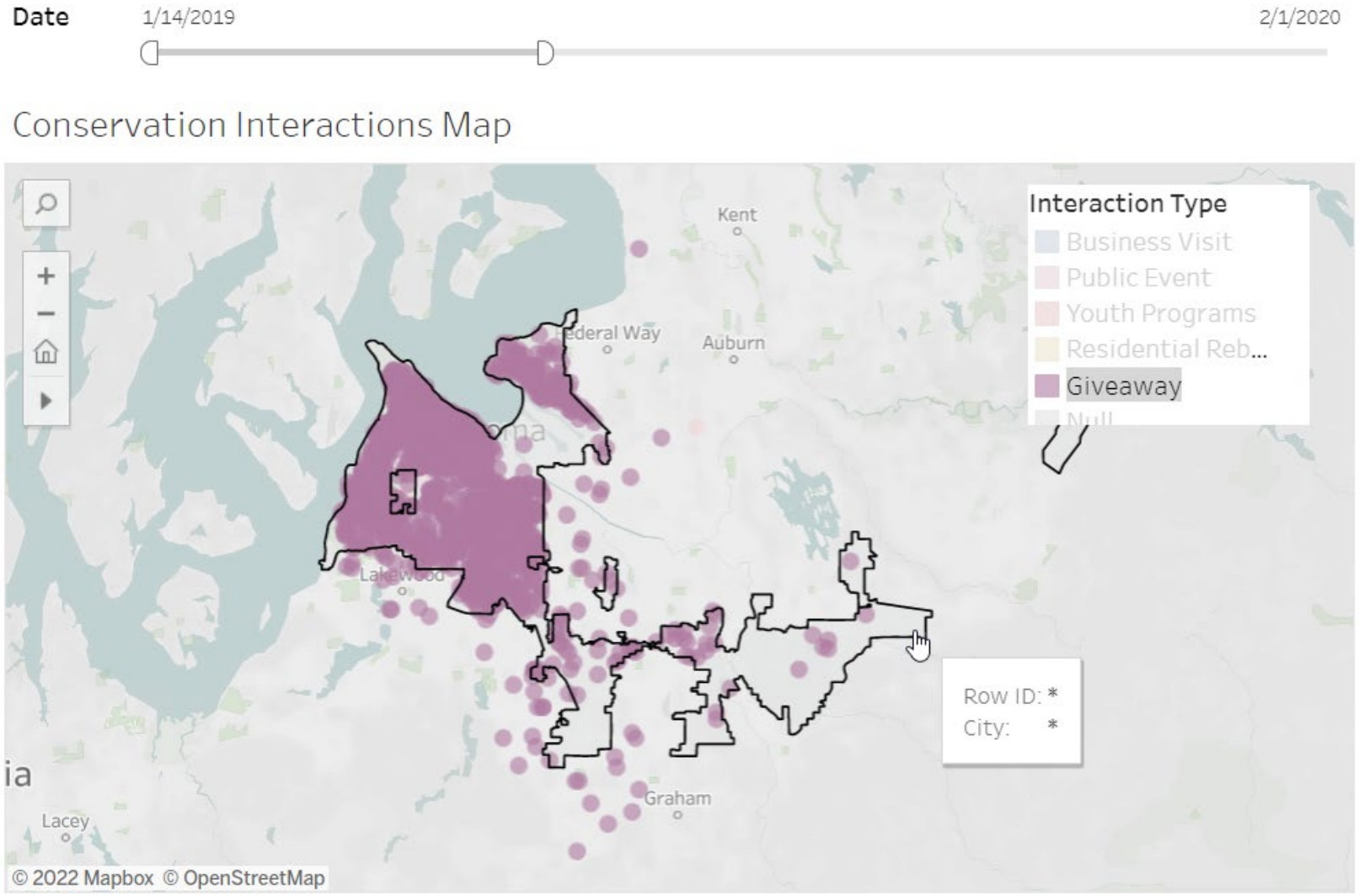
TACOMA PUBLIC UTILITIES

Before 2020

In person giveaway, at public events

Difficult and time consuming to verify service address in the field

At least 3% kits given outside service area



Case Study: COVID Pivot

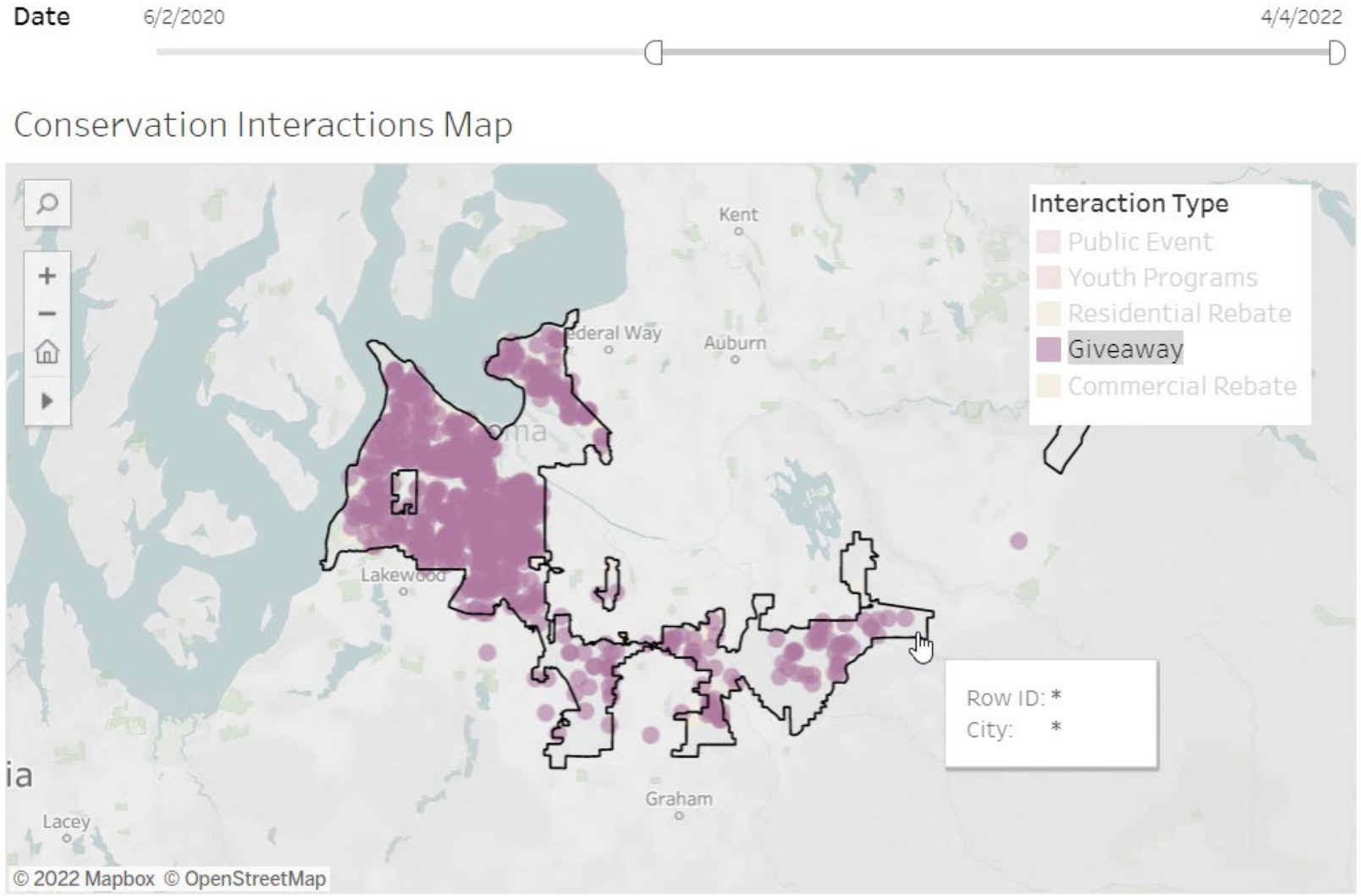
TACOMA WATER
TACOMA PUBLIC UTILITIES

After 2020

No more lugging heavy boxes to events!

Address verification part of workflow.

Less than 0.4% kits given outside service area



Next Steps: What

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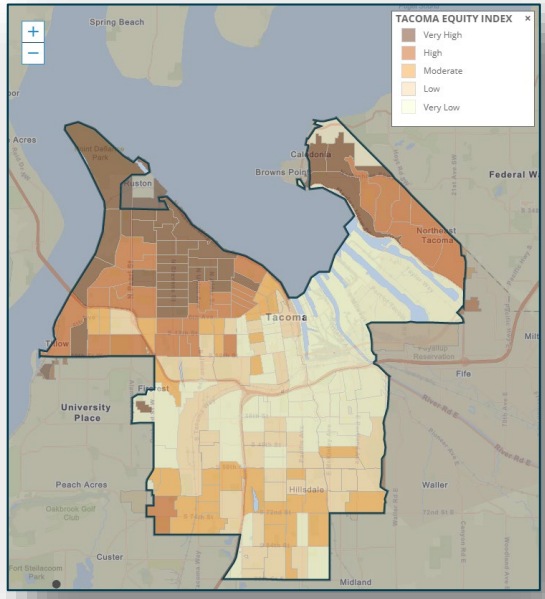
- **Water use by account**
  - Do our interventions result in reduced water use?
  - Which programs are most effective?
  - Which programs give the greatest return on investment?
- **Equity in opportunities**
  - Are we reaching out in an equitable way?
  - Are we most serving neighborhoods that have been previously under-served?
  - Who else should we prioritize?

Next Steps: How

TACOMA WATER
TACOMA PUBLIC UTILITIES

- **Water use by account**
  - Connect to usage data (now enabled through SAP HANA live views)
  - AMI usage data on the way
  - Capturing the right data
  - Individual account and aggregate views

- **Equity in opportunities**
  - City of Tacoma Equity Index
  - Overlay as a map layer in Tableau



Thank You!

TACOMA WATER
TACOMA PUBLIC UTILITIES

Any questions?

Rochelle Gandour-Rood, rgrood@cityoftacoma.org

Jennifer Cummings, jcummings@cityoftacoma.org

Conservation 11am

How to Conserve Water with Electronic Control Valves and active Pressure Management

Cimco-GC
SYSTEMS

How to Conserve Water with Electronic Control Valves and Active Pressure Management

What's on tap for today

Intro to Cimco-GC Systems and Cla-Val

Hydraulic Basics

Conserving Water with Pressure Management

- WHY?
- Standard Pressure Management
- Active Pressure Management

Conclusion

Questions?

Don’t be afraid to ask questions…That is the best way for you to ensure you leave with the knowledge you came for:

- *How do I…?*
- *What is the best way to…?*
- *What does it mean when my valve is…?*
- *How can I improve…?*
- *Can I go the bathroom?*
- *How do I keep my spouse happy??*
- *What is the meaning of life??!!*

Where We're Coming From

Cimco-GC SYSTEMS

- Cla-Val Rep since 1981
- Specialized in Technical Support & Field Service
- Located in Puyallup, WA
- Territory: WA, OR, ID, & AK

CLA-VAL · VAL-MATIC · Cimco-GC PACKAGED SYSTEMS · INPIPE ENERGY · SAFE-T-COVER · PumpTech ES

Cimco-GC Systems

How We Support the Region:

- Engineering & Design Support
- Outside Support Team
- Inside Support Team
- Field Service Department
- Local inventory of parts, pilots, and valve bodies through 8”

Cimco-GC SYSTEMS

Cla-Val Overview

Cla-Val Global
Headquarters - USA

Cla-Val Europe
Switzerland

Cla-Val
France

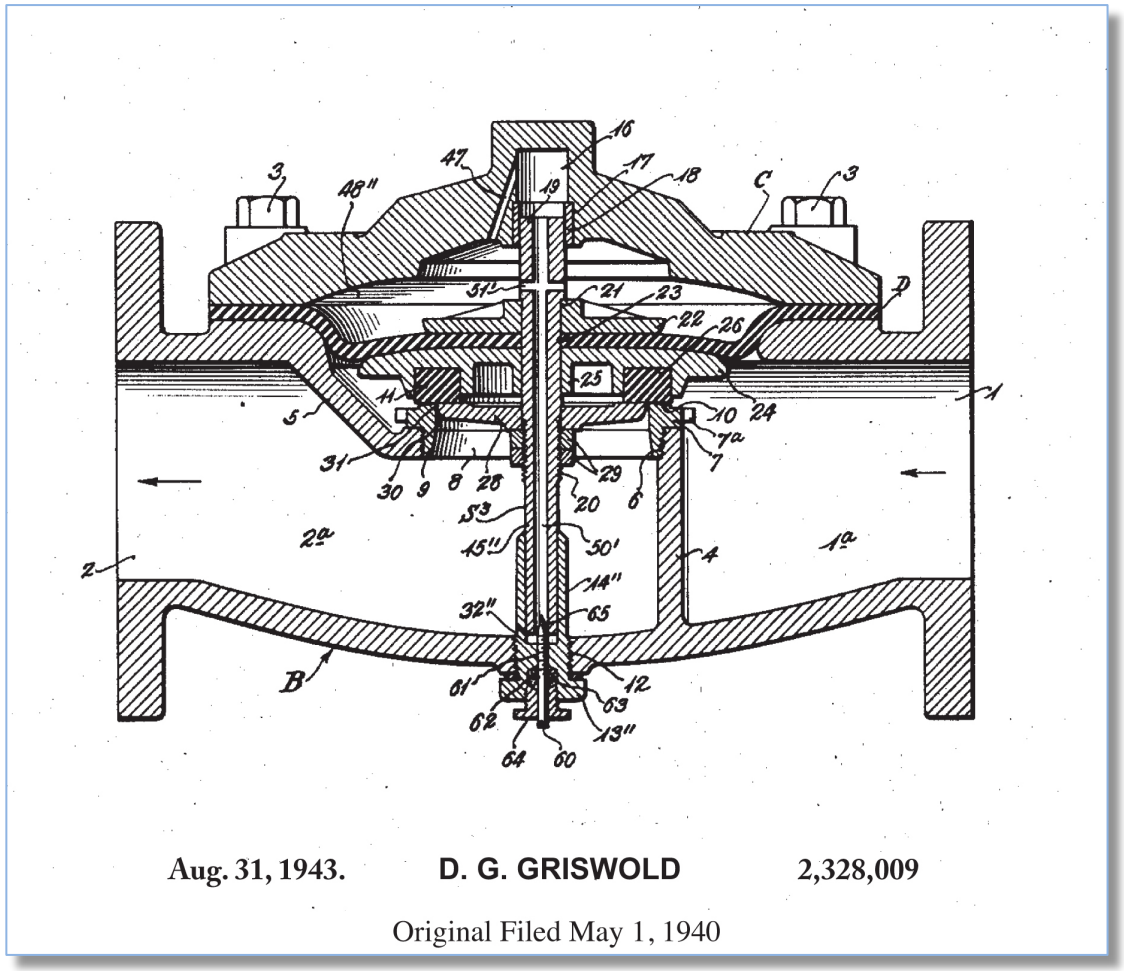
Cla-Val
United Kingdom

Cla-Val
Canada

Cla-Val Pacific
New Zealand

More than 80 years in the making

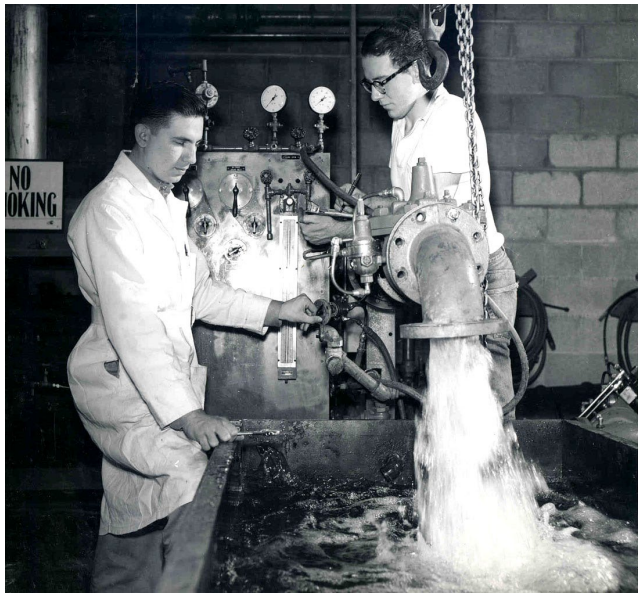
The first of many patented products



Aug. 31, 1943. D. G. GRISWOLD 2,328,009

Original Filed May 1, 1940

- Since 1936, Cla-Val has produced the automatic control valves for a diverse array of industries.
- Established in South Pasadena with just five employees, Cla-Val moved to its present home, a twenty-acre property in Costa Mesa, California in 1954.
- Over the years, Cla-Val has continued to strengthen its operational with state-of-the-art production facilities and warehouses in Canada, Switzerland, France, the United Kingdom and New Zealand.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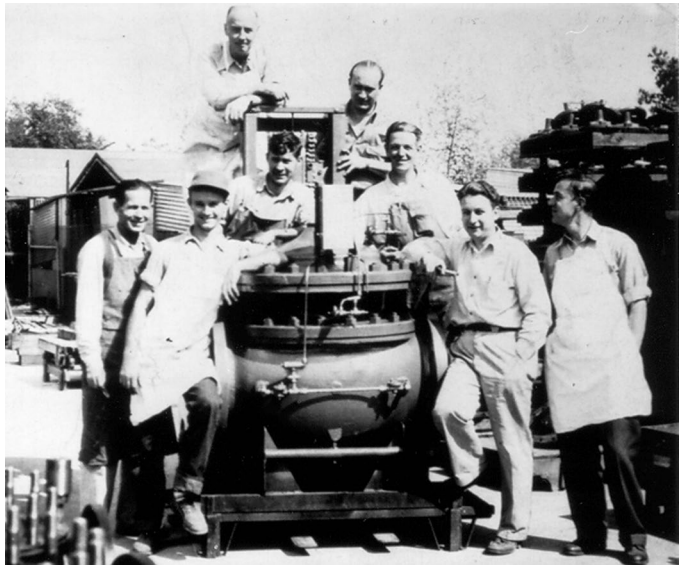


Cla-Val Automatic Control Valves

- Founded by Donald G. Griswold 1936
- Based out of Costa Mesa, CA
  - Only Control Valve Manufacturer in the US
- Only 1 Generation of Valves
  - No additional phases, styles, etc.
- Preferred brand Worldwide!

Cimco-GC SYSTEMS

Cla-Val Foundry: Costa Mesa, California

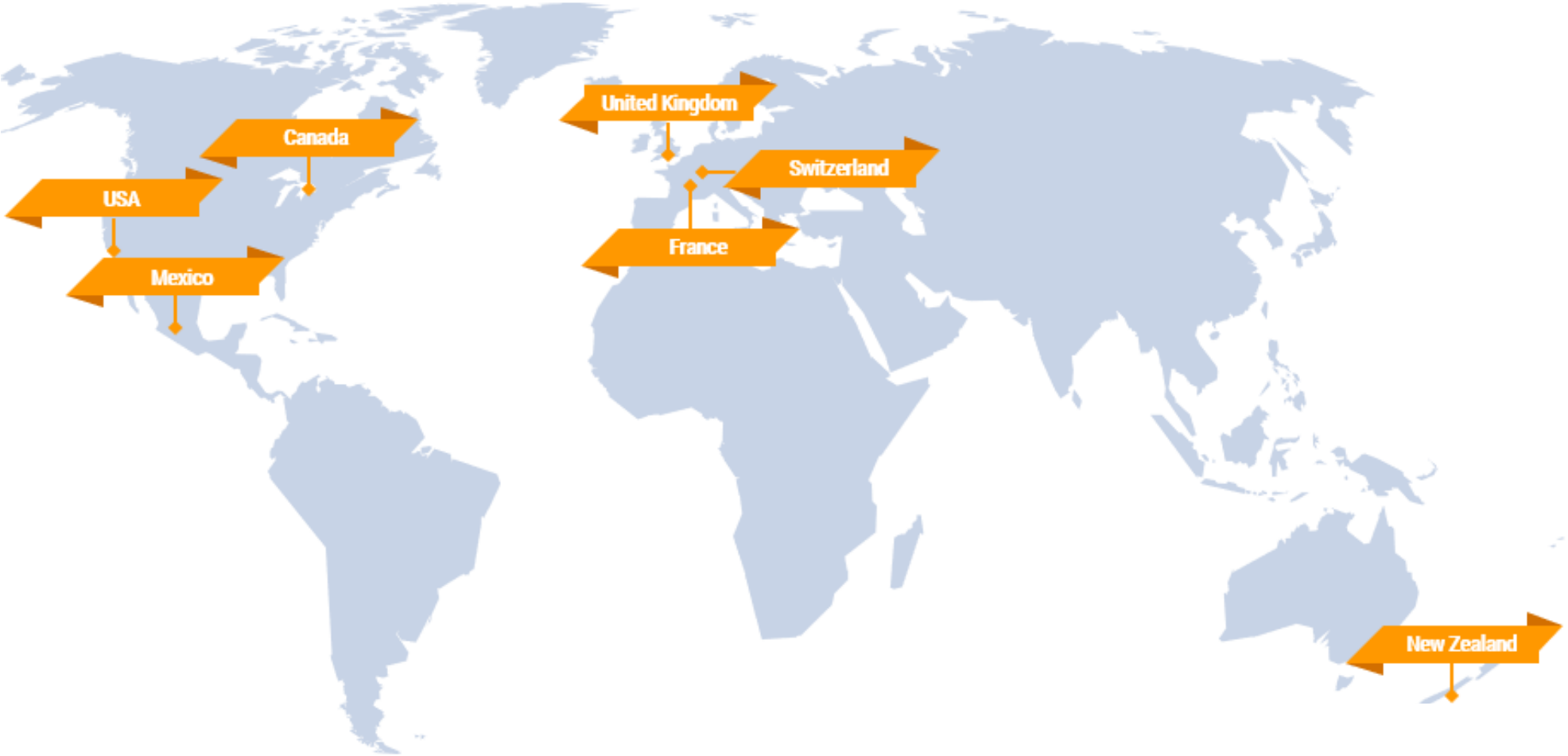
GRISWOLD CASTING

Foundry stats:

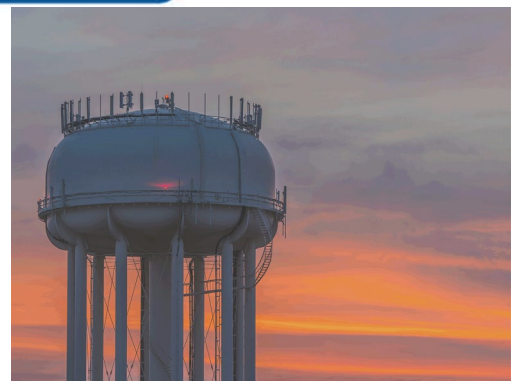
- 55 different metals and alloys
- 250,000 tons of metal per year
- 750 castings per month
- In addition to our own products, we ship 100 finished parts per month for other manufacturers

Cimco-GC SYSTEMS

HQ’s throughout the World



Not Just Waterworks…



Fire Protection

Industrial

Mining, Oil, Gas

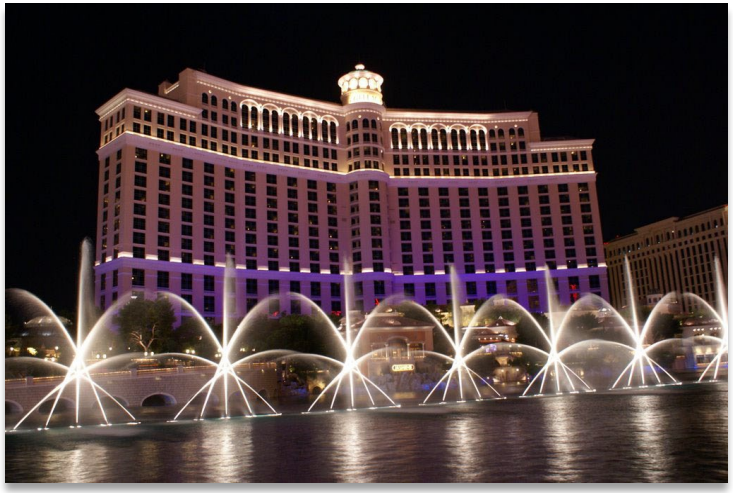
Commercial Fueling Systems

Military Grade Fueling

Marine Applications

Recognizable Landmarks

Bellagio Hotel Fountain
Las Vegas, NV



The White House
Washington, D.C.

Burj Khalifa
Dubai, U.A.E.
(Tallest Building in the World)

Freedom Tower One

100+ Cla-Val's
Domestic Water System

100+ Cla-Val's
Fire Protection System

CLA-VAL Factory Tours & Training

Cimco-GC SYSTEMS

Basic Hydraulics

CLA-VAL™

Cimco-GC SYSTEMS

Necessary for Many Applications throughout the Distribution System

- Pressure Control
  - Pressure Reducing
  - Pressure Sustaining
  - Combination Valves
- Flow Control
  - Metering Valves
  - GPM Set Points
- Level Control
  - Tank/Reservoir Fill
- Surge Control
  - Relief Valves
  - Surge Anticipators
- Pump Control Valves
  - Booster Pump Control
  - Deep Well Pump Control
- Check Valves
- Electronic Control Vales
  - Programmable Features
  - SCADA Integration

Hydraulics 101

Hydraulics 101

"the study of fluids at rest and in motion"

The relationships between water volume, velocity, flow, and pressure is critical for water systems.

What we will look at today:

1. Flow
2. Pressure Head
3. Static and Dynamic Pressure
4. Friction Loss
5. Relationship of Flow and Pressure

Hydraulics 101

1. Flow

The volume of water displaced per unit time, and is expressed as:

- cubic feet per second,
- gallons per minute
- million gallons per day

Hydraulics 101

1. Flow

The basic flow equation is :

$$Q = A \times V$$

- **A** = cross-sectional area of the flowing stream of water [ft^2]
- **V** = the velocity of flow (speed at which the water is moving) [ft/s]
- Q = flow

Hydraulics 101

1. Flow

How much water leaks from pipeline depends on:

- Cross sectional area of the break
- Velocity
- Time

Hydraulics 101

1. Flow

Large Main breaks grab news headlines, but are quickly addressed.

Small undetected leaks lead to high water loss over time.

Many systems experience between 10-20% water loss through leakage

Hydraulics 101

1. Flow

What determines the velocity of flow through a leak is the line pressure, and the pressure on the outside of the pipe (Usually low to none).

Higher pressures in pipelines cause more leakage, even with the same size cracks and holes.

Hydraulics 101

2. Pressure Head

(Also known as *static pressure* or *static head)*

In a tank that is not airtight, the only pressure exerted is by the specific weight of water.

Hydraulics 101

2. Pressure Head

Pressure Head Can be expressed as either:

- **Head** (feet of water or meters of water),
- or **Pressure** – (psi / or bar).

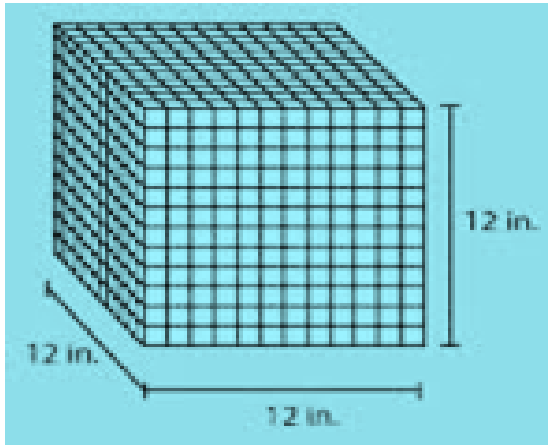
Hydraulics 101

2. Pressure Head

A cubic foot of water weighs 62.4 pounds.

Therefore, if a column with a 144 square inch base exert a pressure of 62.4 pounds

Then a single square-inch column undergoes:



62.4 pounds/144 square inches = **0.433 pounds per square inch**

Hydraulics 101

2. Pressure Head

1 ft of head = 0.433 psi

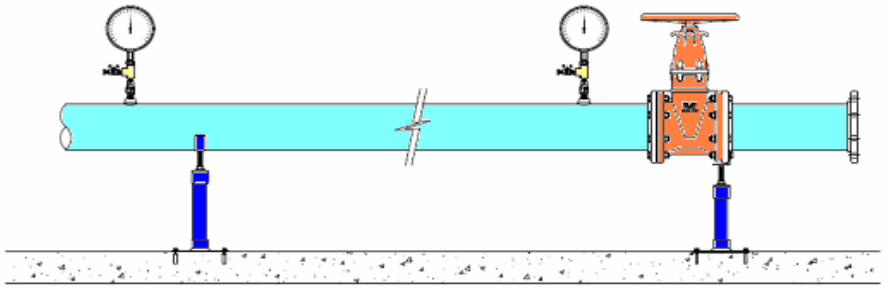
1 PSI = 2.31 ft of head

Hydraulics 101

Static and Dynamic Pressure

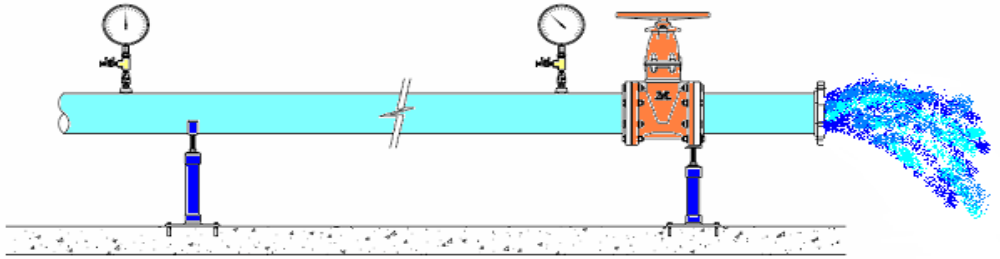
Static Pressure

When fluid is at rest



Dynamic Pressure

When fluid is in motion



Hydraulics 101

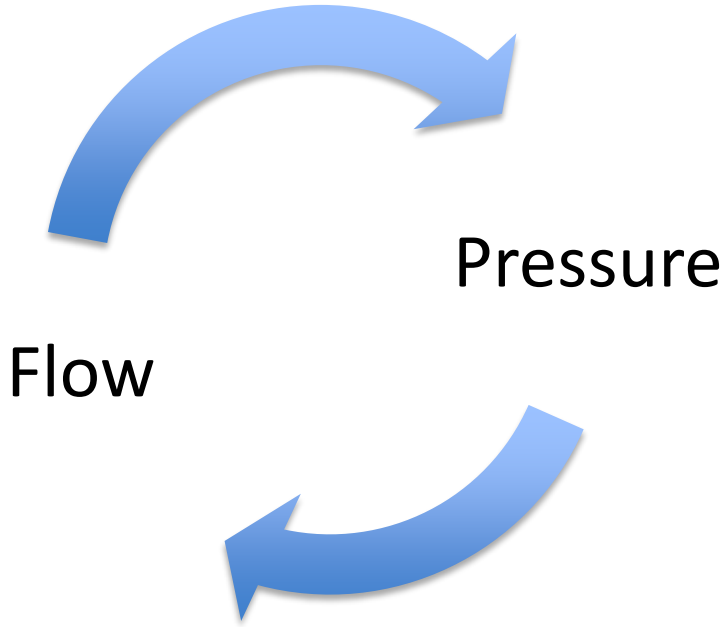
Friction Loss

When water flows through a pipeline, there will always be pressure drop. This is due to many factors, including:

- the size of the pipe
- the age of the pipe (roughness of the inside)
- how much water is going through the pipe (Flow)
- how many fittings or bends are in the pipe
- Valves
- length of pipe

Hydraulics 101

6. Relationship Between Pressure & Flow



Hydraulics 101

6. Relationship Between Pressure & Flow

In most water and wastewater systems pumps and gravity are what create flow by introducing energy into the system.

Pressure is the evidence of resistance of the system of pipe and fittings.

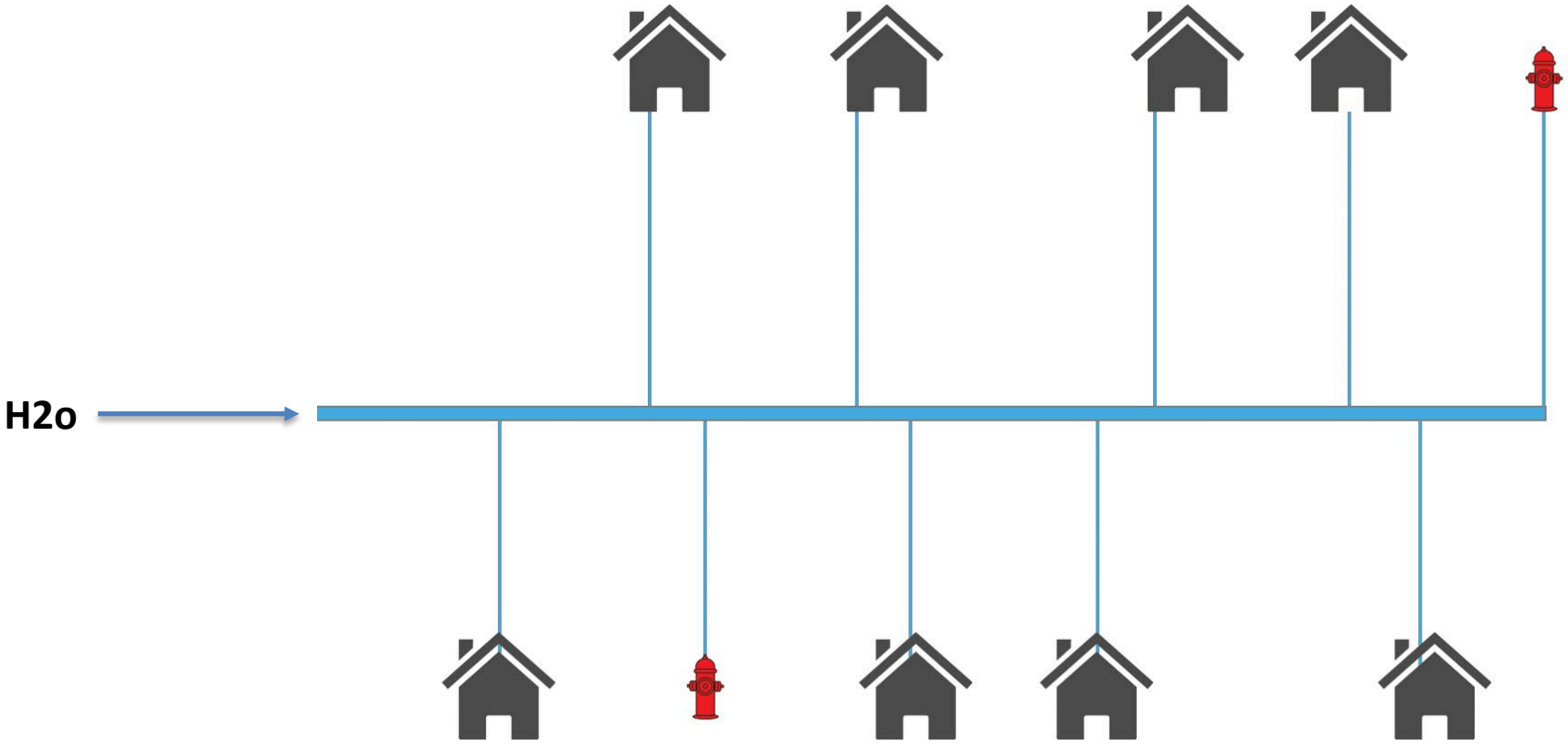
Basic Hydraulics

CLA-VAL™

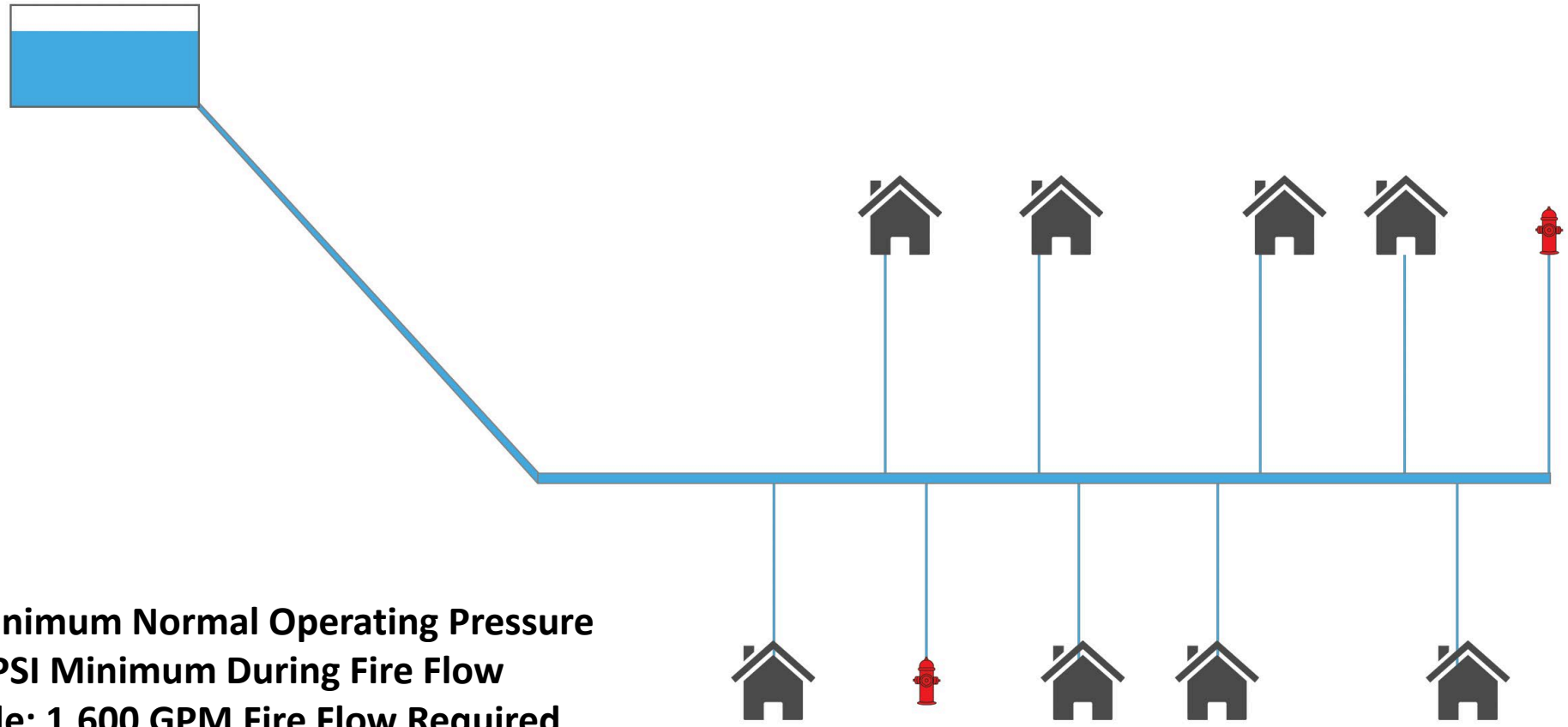
Cimco-GC SYSTEMS

Why We Need Pressure Management

Pressure Management Example

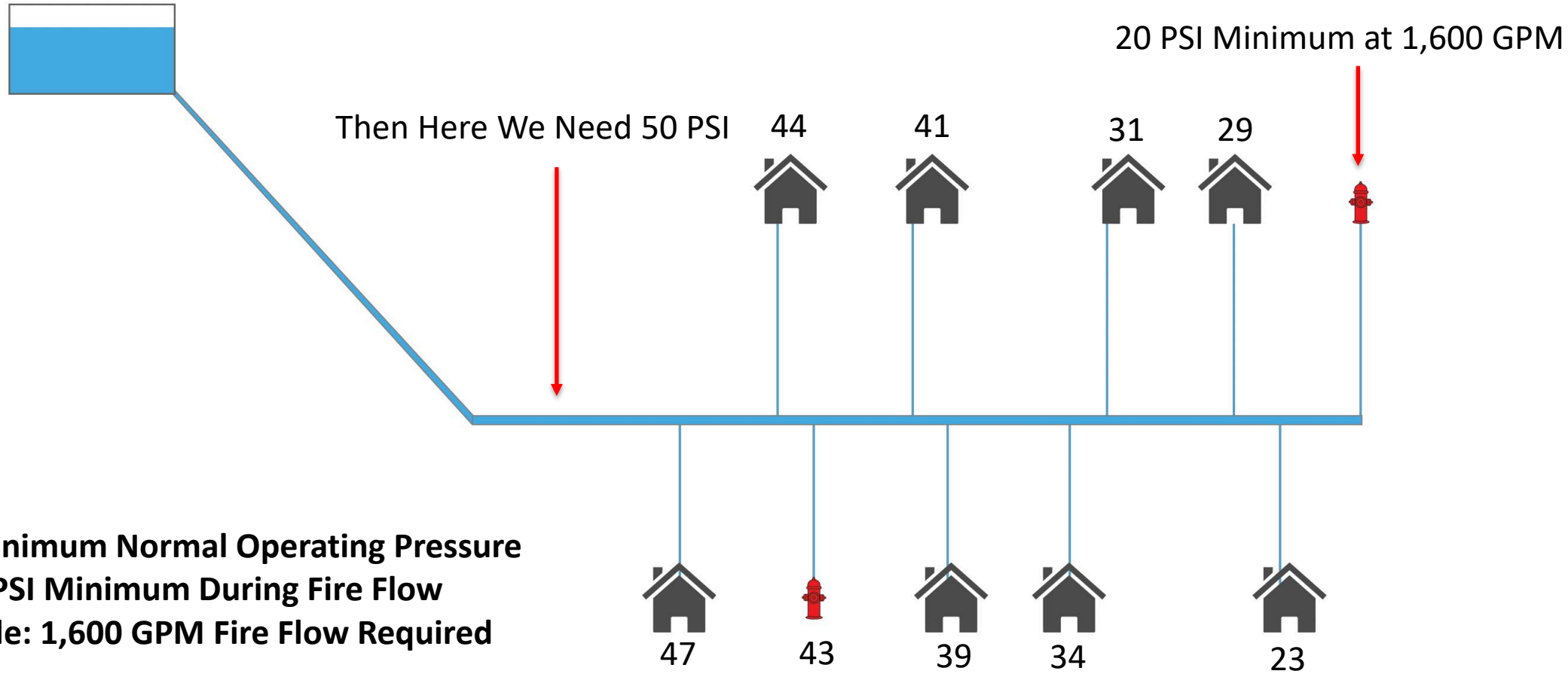


Gravity Fed by a Reservoir



30 Psi Minimum Normal Operating Pressure
20 PSI Minimum During Fire Flow
Example: 1,600 GPM Fire Flow Required

Gravity Fed by a Reservoir



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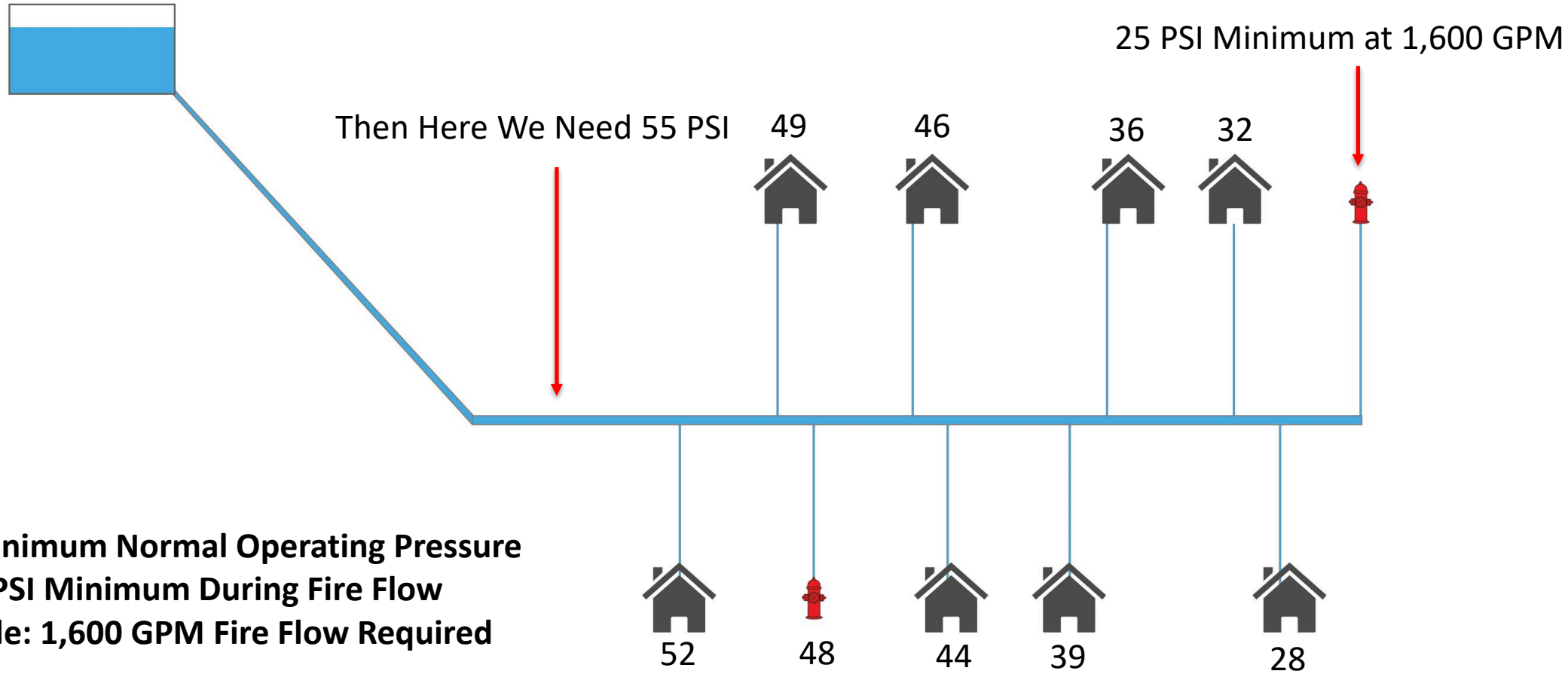

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Cimco-GC SYSTEMS

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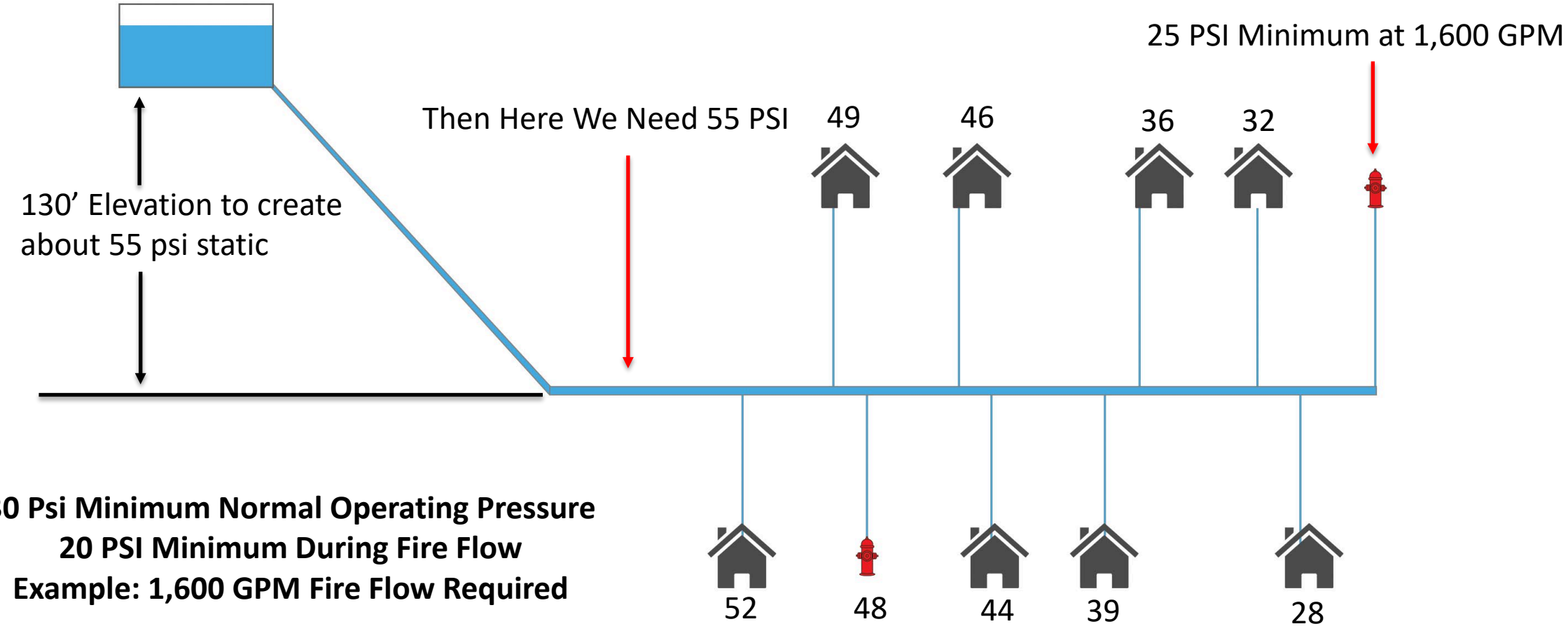

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Cimco-GC SYSTEMS

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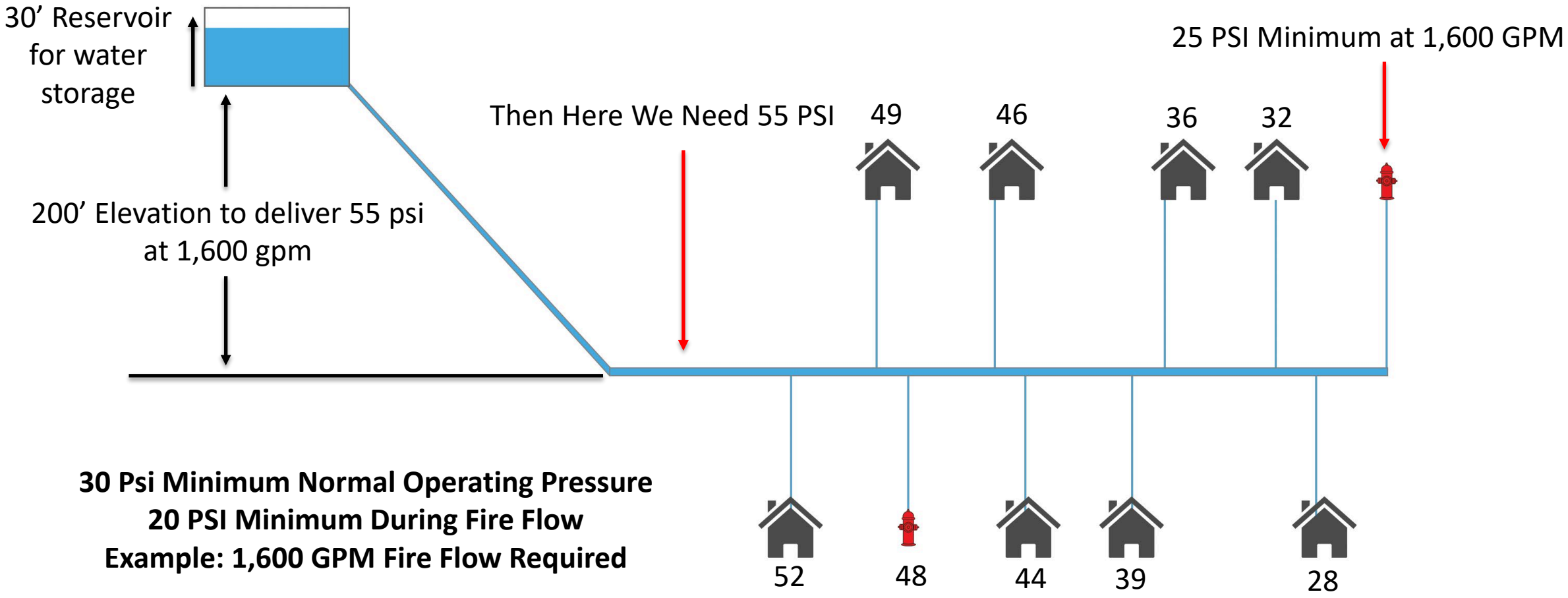

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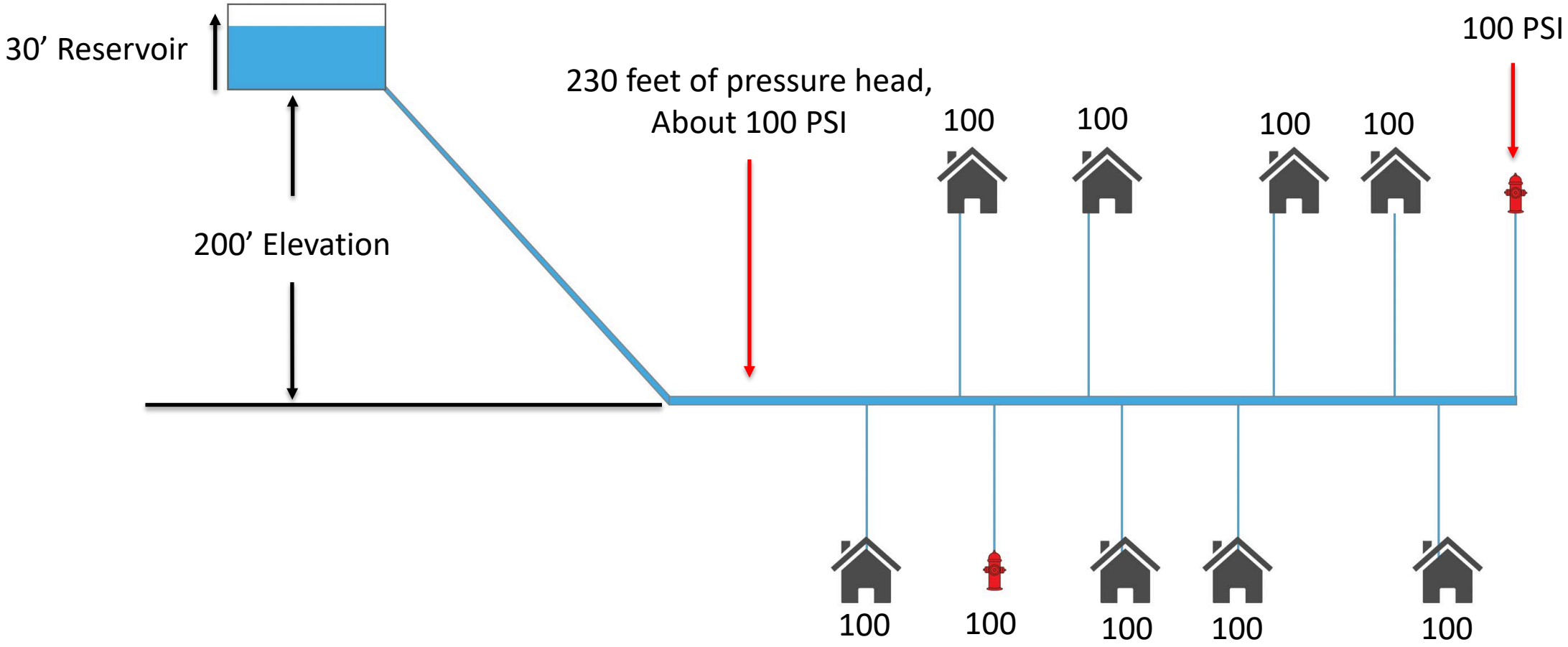
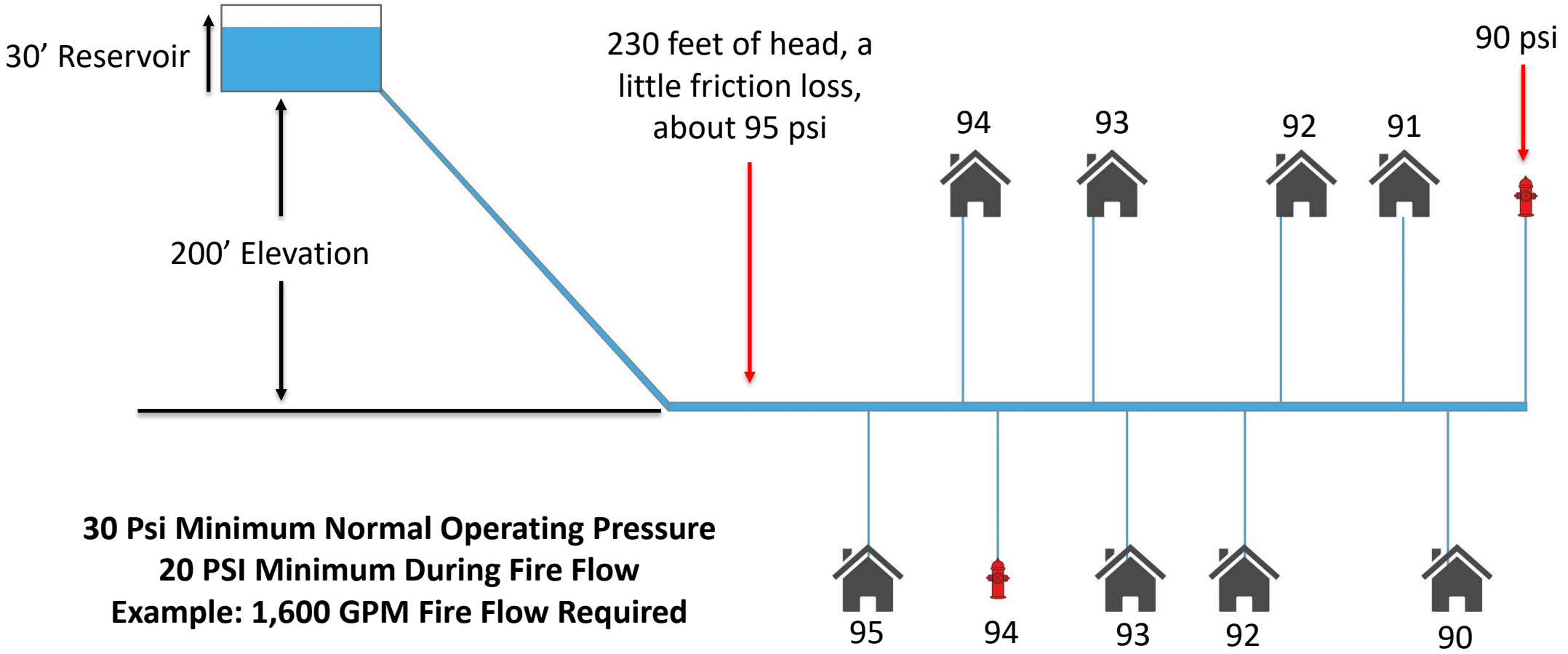
20 PSI Minimum During Fire Flow
Example: 1,600 GPM Fire Flow Required

If the Systems is Static…



Normal System Flows: 200 gpm



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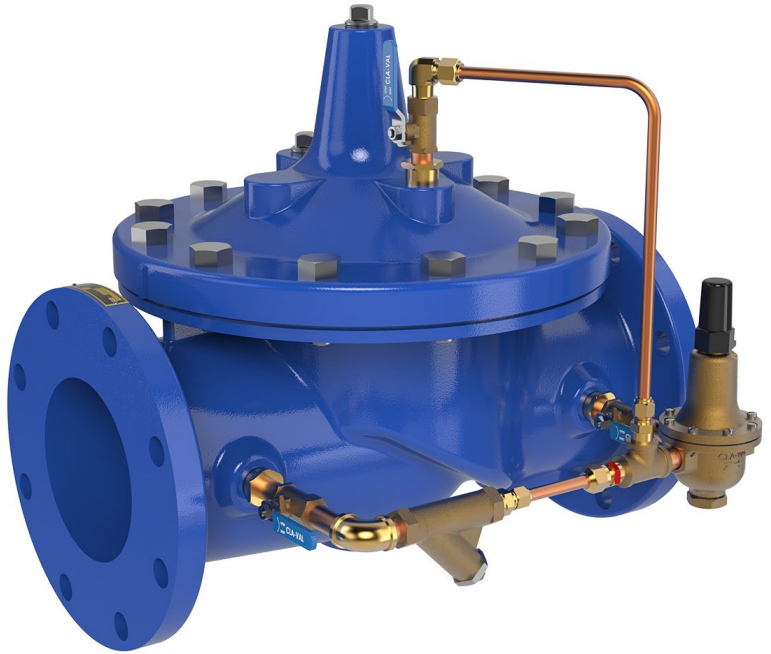
20 PSI Minimum During Fire Flow
Example: 1,600 GPM Fire Flow Required

Cimco-GC SYSTEMS

Pressure Management

Pressure Management

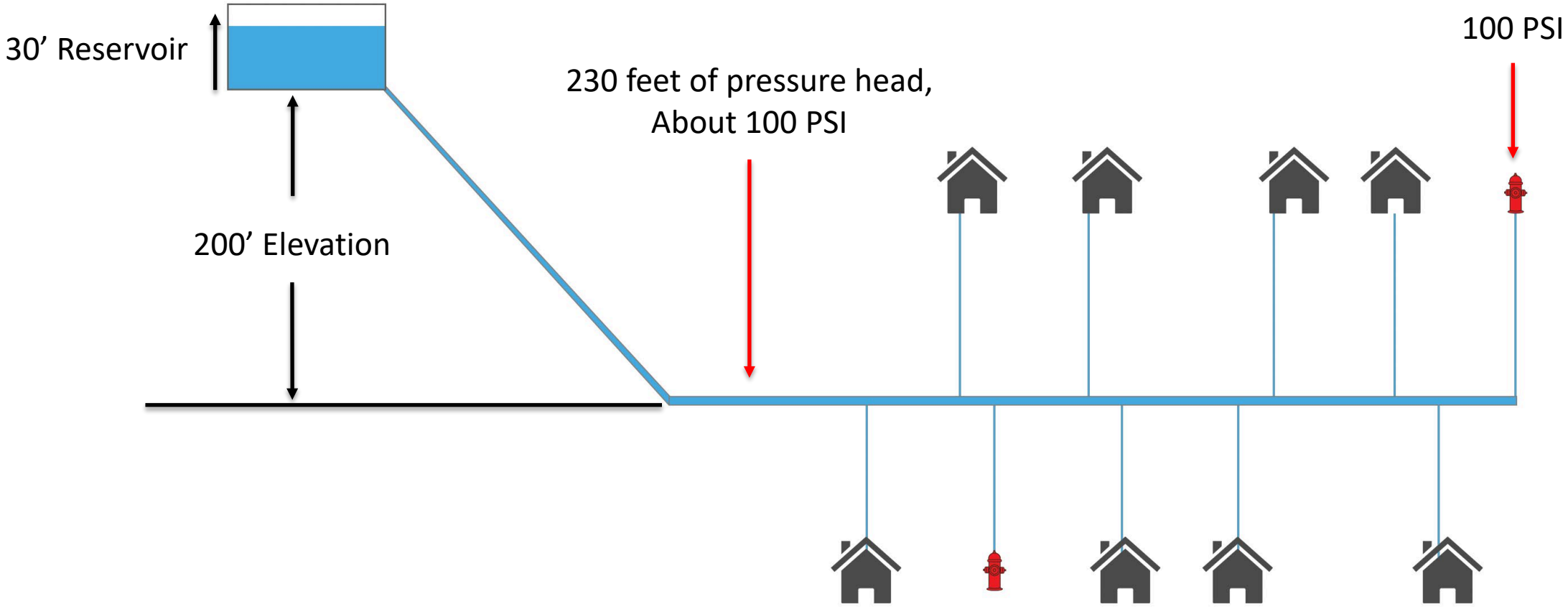
1. Standard Pressure Management
   - Hydraulic Pressure Reducing Valves
   - Hytrol base valve
   - Pilot Systems
   - CRD
   - Pressure Reducing Station Design



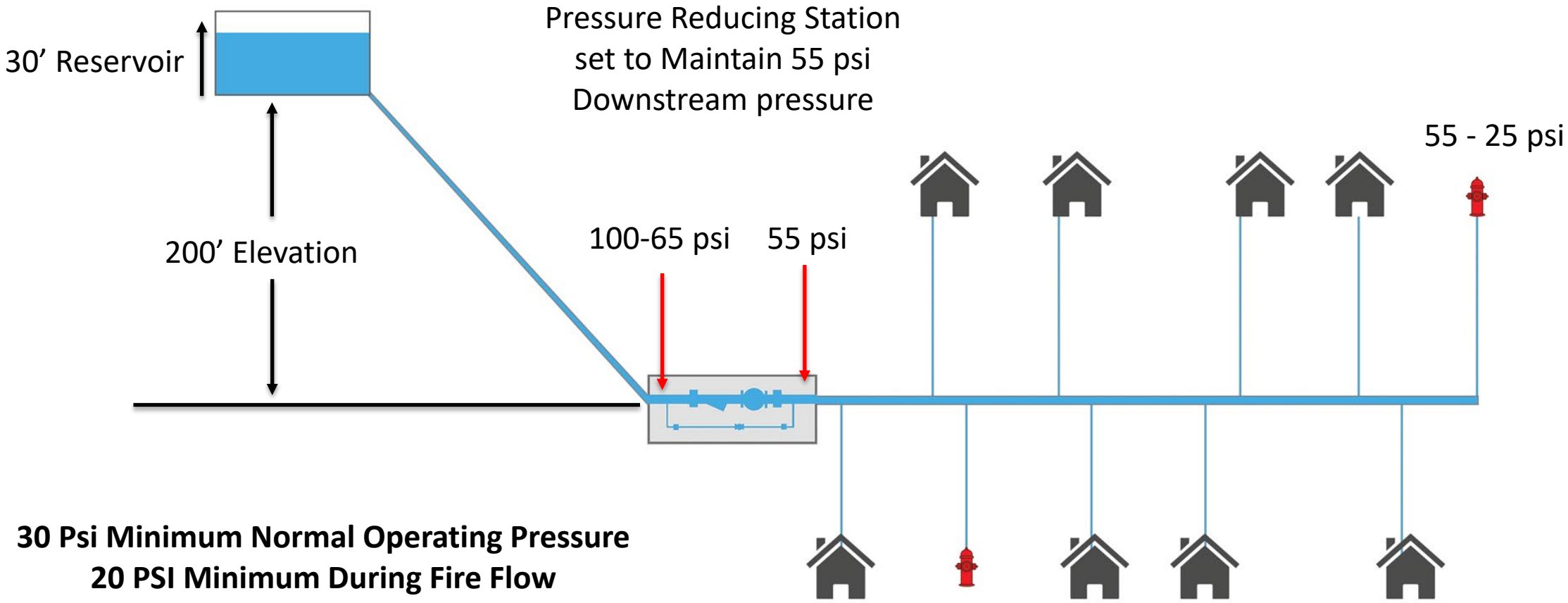
Pressure Management, cont

2. Active Pressure Management
   - Adjusting set points use case
   - Valves to Execute Active Pressure Management
   - Flow Metering
   - Hydro Power Generation

Too Much Pressure!

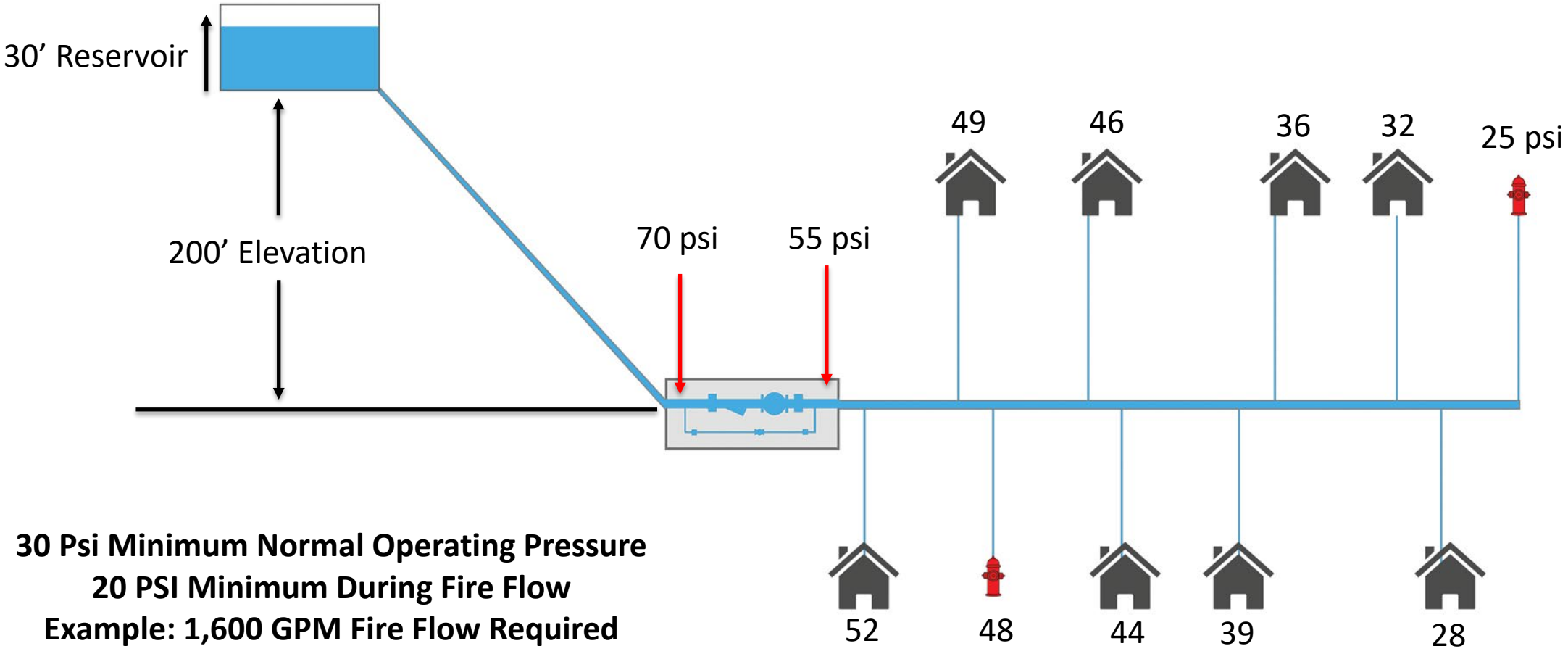


Standard Pressure Management



30 Psi Minimum Normal Operating Pressure
20 PSI Minimum During Fire Flow
Example: 1,600 GPM Fire Flow Required

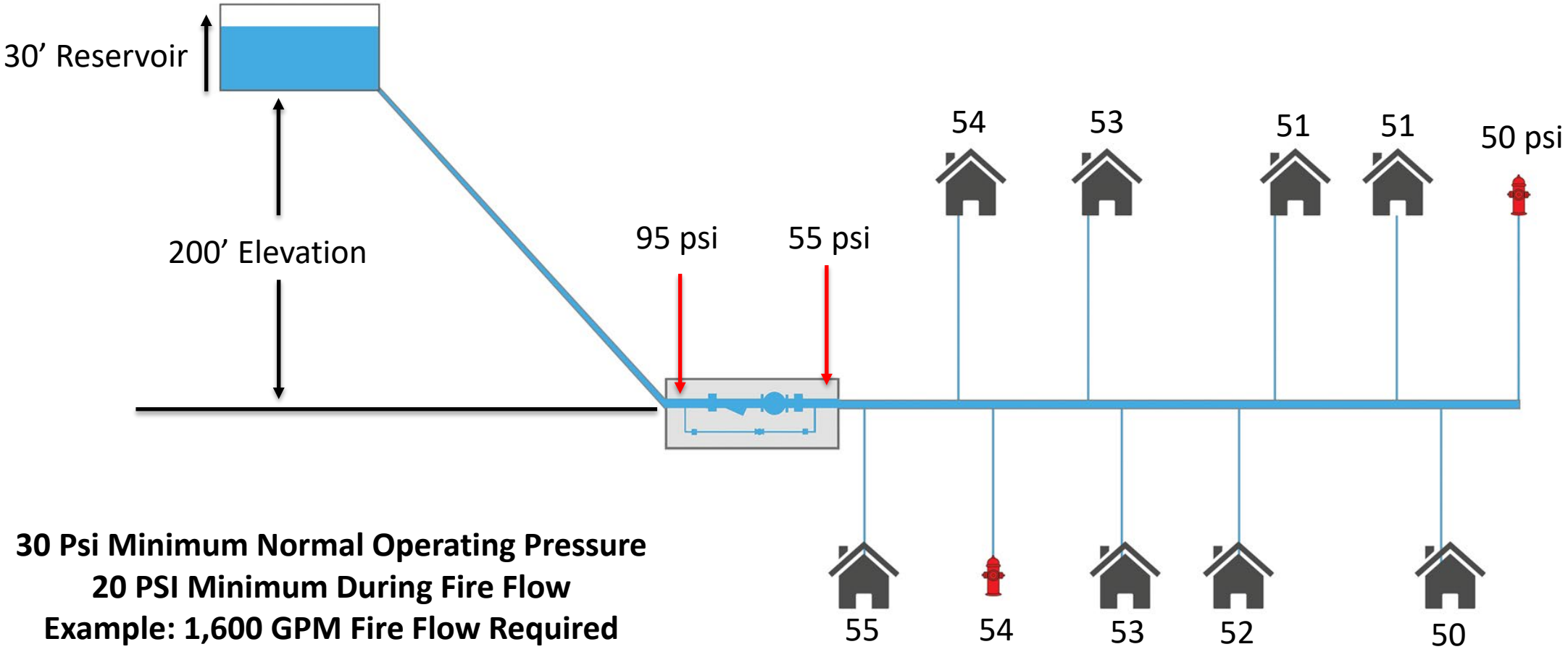
Standard Pressure Management
- Fire Flow 1,600 gpm -



30 Psi Minimum Normal Operating Pressure
20 PSI Minimum During Fire Flow
Example: 1,600 GPM Fire Flow Required

Cimco-GC SYSTEMS

Standard Pressure Management
- Peak Normal flow 200 gpm -



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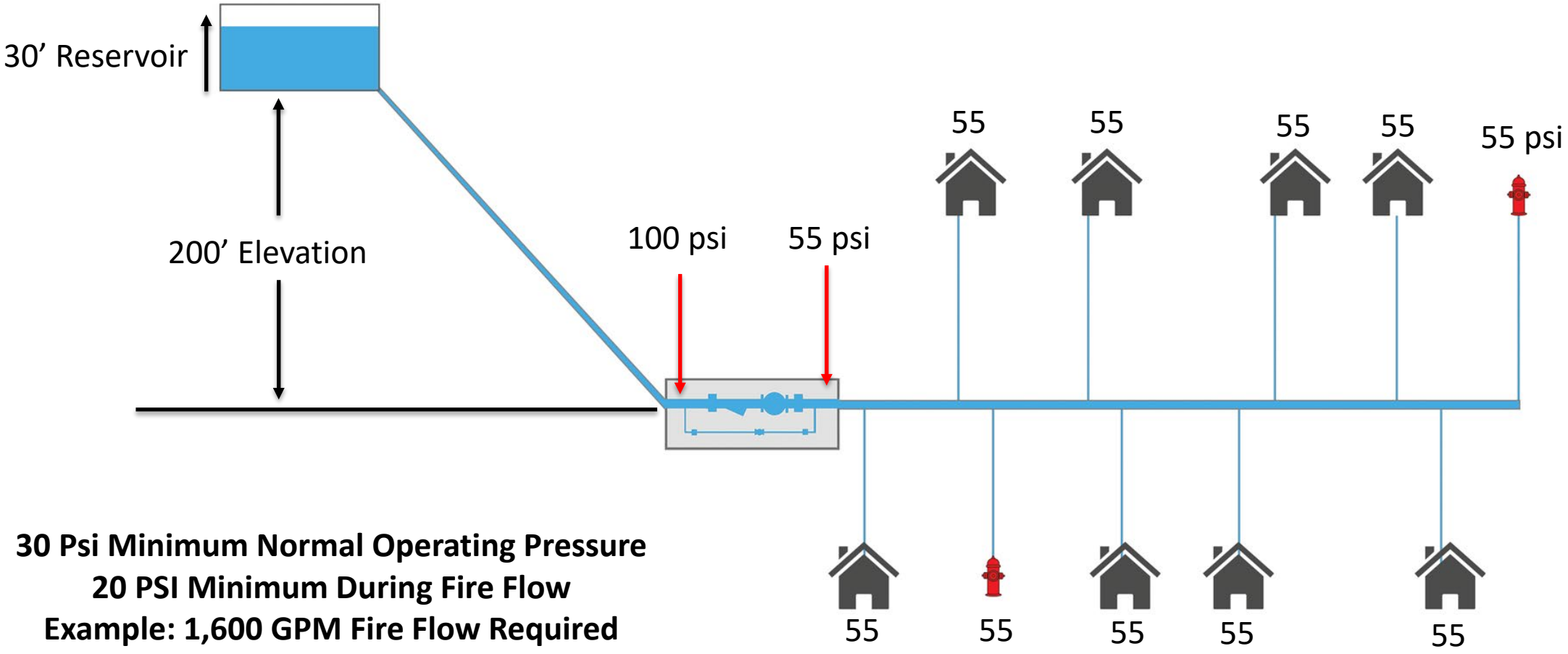
Example: 1,600 GPM Fire Flow Required

Cimco-GC SYSTEMS

Standard Pressure Management
- Static -



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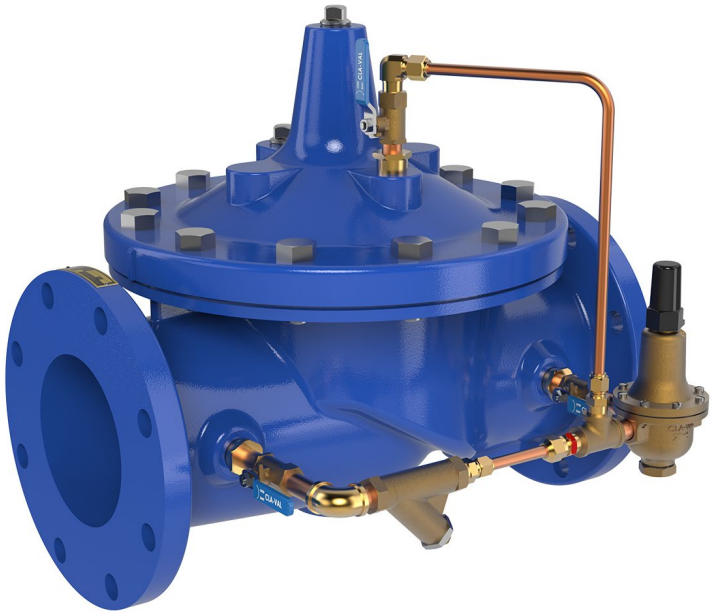
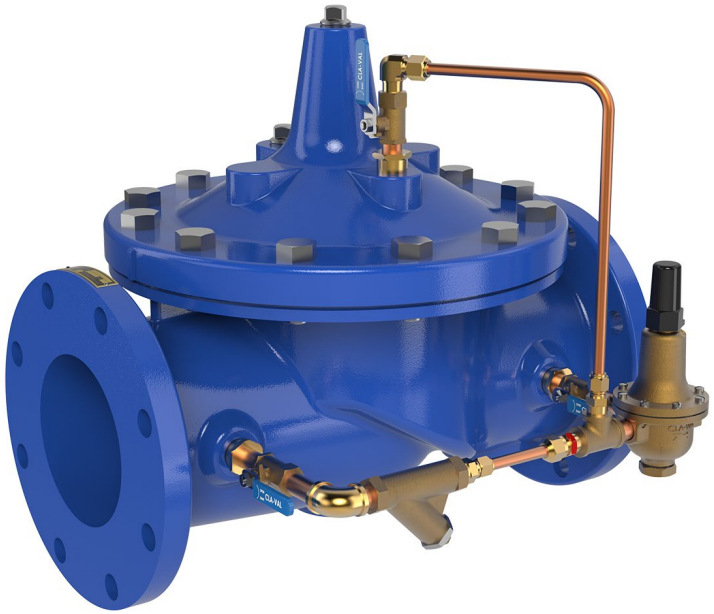
Example: 1,600 GPM Fire Flow Required

Cimco-GC SYSTEMS

Pressure Reducing Valves



Pressure Reducing Valves

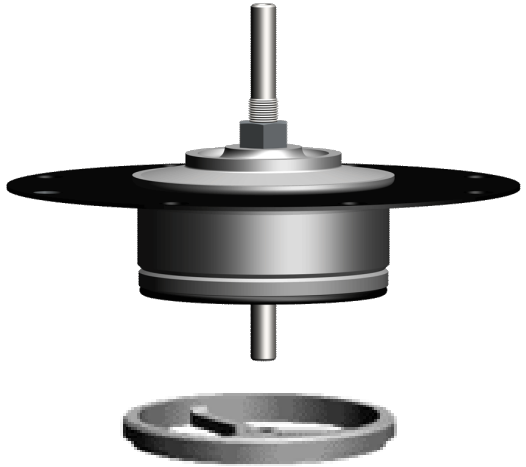


Maintain a constant downstream pressure regardless of inlet pressure or changes in flow rate

3 Main Area's

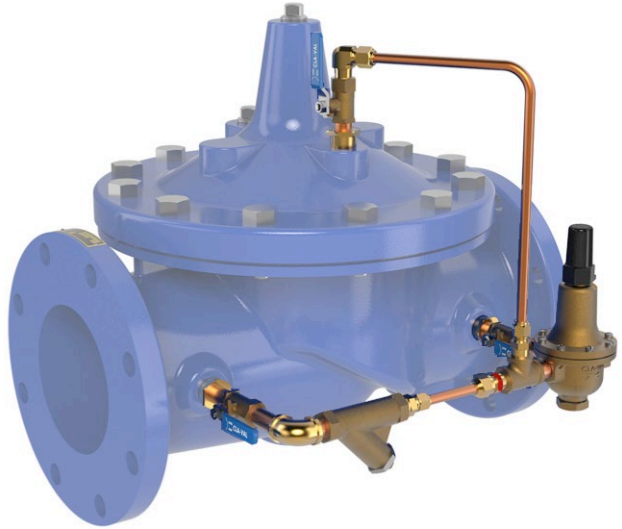
Basic Valve Body

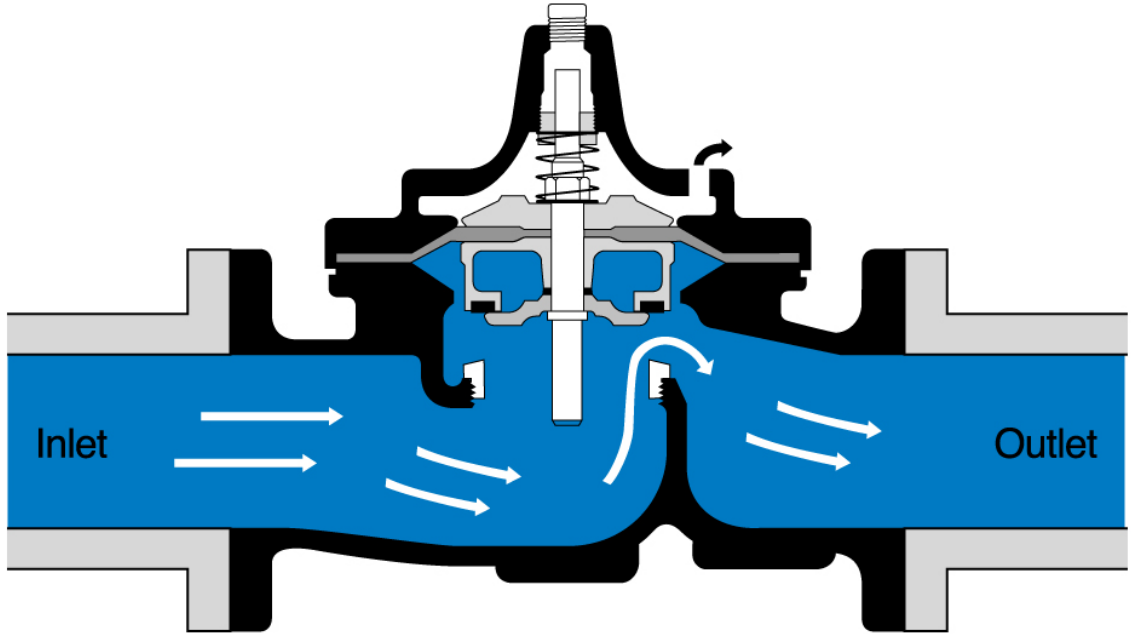
Disc /Diaphragm Assembly



Seat

Pilot Control System

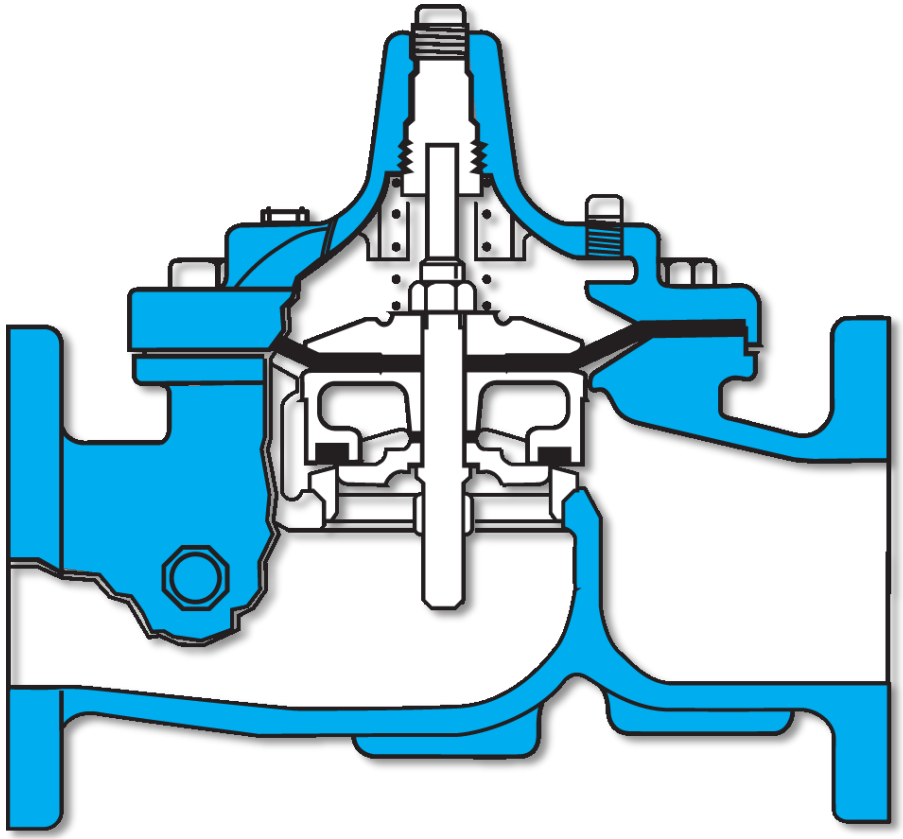




Standard Flow Up and Over Seat

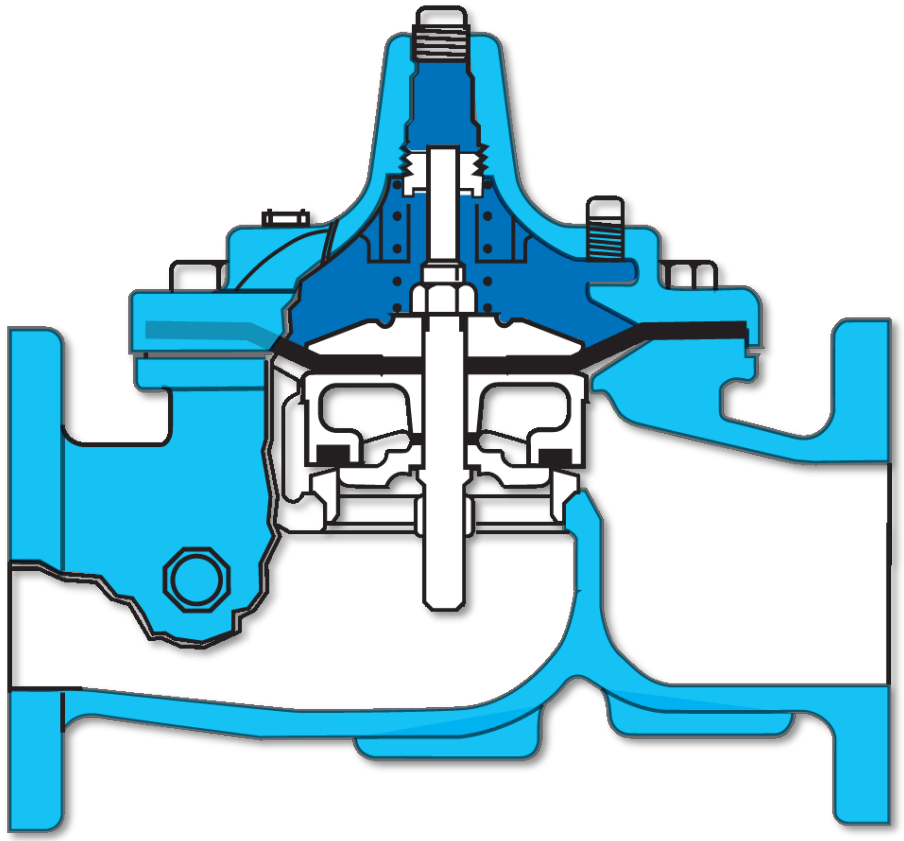
Four Basic Design Ideas

1. Modified Globe Design



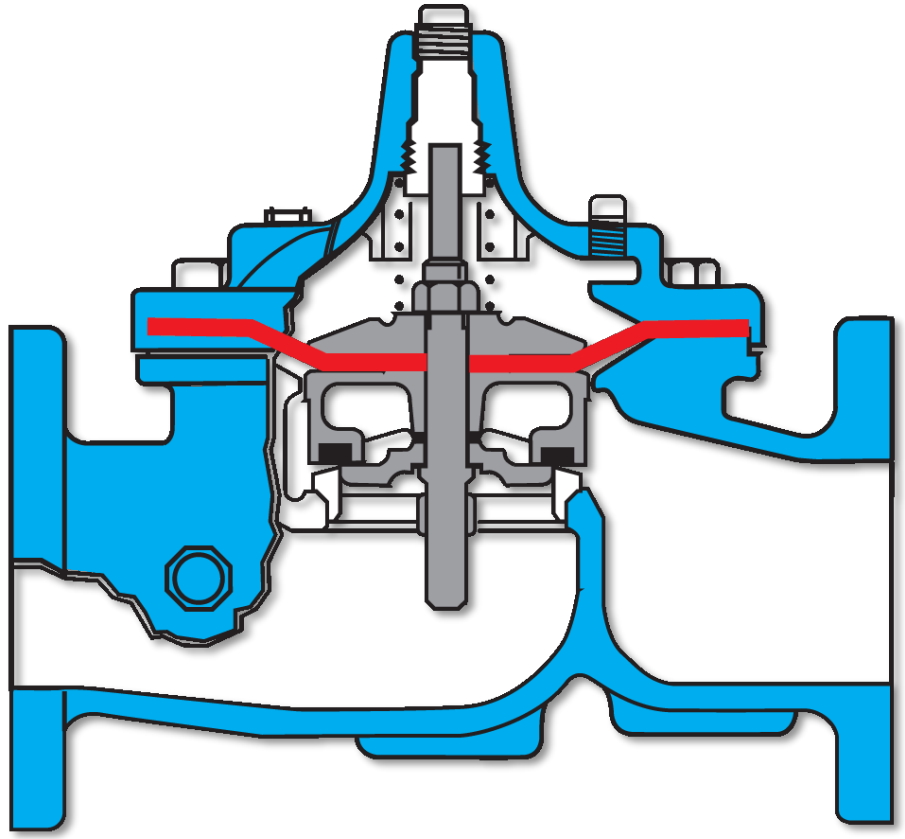
Four Basic Design Ideas

1. Modified Globe Design
2. Hydraulically Operated



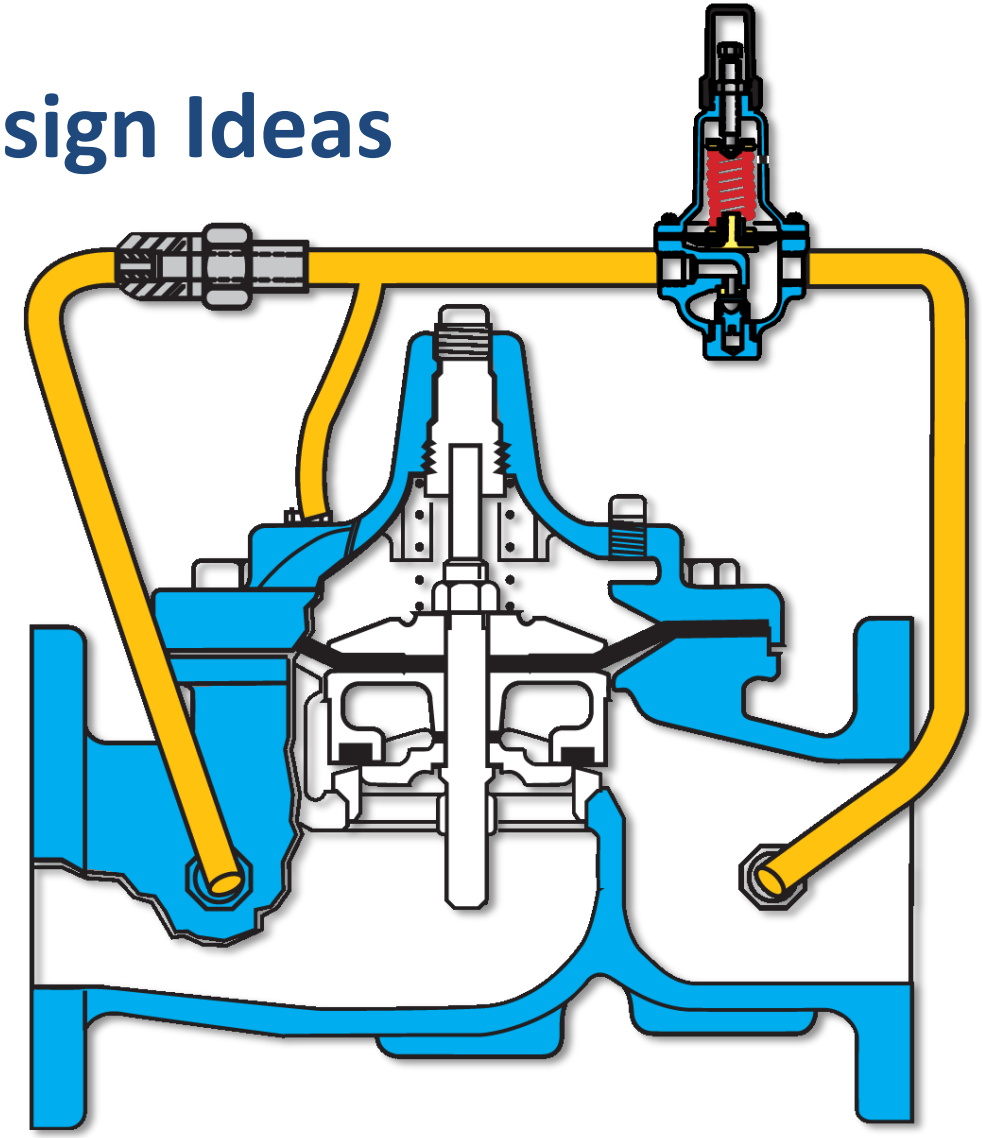
Four Basic Design Ideas

1. Modified Globe Design
2. Hydraulically Operated
3. Diaphragm Actuated

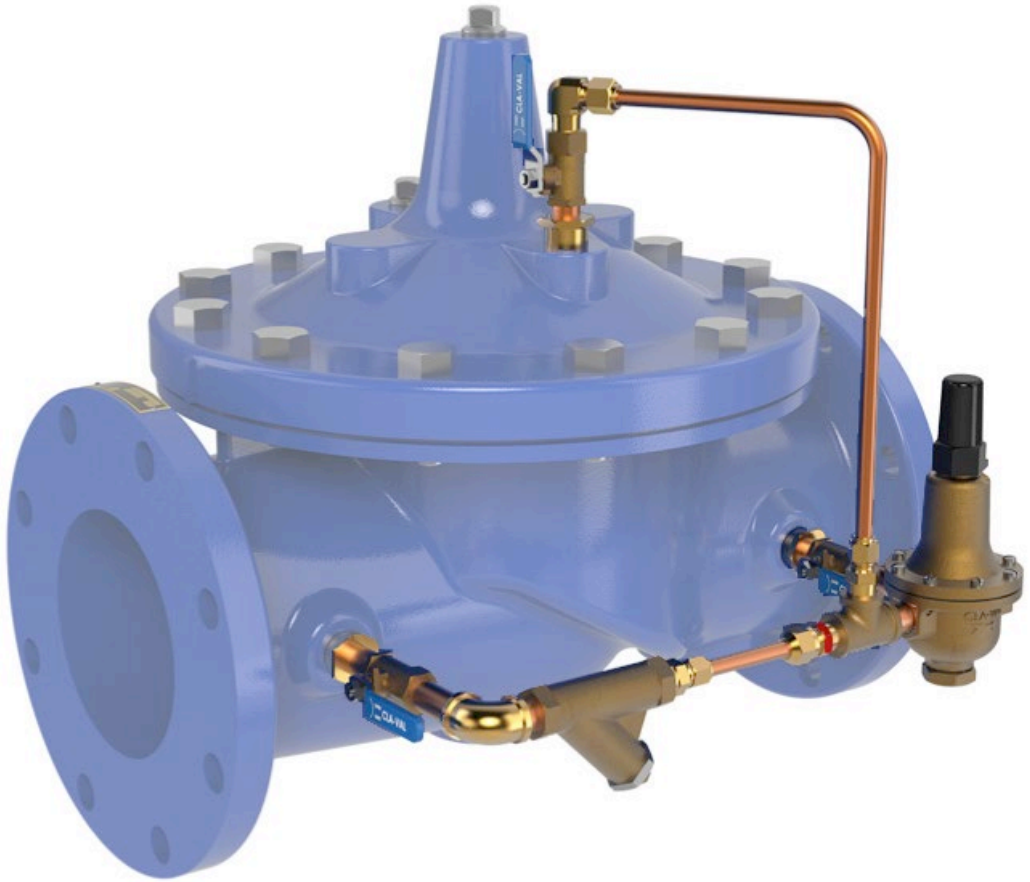


Four Basic Design Ideas

1. Modified Globe Design
2. Hydraulically Operated
3. Diaphragm Actuated
4. Pilot Controlled



Intro To Pilot Systems



Pilot Controls

- Provide Functionality of the valve
- Standard Features
  - CRD, CRL, CRA, CDS6A, etc.
  - 3/8” Pilot Tubing Lines (Copper)
    - Stainless Steel Recommended
  - Brass Fittings
    - Stainless Steel Recommended
- Optional Features
  - Strainers, Speed Controls, Position Indicators, Check Features, etc.
- Connections made to main valve ports

How many different pilot control configurations or combinations?

33,000!

Remember – it does not take multiple valves to accomplish multiple jobs

CVCL 1 2 3 4 DIST CODE 002 SHEET 1 OF 5

CLA-VAL CO. NEWPORT BEACH, CALIFORNIA

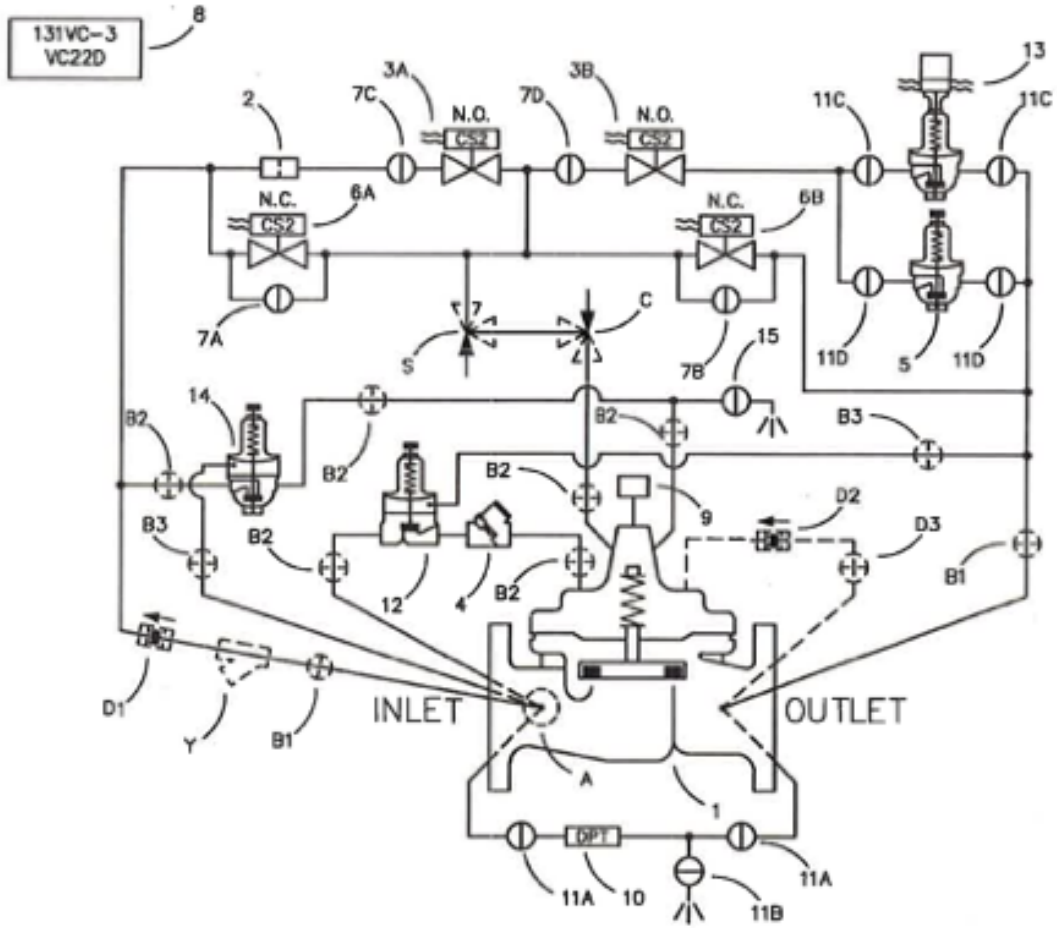
CATALOG NO.	DRAWING NO.	REV
133-AQ	210555	–

TYPE OF VALVE AND MAIN FEATURES

ELECTRONIC INTERFACE METERING VALVE
WITH HYDRAULIC PRESSURE REDUCING, PRESSURE SUSTAINING
SOLENOID SELECTED, WITH SURGE SHUTOFF

DESIGN		
DRAWN	EA	8-21-15
CHK'D	VL	10-8-15
APV'D	CH	10-8-15

—— - - - - NOT FURNISHED BY CLA-VAL CO. - - - - - OPTIONAL FEATURES



BASE QTY	BASIC COMPONENTS	QTY
1	100-01 HYTROL (133-AQ) MAIN VALVE	1
	~~100-20 HYTROL (633-AQ) MAIN VALVE~~	
2	X58C RESTRICTION ASSEMBLY	1
3	CS2 SOLENOID CONTROL (N.O.)	2
4	CSC SWING CHECK VALVE	1
5	CRD PRESSURE REDUCING CONTROL	1
6	CS2 SOLENOID CONTROL (N.C.)	2
7	CK2 COCK (SOLENOID BYPASS)	4
8	131VC-3 ELECTRONIC CONTROLLER/VC22D	1
9	X117D POSITION TRANSMITTER	1
10	DIFFERENTIAL PRESSURE TRANSMITTER	1
11	CK2 COCK (ISOLATION VALVE)	7
12	CRL/CRL60 PRESSURE RELIEF CONTROL	1
13	CRD34 ELECTRONIC PRESSURE REDUCING CONTROL	1
14	CRA PRESSURE REDUCING CONTROL	1
15	CK2 COCK (DRAIN VALVE)	1

CAD REVISION RECORD - DO NOT REVISE MANUALLY

DESCRIPTION	BY	DATE
FOR PRODUCTION (ECO 25325)	EA	8-31-15

Cimco-GC SYSTEMS

Divided into Two Groups

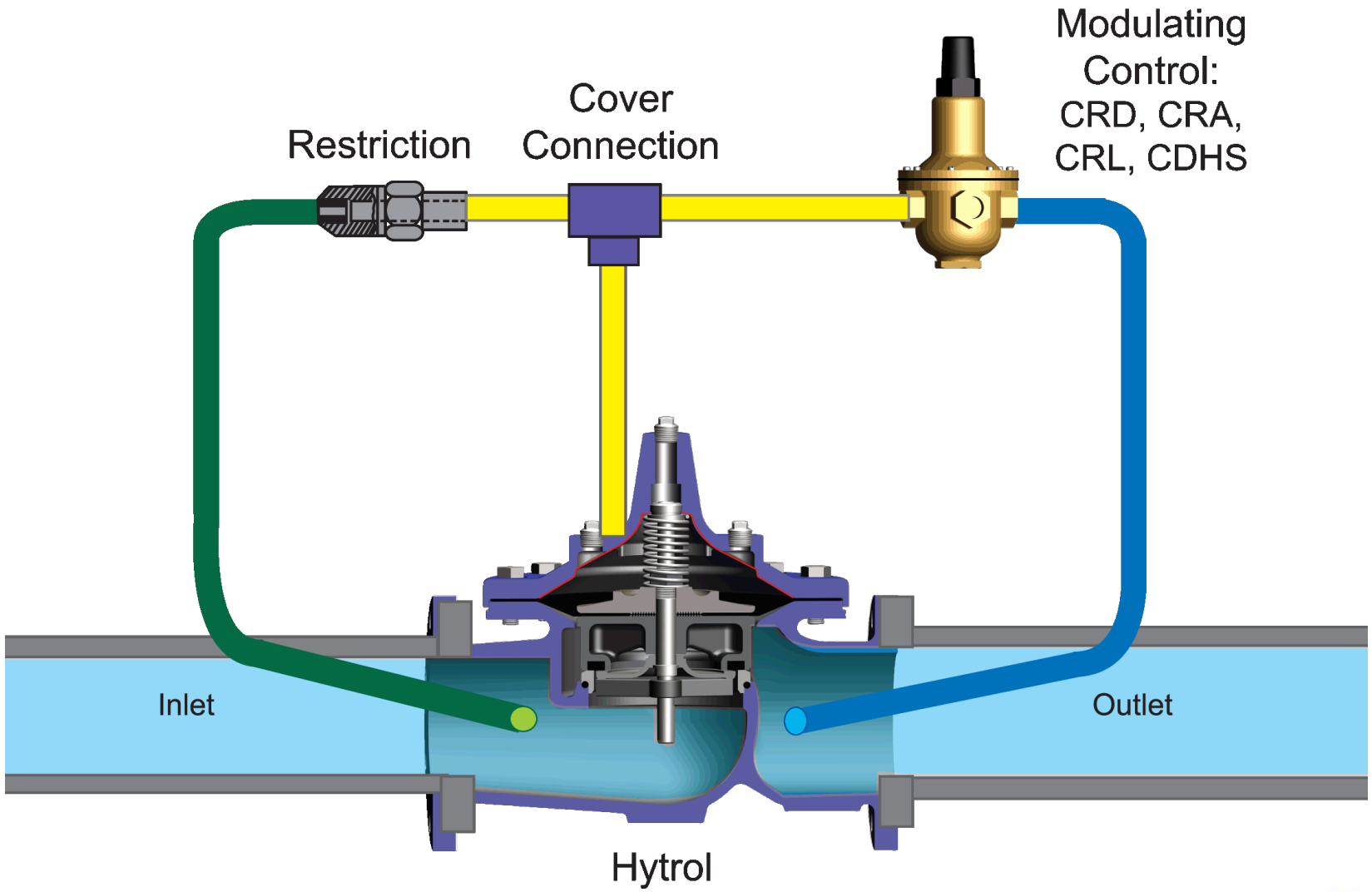
Modulating

1. Pressure Reducing
2. Pressure Sustaining/Relief
3. Rate of Flow
4. Electronic

Non-Modulating

1. Pump Control
2. Solenoid Operated
3. Level Control

Hydraulic Modulating Valves Will Have



90-01 Pressure Reducing Operation

- Modulates all day based off of system demand to maintain pressure set up
- Utilizes CRD Component to sense pressure change
- Drop in Pressure, Valve Opens
- Rise in Pressure, Valve Closes
- +/- 1psi accurate
- Reacts very quickly to change
- Needs at least 10psi Differential Pressure for control

X58 Restrictors

- Large orifice stained RED – 1/8″
- Small orifice stained BLUE – 3/32″

CRD Pressure Reducing Pilot Control

- **C** = Control
- **R D** = Reduce

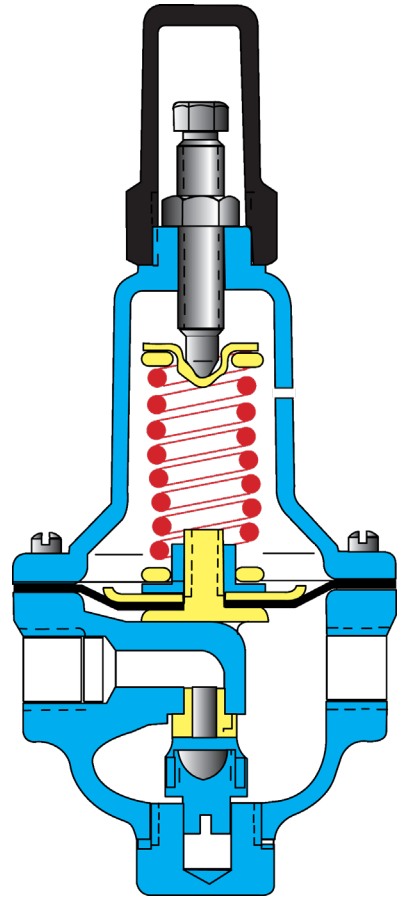
Cimco-GC SYSTEMS

CRD Pressure Reducing Pilot Control

- Normally open
- Closes on pressure rise
- Senses outlet pressure
- 3/8” connection
- ¼” Orifice
- Design has not changed since 1950’s

CRD Pressure Reducing Pilot Control

- Spring Adjusted
- Clockwise Turn – Increase PSI
- Counterclockwise Turn – Decrease PSI
- Always adjust slowly



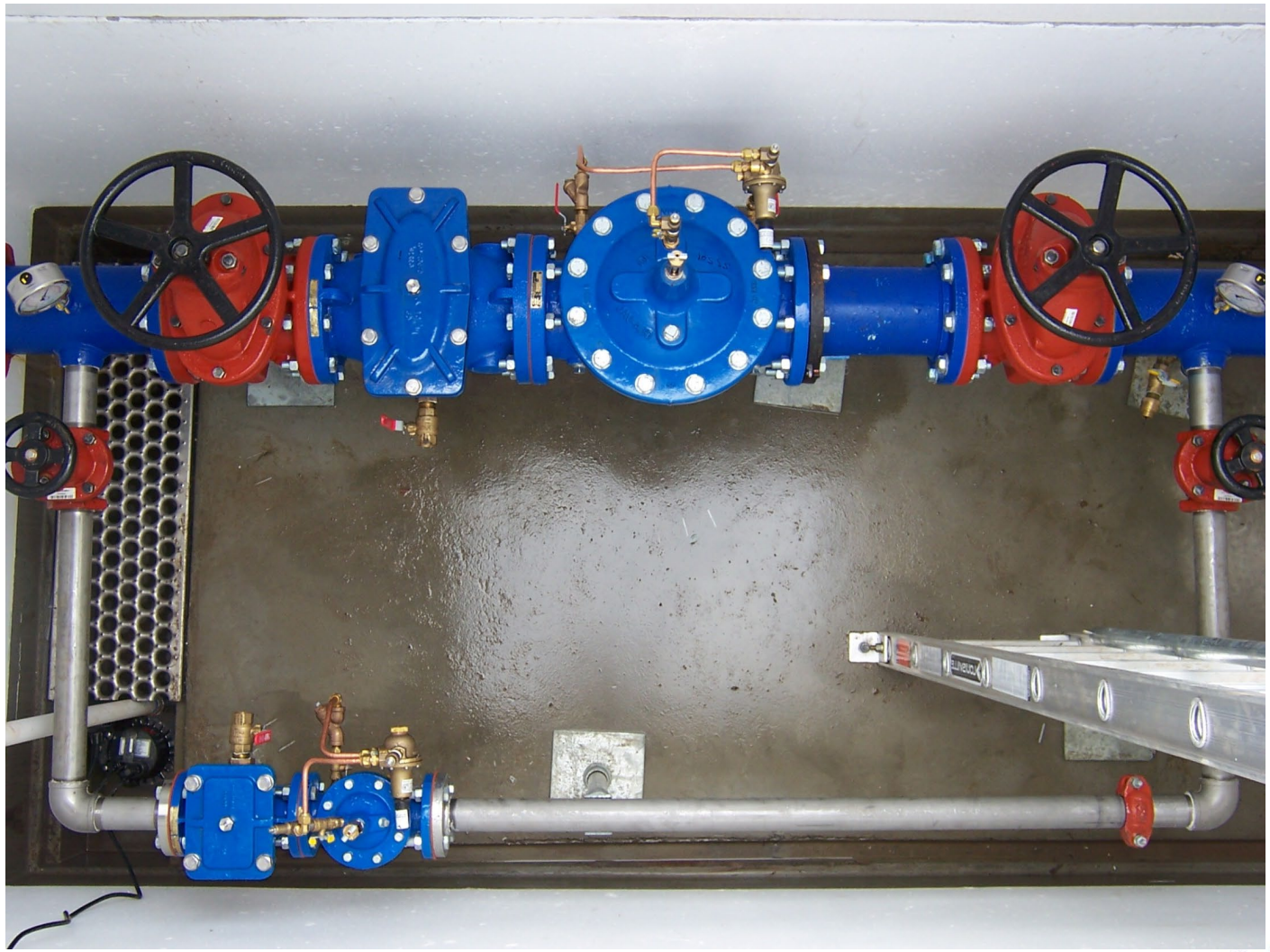
CRD Adjustment Ranges

Spring		
CRD-18	100 -------- 500	26 psi per turn
Green	30 ------- 300	27psi per turn
Black	20 ------- 105	13psi per turn
Red	15 ------- 75	9psi per turn

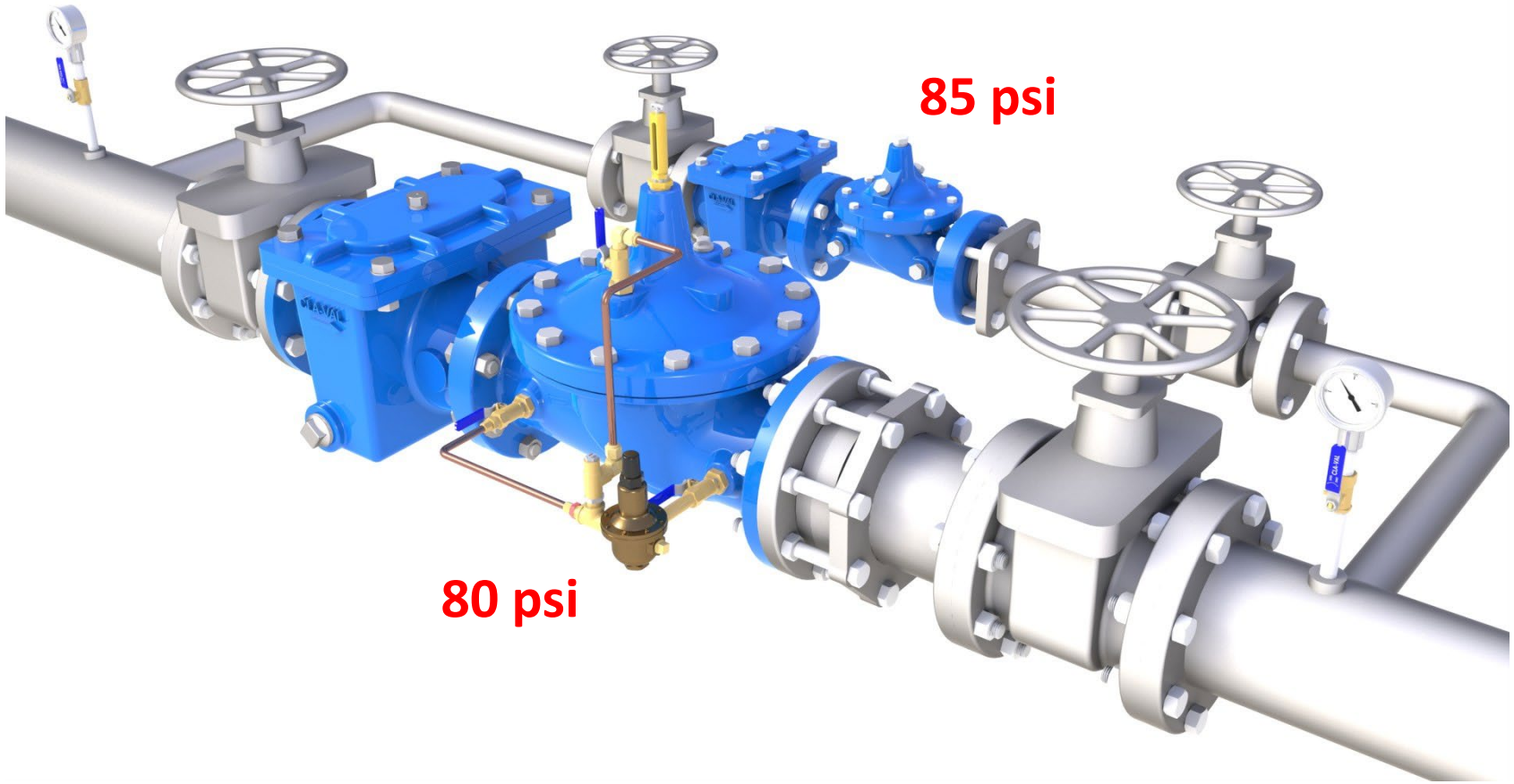
psi →

Pressure Reducing Bypass Design

Pressure Reducing Bypass Design



Coordinating Pressure Reducing Valves



Cimco-GC SYSTEMS

Bypass Advantages

- Individual valve sized for low and high demand
  - Allows them to specialize for optimal performance

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- No downtime when servicing
  - Isolate one for maintenance and flow through the other

Bypass Advantages

- Individual valve sized for low and high demand
  - Allows them to specialize for optimal performance
- No downtime when servicing
  - Isolate one for maintenance and flow through the other
- Built in Redundancy
  - Just in case…

Benefits of Standard Pressure Management

- Pressure is reduced to a usable pressure no matter the flow
- Fire flow pressures and capacity are maintained
- Automatic control
- Completely hydraulic, no power required
- Simple

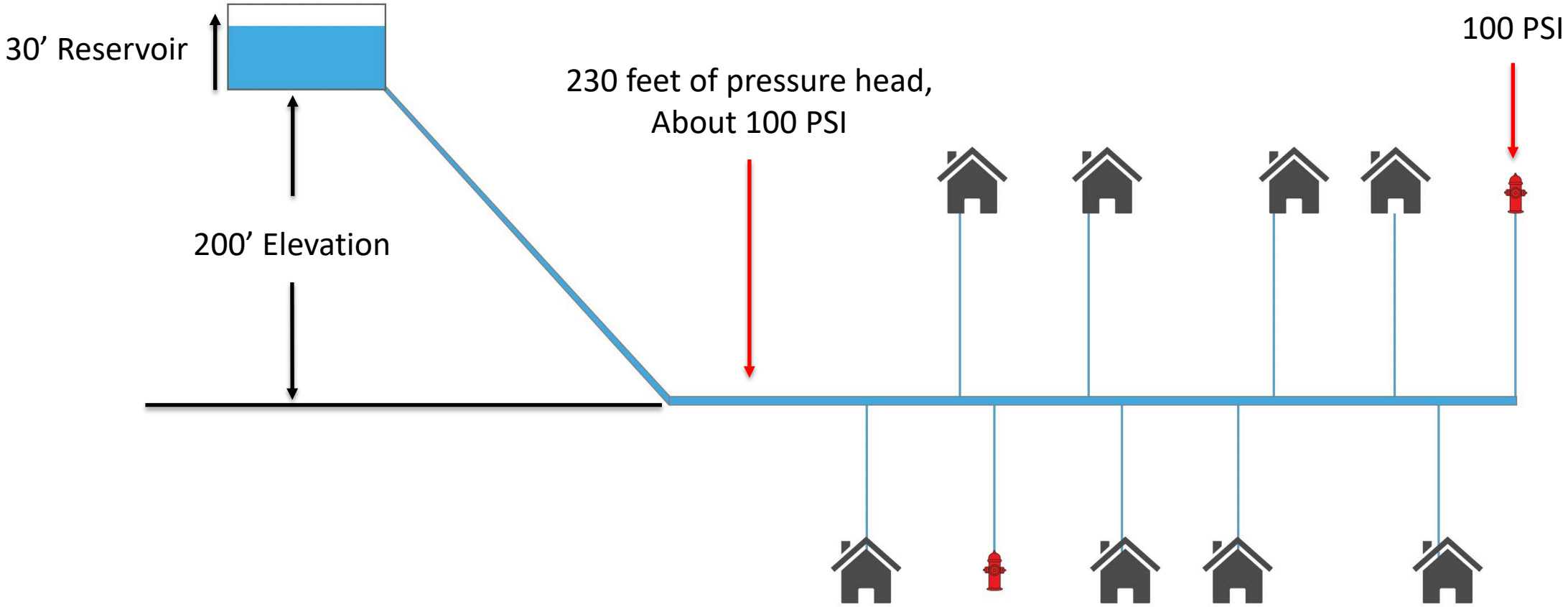
Drawbacks of Standard Pressure Management

- Effectively over-pressurizing the system all the time
  - Designed for max fire flow at the farthest service points
- Higher pressures lead to more leakage
  - Small leaks = high water loss over time
- Higher pressures can lead to more line breaks
  - Ends of zones especially can see daily pressure fluctuations adding stress to the pipeline

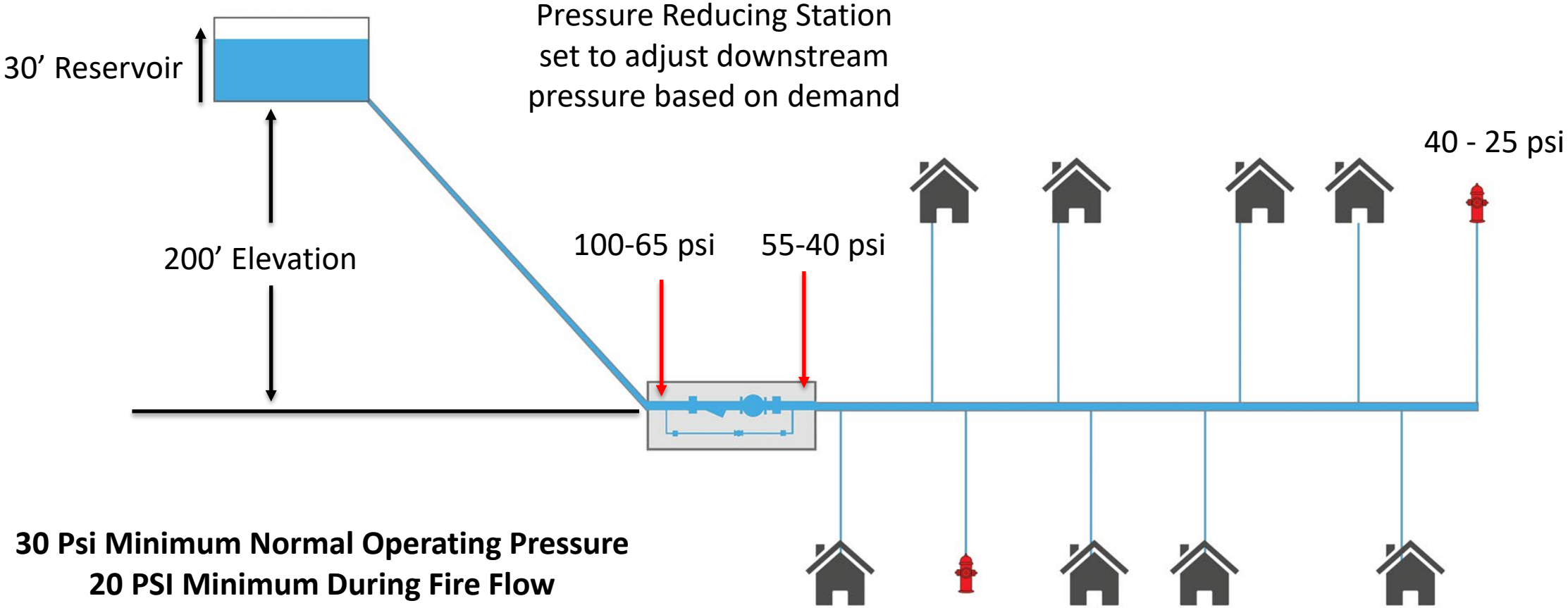
Pressure Management, cont

2. Active Pressure Management
   - Adjusting set points use case
   - Hydraulic Pressure Management Valve
   - Motorized Pilots
   - Solenoid Selected Dual Stage
   - Full Electronic controls
   - Flow Metering
   - Hydro Power Generation

Too Much Pressure!



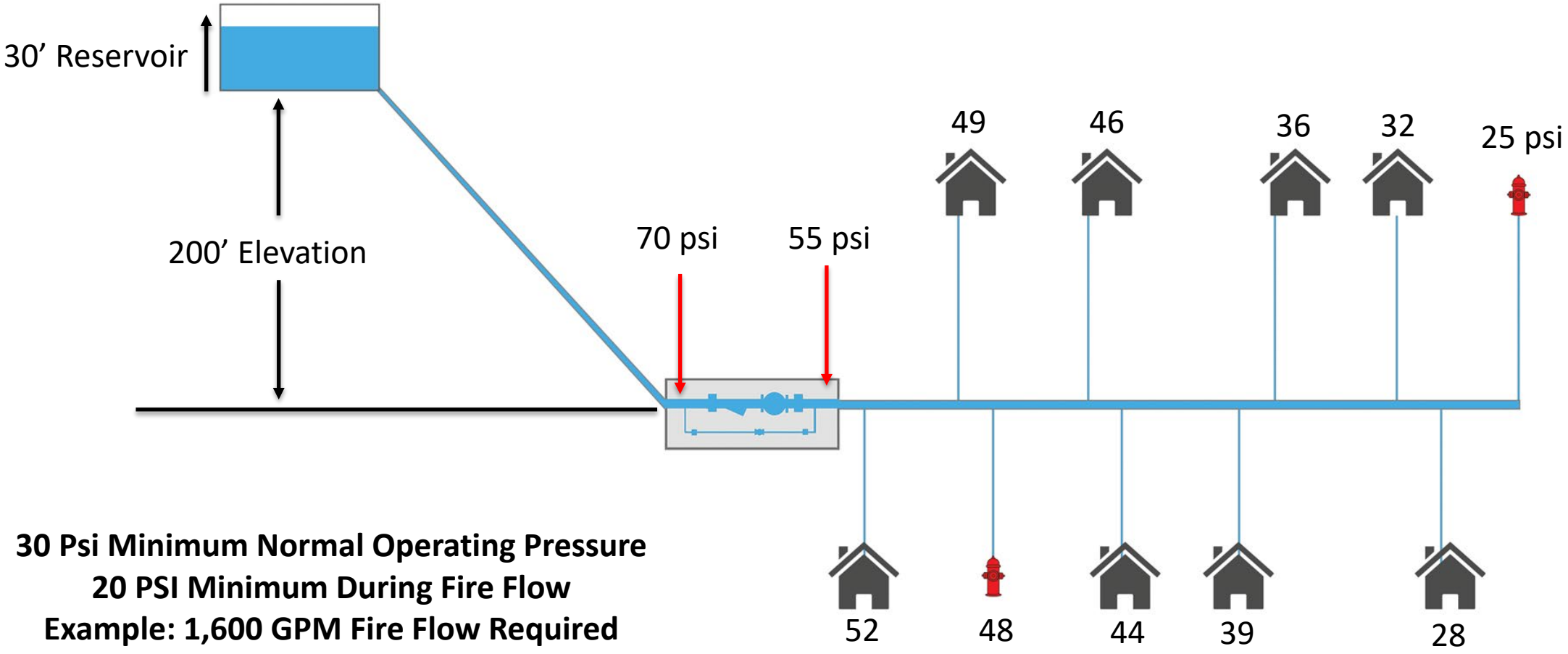
Active Pressure Management



30 Psi Minimum Normal Operating Pressure
20 PSI Minimum During Fire Flow
Example: 1,600 GPM Fire Flow Required

Cimco-GC SYSTEMS

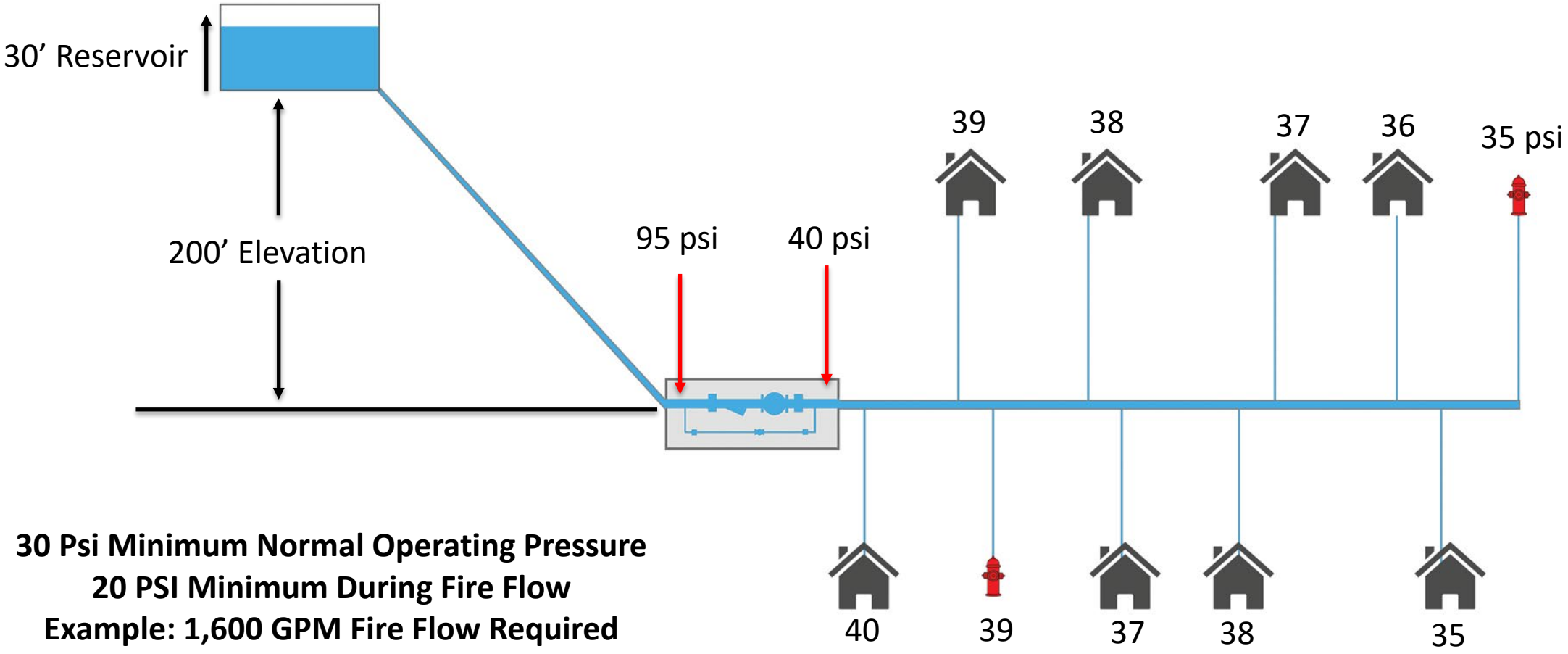
Active Pressure Management
- Fire Flow 1,600 gpm -



30 Psi Minimum Normal Operating Pressure
20 PSI Minimum During Fire Flow
Example: 1,600 GPM Fire Flow Required

Cimco-GC SYSTEMS

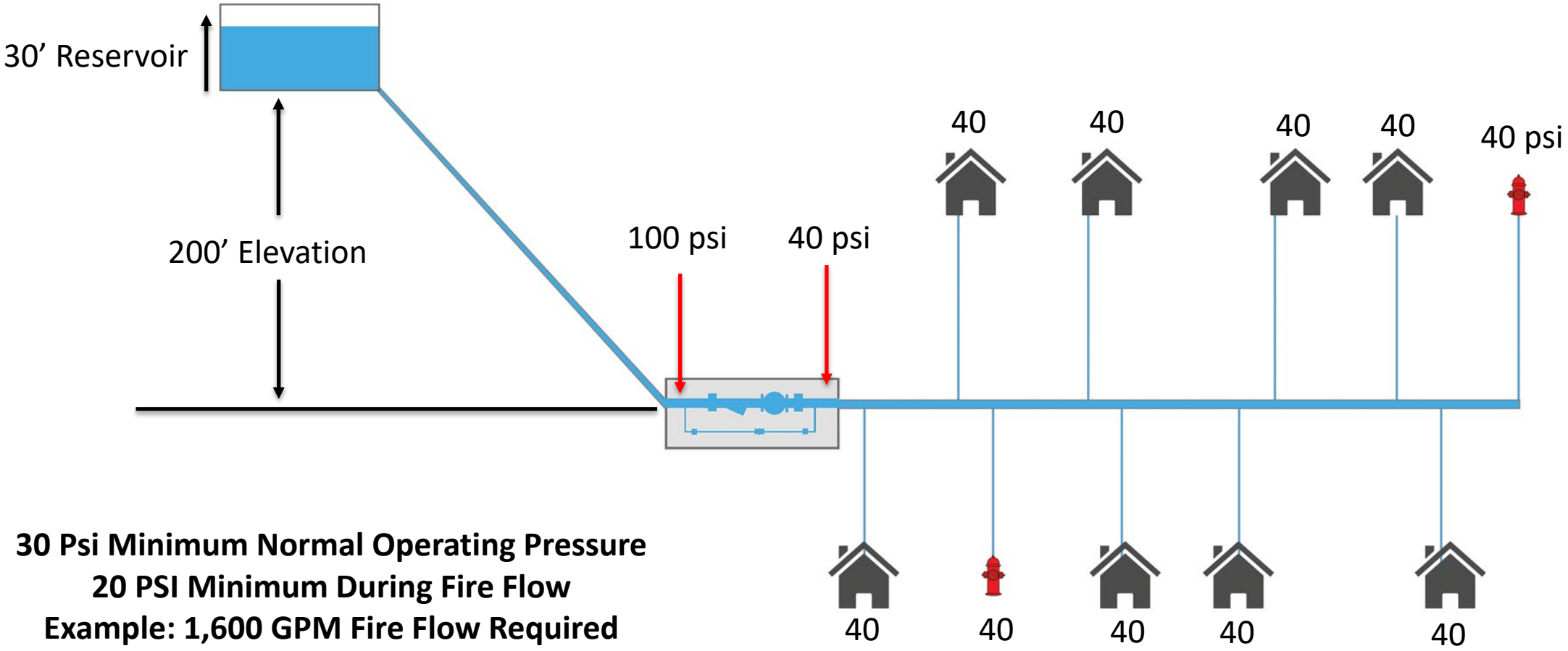
Active Pressure Management
- Peak Normal flow 200 gpm -



30 Psi Minimum Normal Operating Pressure
20 PSI Minimum During Fire Flow
Example: 1,600 GPM Fire Flow Required

Cimco-GC SYSTEMS

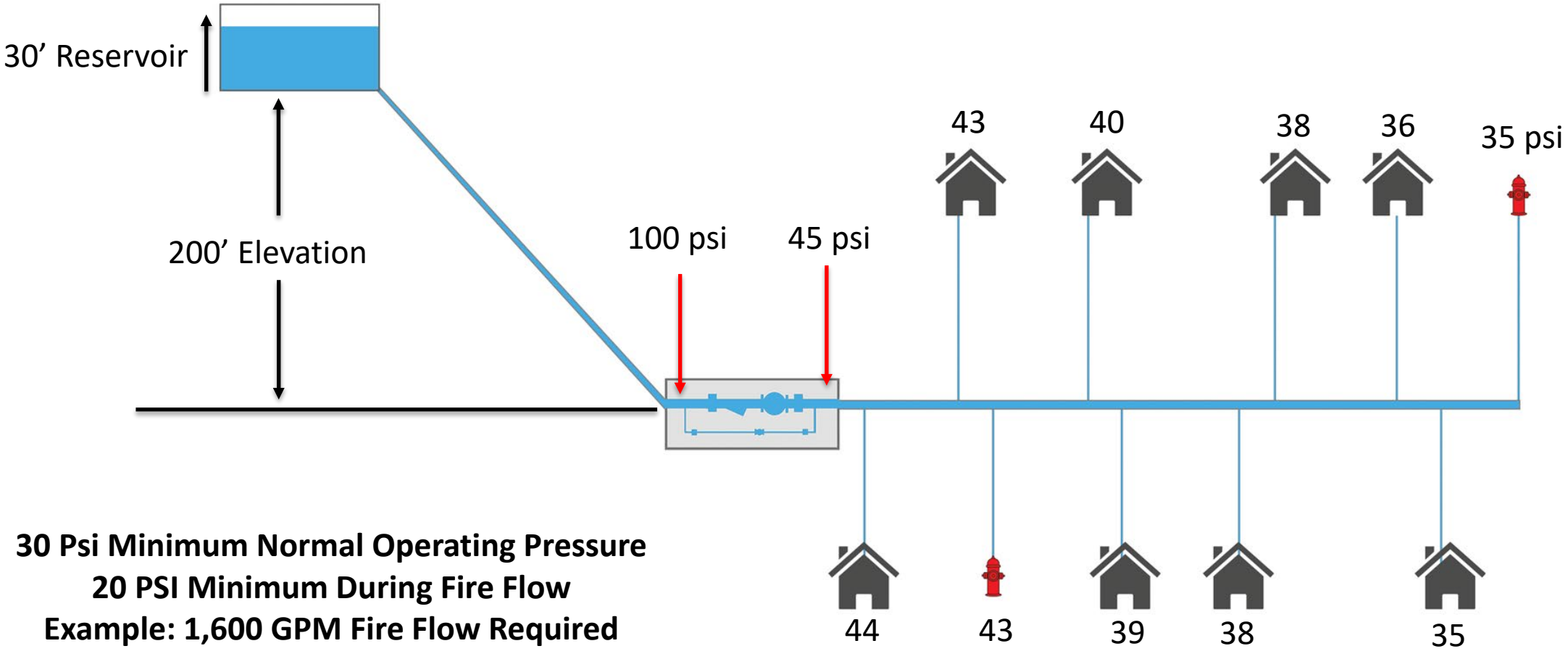
Standard Pressure Management
- Static -



30 Psi Minimum Normal Operating Pressure
20 PSI Minimum During Fire Flow
Example: 1,600 GPM Fire Flow Required

Cimco-GC SYSTEMS

Standard Pressure Management
- High Summer Demand: 500 gpm -



30 Psi Minimum Normal Operating Pressure
20 PSI Minimum During Fire Flow
Example: 1,600 GPM Fire Flow Required

Cimco-GC SYSTEMS

How to Execute Active Pressure Management

1. Hydraulic Pressure Management Valves
2. Electronic Actuated Pilots
3. Solenoid Selected Dual Stage
4. Full Electronic controls
    1. Flow Metering
    2. Hydro Power Generation

1. Hydraulic Pressure Management valves

Hydraulic Pressure Management Valve 98-06

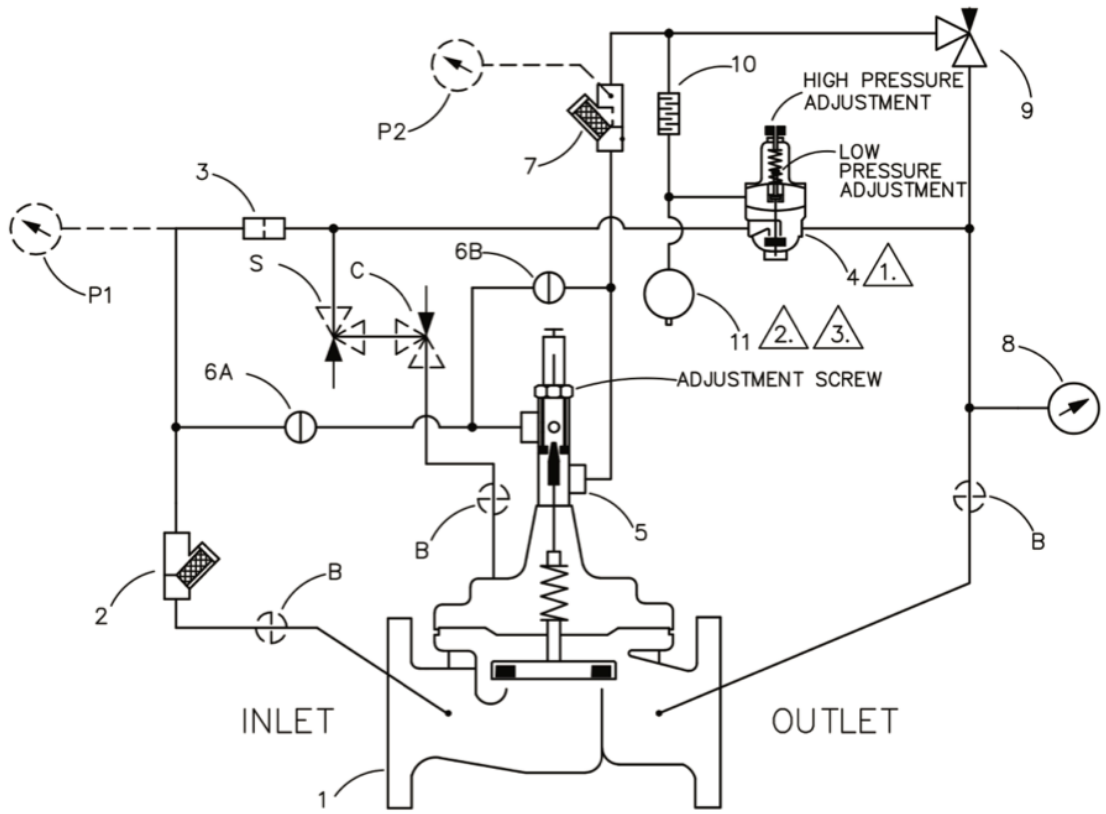
- Pressure reducing valve that maintains downstream pressure regardless of inlet pressure or flows

- Automatically shifts between two downstream pressure set points based on the valve position (indication of flow)

1. Hydraulic Pressure Management Valve 98-06

- Smooth transition between high and low set points
- Transition point between high and low set point is adjustable
- Retrofittable to standard pressure reducing valves

Hydraulic Pressure Management Valve
98-06



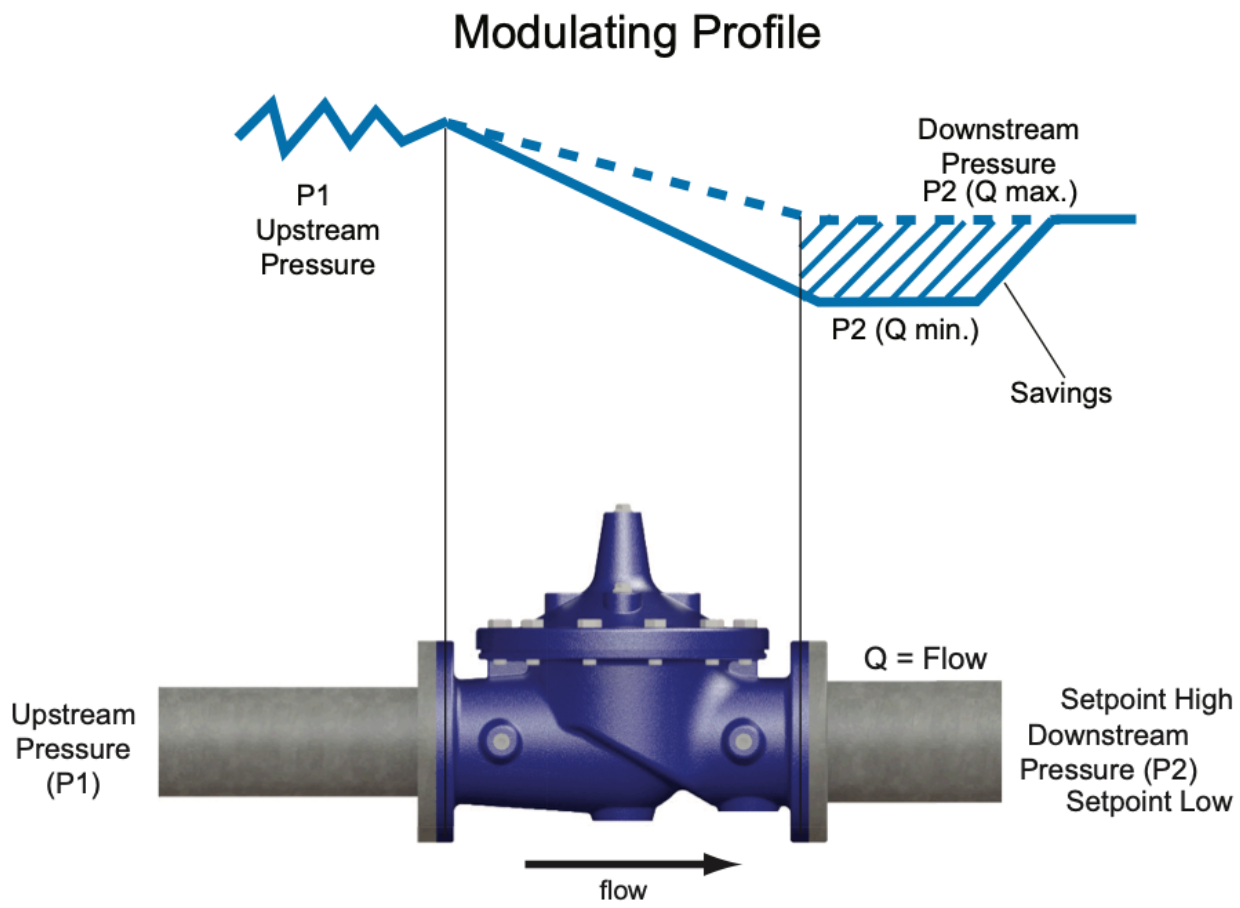
Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	X43 “Y” Strainer
3	X58C Restriction Assembly
4	CPM-A Pressure Management Control
5	X78-4 Stem Assembly + X101 Valve Position Indicator Assembly
6	CK2 Isolation Valve
7	X44A Strainer Orifice Assembly
8	X141 Gage Assembly
9	CV Speed Control
10	X58E Restriction Assembly
11	Accumulator (Air Charged)

Optional Features

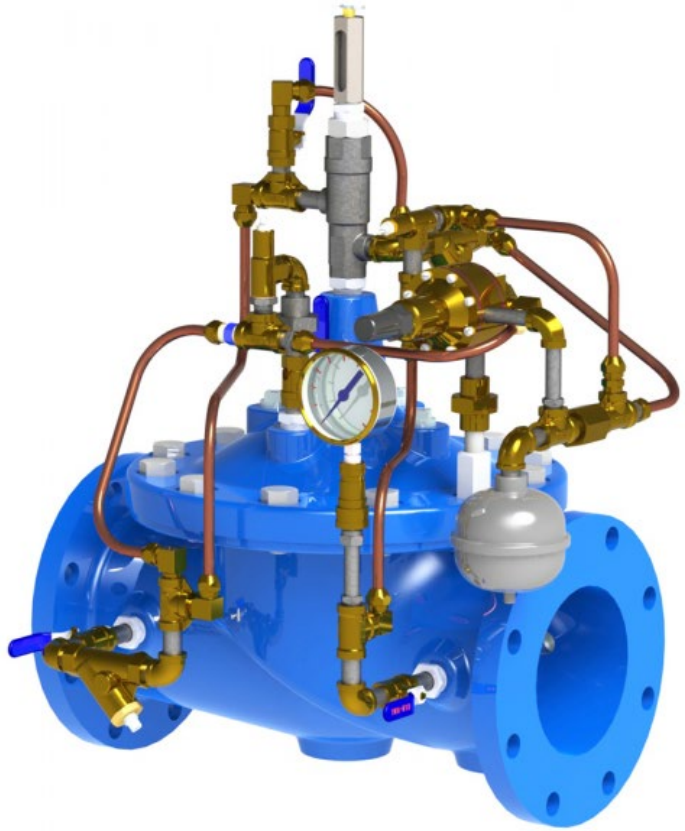
Item	Description
B	CK2 Isolation Valve
C	CV Flow Control (Closing)
P	X141 Gage Assembly
S	CV Flow Control (Opening)

Hydraulic Pressure Management Valve 98-06



Hydraulic Pressure Management Valve 98-06

- Pros:
  - Automatic
  - Hydraulic, no power needed
- Cons:
  - Complicated
  - More Expensive than 90-01
  - Harder to maintain
  - No remote control

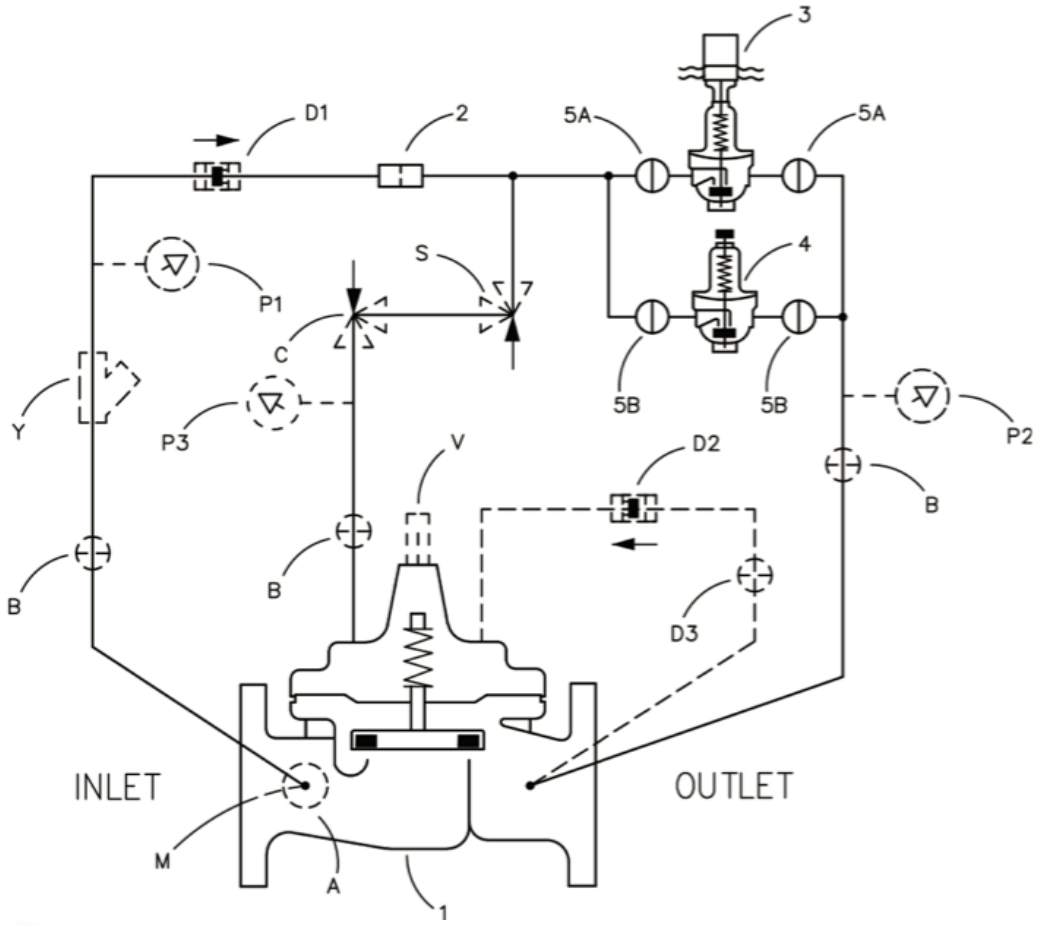


2. Electronic Actuated Pilots

Motorized Pilots

- Electronically change the set point of hydraulic pilots
- Same hydraulic pilot function, with motor actuated set screw adjustment

390-07 Electronic Actuated Pressure Reducing Valve



Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	X58C Restriction Fitting
3	CRD-34 Electronic Pressure Reducing Control
4	CRD Pressure Reducing Control
5	CK2 Isolation Valve

Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
C	CV Flow Control (Closing)
D	Check Valves with Isolation Valve
P	X141 Pressure Gauge
S	CV Flow Control (Opening)
V	X101 Valve Position Indicator
Y	X43 "Y" Strainer

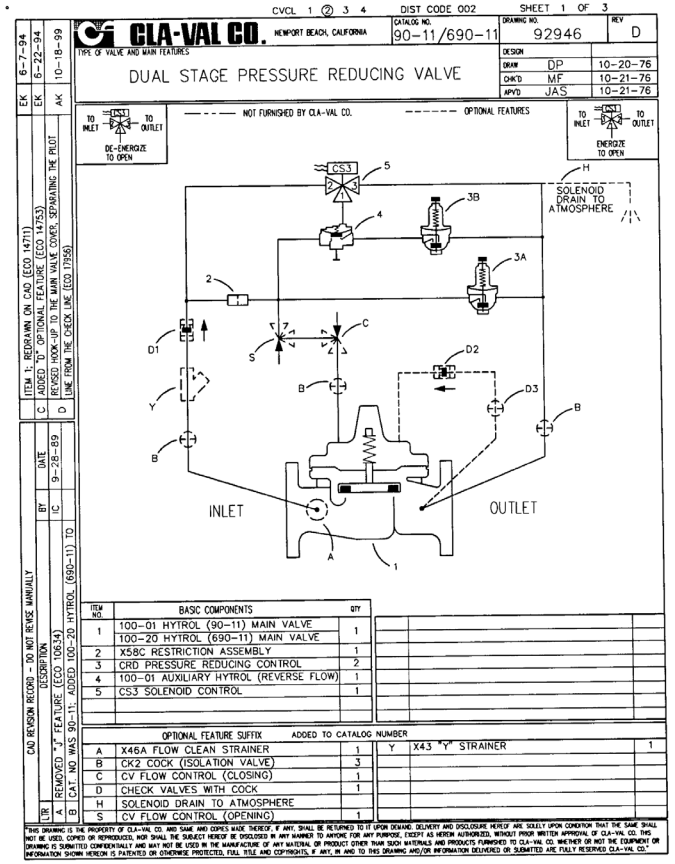
390-07 Electronic Actuated Pressure Reducing Valve

- Pros:
  - Reliable Hydraulic Control (Fails at last pressure set point on power loss)
  - Same repair parts as 90-01
  - Full adjustability
- Cons:
  - Requires power
  - Requires controller/SCADA to tell when to change set points
  - Slightly more expensive than 90-01

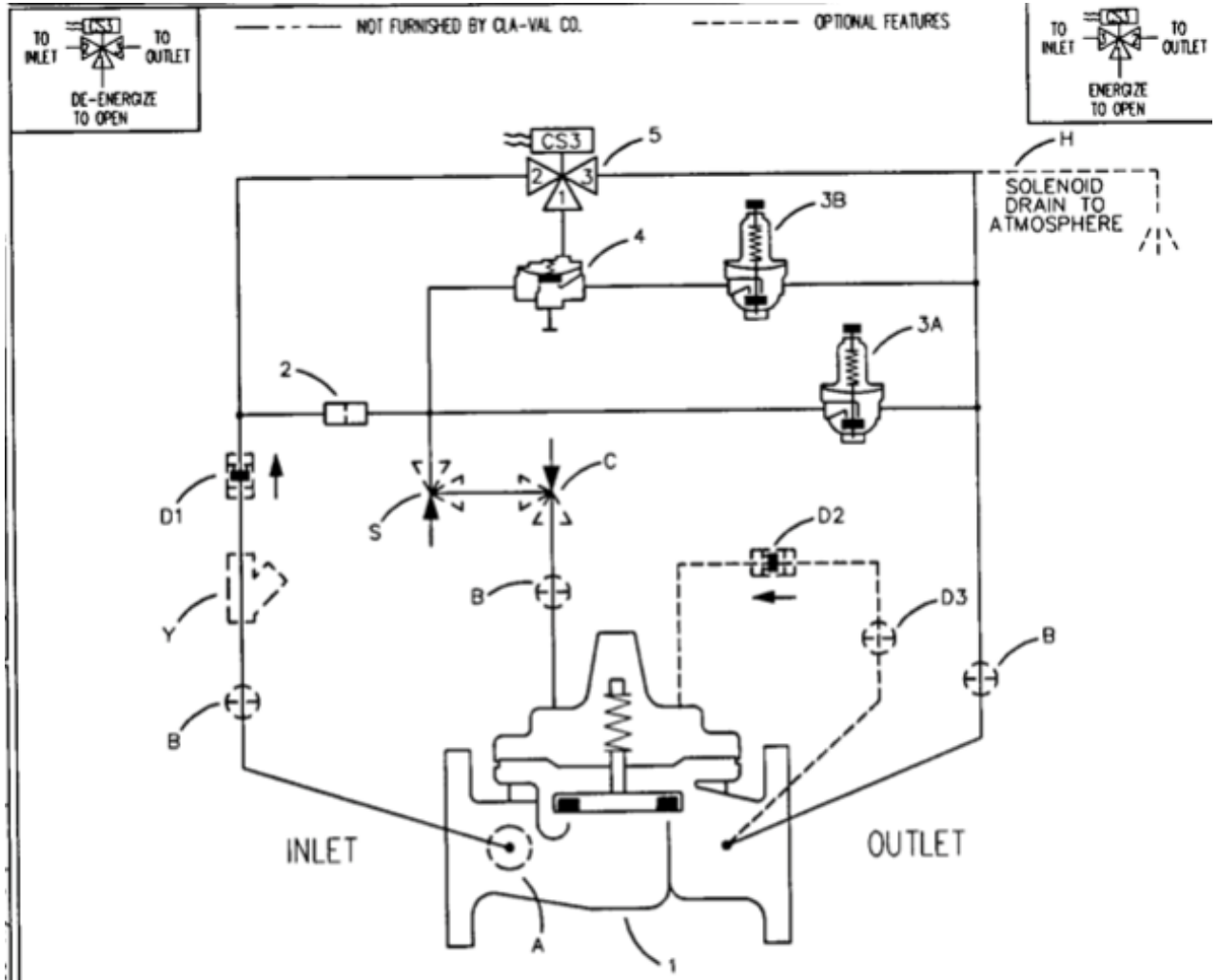
3. Solenoid Selected

3. Solenoid Selected Dual Stage

- Two CRD's (or more) set at different set points
- Higher CRD can be cut off by a solenoid control, reducing the valve's set point to the lower CRD



90-11 Dual Stage Pressure Reducing Valve



ITEM NO.	BASIC COMPONENTS	QTY
1	100-01 HYTROL (90-11) MAIN VALVE 100-20 HYTROL (690-11) MAIN VALVE	1
2	X58C RESTRICTION ASSEMBLY	1
3	CRD PRESSURE REDUCING CONTROL	2
4	100-01 AUXILIARY HYTROL (REVERSE FLOW)	1
5	CS3 SOLENOID CONTROL	1

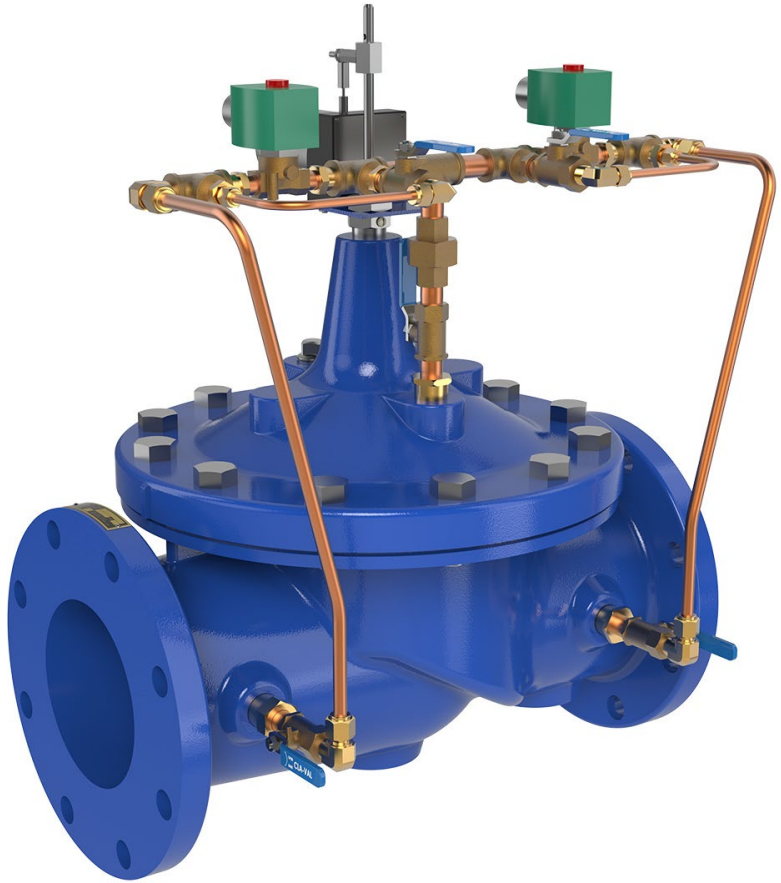
	OPTIONAL FEATURE SUFFIX	ADDED TO CATALOG
A	X46A FLOW CLEAN STRAINER	1
B	CK2 COCK (ISOLATION VALVE)	3
C	CV FLOW CONTROL (CLOSING)	1
D	CHECK VALVES WITH COCK	1
H	SOLENOID DRAIN TO ATMOSPHERE	
S	CV FLOW CONTROL (OPENING)	1

90-11 Dual Stage Pressure Reducing Valve

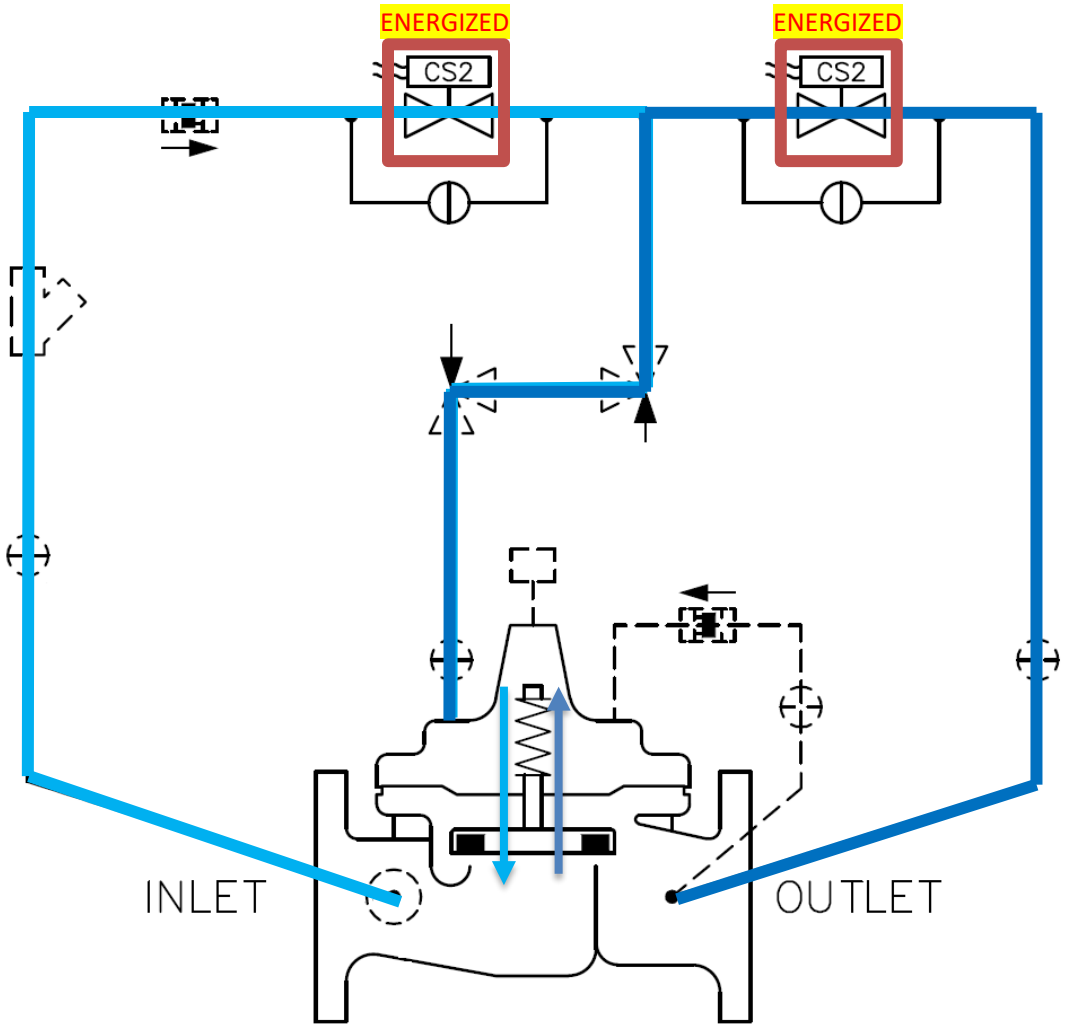
- Pros:
  - Reliable Hydraulic Control (Can be set to fail on power loss to the high pressure or low pressure set point)
  - Same repair parts as 93-01
- Cons:
  - Requires power
  - Requires controller/SCADA to tell when to change set points
  - Slightly more expensive than 90-01
  - Limited set point options

4. Full Electronic Controls

Multi-Solenoid Control Valves



Electronic Dual Solenoid Control Valve

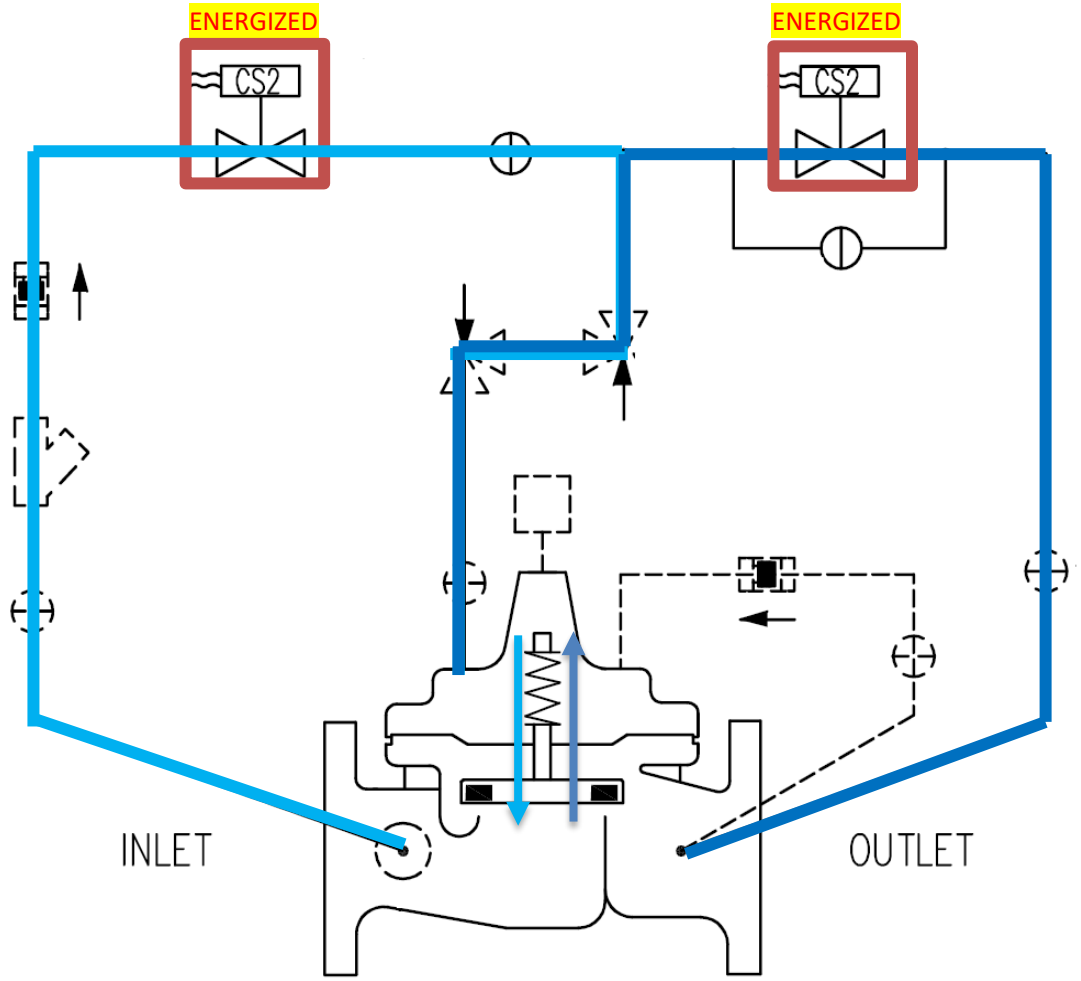


- Normally Closed Closing Solenoid
- Normally Closed Opening Solenoid

Therefore

Fail Last Position on Power Loss

Electronic Dual Solenoid Control Valve



- Normally Open Closing Solenoid
- Normally Closed Opening Solenoid

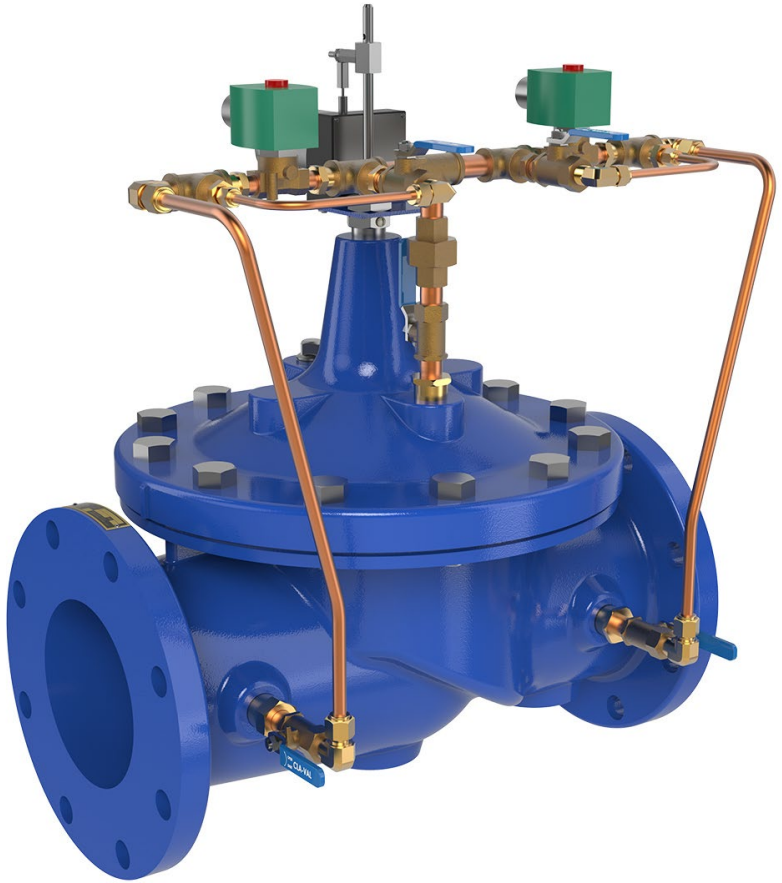
Therefore

Fail Closed Position on Power Loss

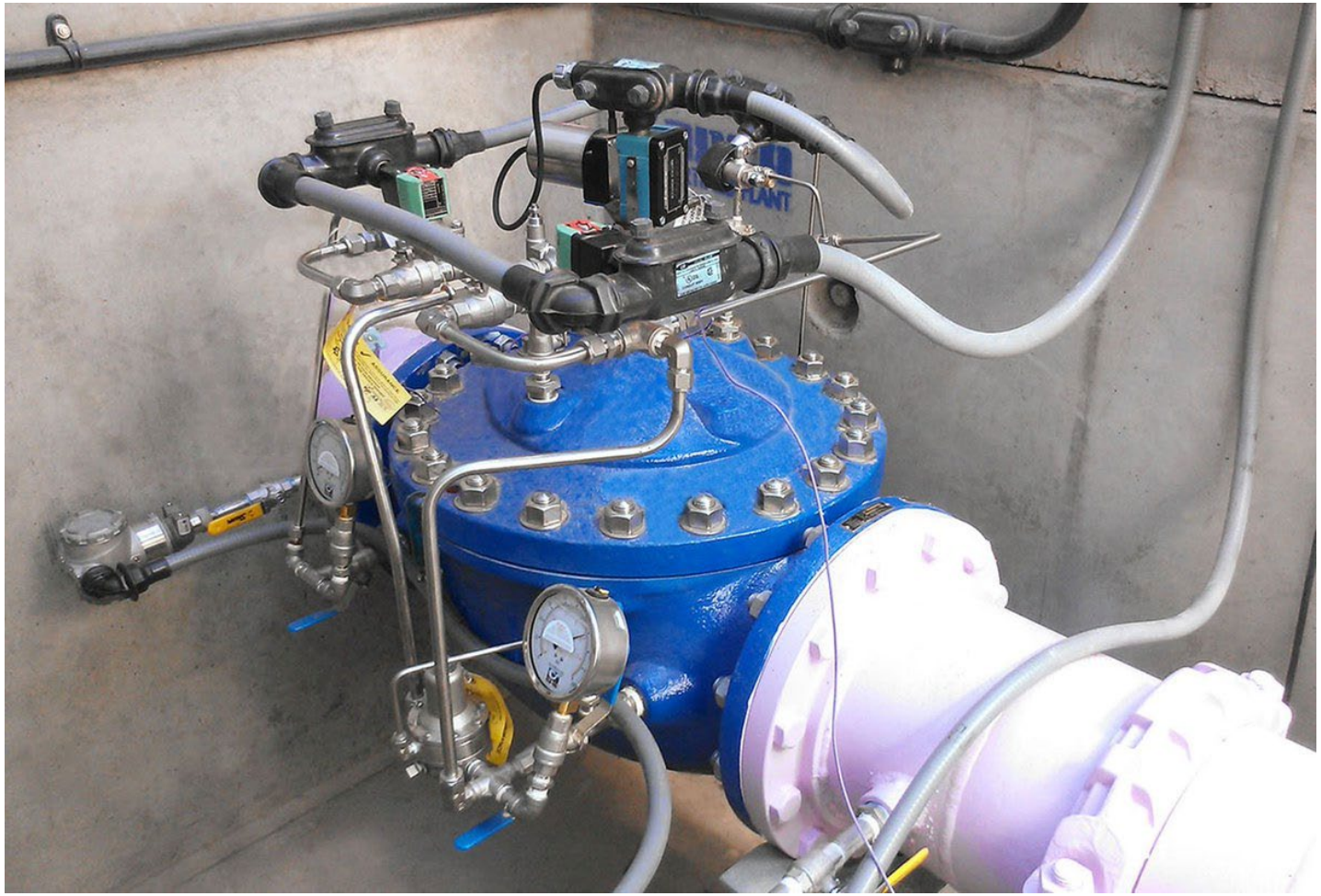
Multi-Solenoid Control Valves

The “Swiss Army Knife” of electronic controls

- Coordination of opening and closing solenoids allows modulation
- Capable of pressure reducing, pressure sustaining, flow control, level control
- **Often called Electronic Interface**



Hybrid Dual Solenoid Valves

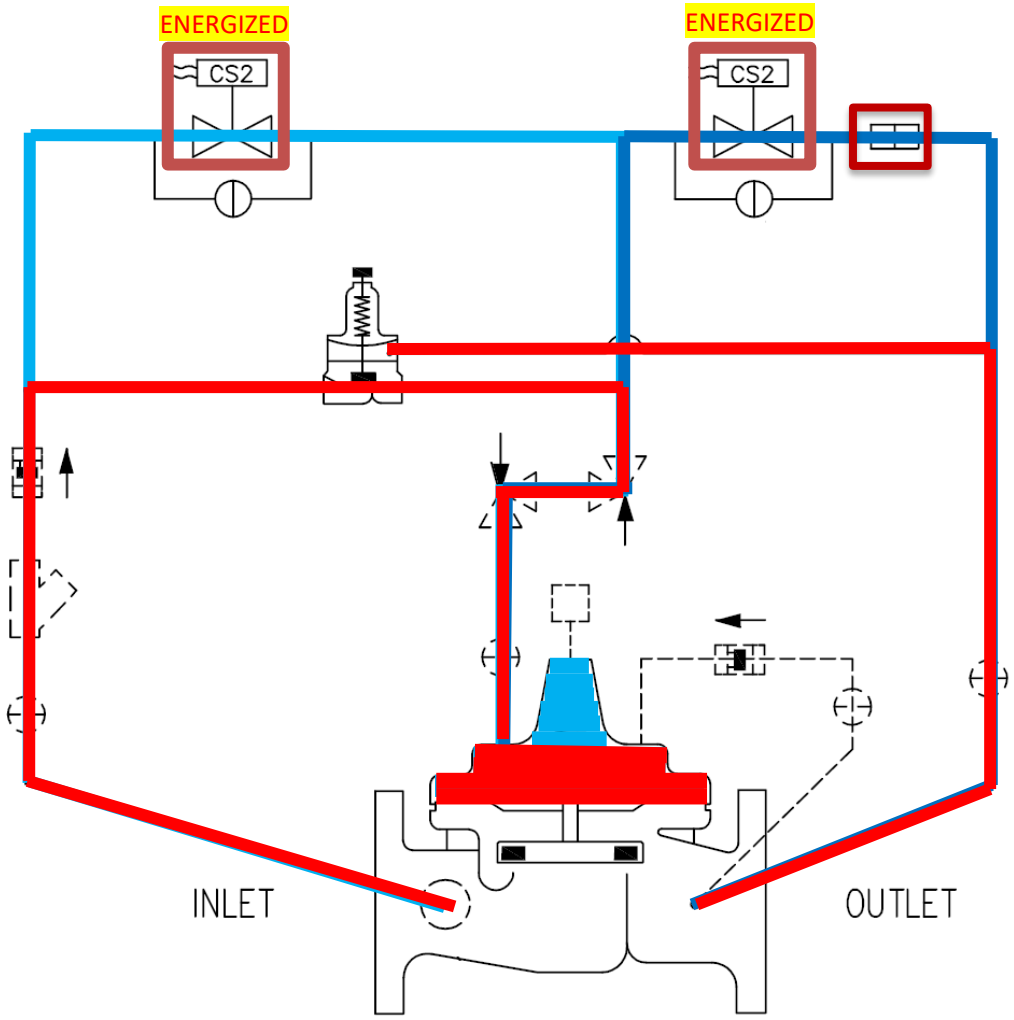


Hybrid Dual Solenoid Valves

The two main ways the hydraulic pilots and electronic controls interact:

1. Hydraulic Override
2. Solenoid Selected

Hydraulic Override Dual Solenoid Control Valve

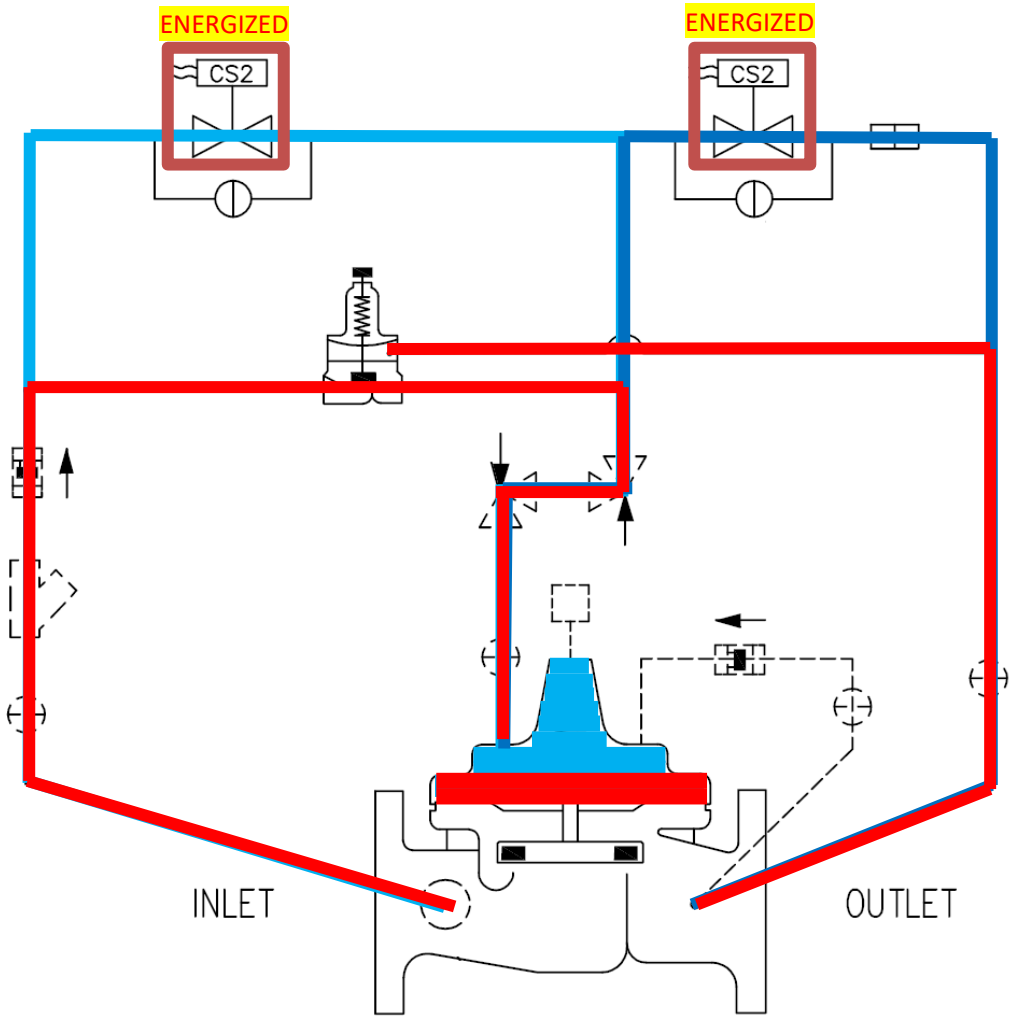


- Normally Closed Closing Solenoid
- Normally Closed Opening Solenoid
- Downstream Pressure Override Always Active

Therefore

Fail Last Position on Power Loss w/ Hydraulic Downstream Pressure Override

Hydraulic Override Dual Solenoid Control Valve

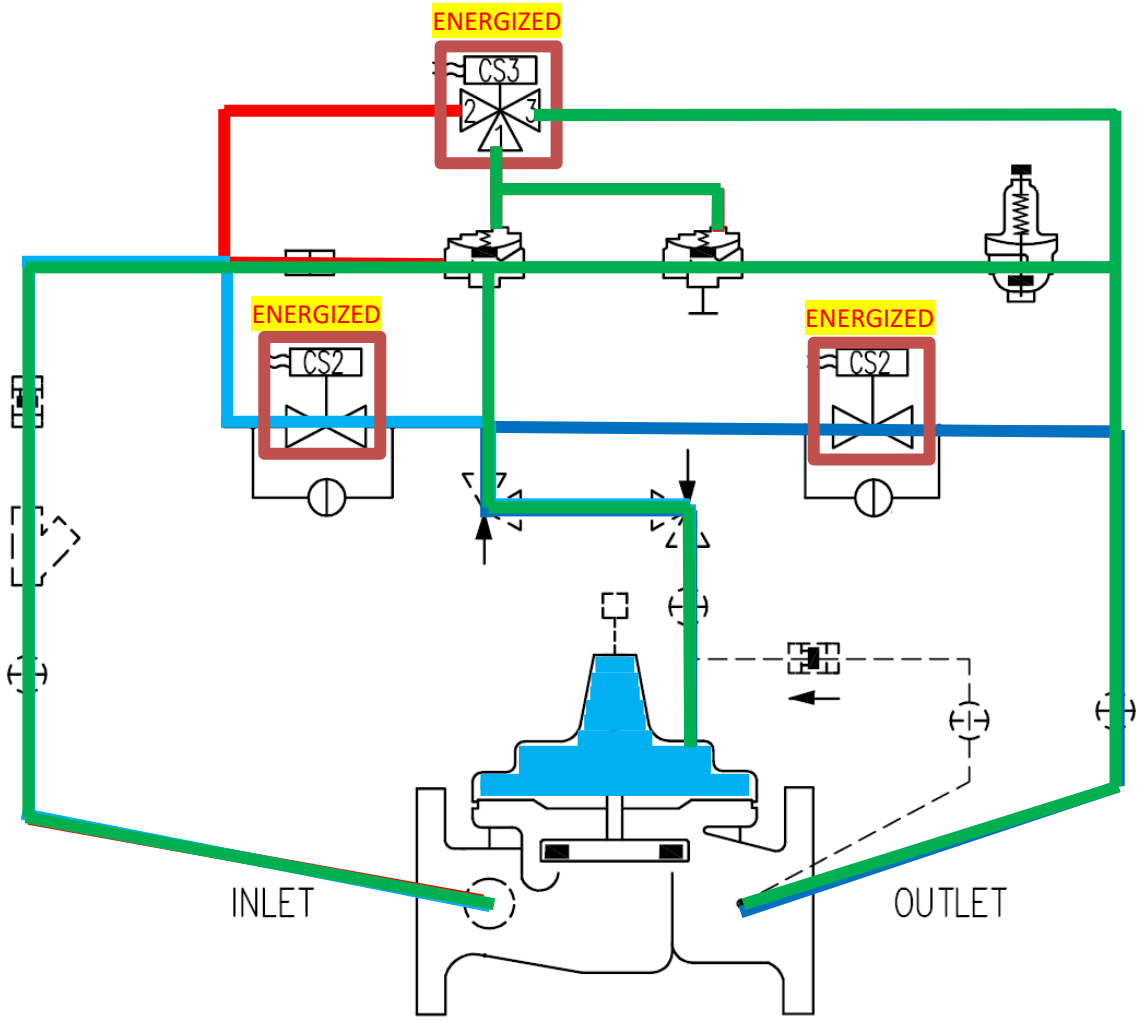


- Normally Closed Closing Solenoid
- Normally Closed Opening Solenoid
- Downstream Pressure Override Always Active

Therefore

Fail Last Position on Power Loss w/ Hydraulic Downstream Pressure Override

Solenoid Selected Dual Solenoid Control Valve



- Normally Closed Closing Solenoid
- Normally Closed Opening Solenoid
- Normally Open Hydraulic Override Solenoid
  - Energize during standard operation to disable hydraulic mechanical system

Therefore

Fail to Hydraulic Pressure Reducing on Power Loss

Pros and Cons of Hydraulic Override

+ Constant hydraulic oversight
+ Control on power loss

- Hydraulic pilots limit electronic controls
- Hydraulic pilots not remotely controlled

Pros and Cons of Solenoid Selected

+ Hydraulic system takes over operation on power loss
+ Full electronic control, hydraulic pilots will not interfere

- No hydraulic oversight while solenoids are powered

Combinations Upon Combinations

You can combine hydraulic override, solenoid selected, and even motorized pilots!

Flow Metering

Flow Metering

Flow Metering Options:

1. Mag Meter
2. X144 Insertion Meter
3. Differential Metering

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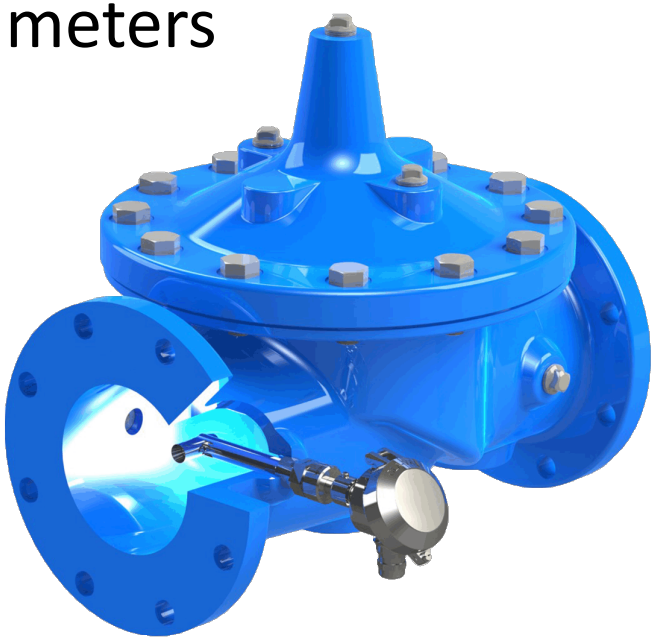
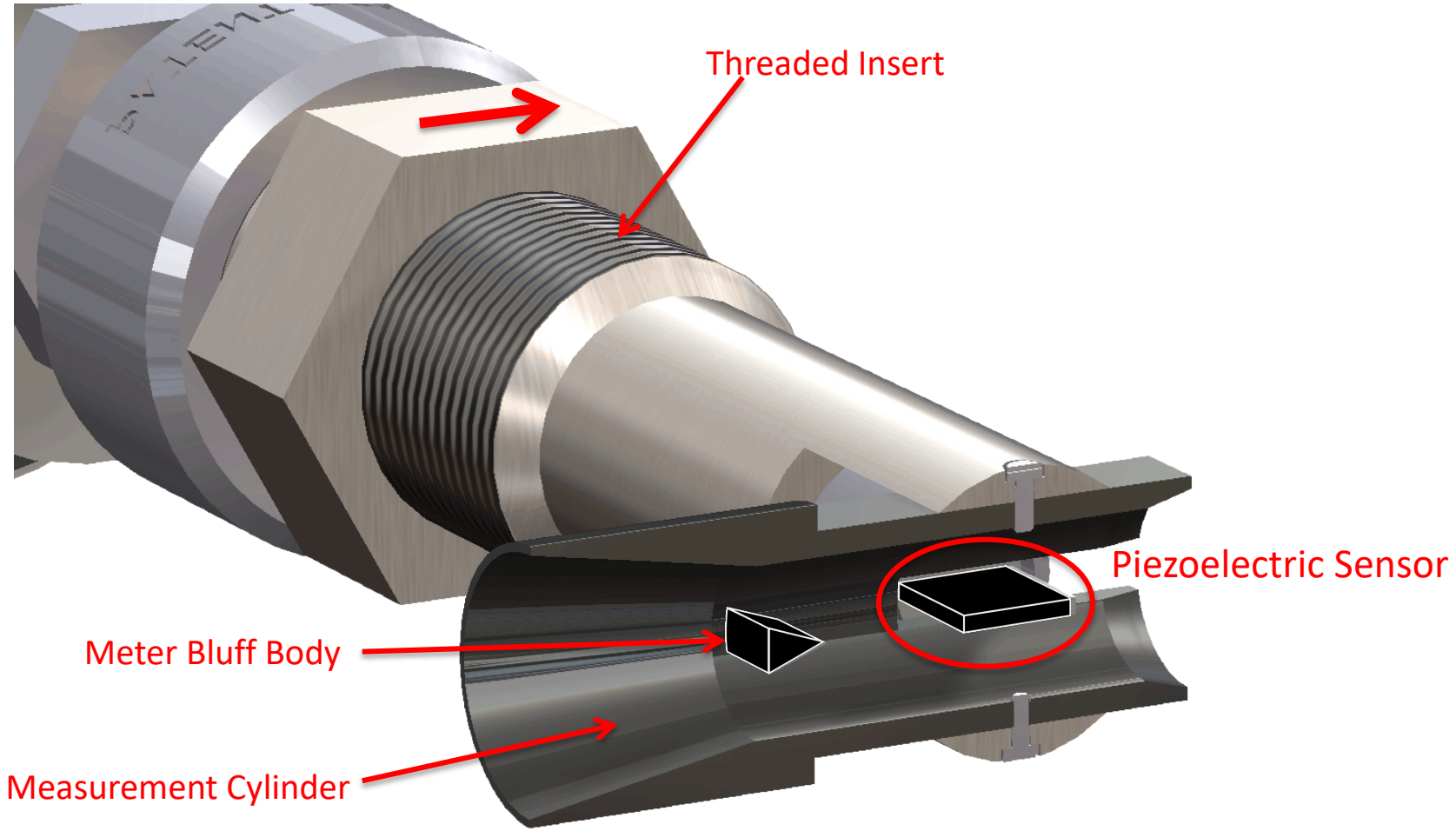
X144 e-FlowMeter

- Accuracy of +/- 2% of Full Scale
- Can be used in areas not normally suited for flow meters
  - Pipe reducers
  - Elbows
  - Downstream of Gate Valves



An Inside look at the X144 e-FlowMeter

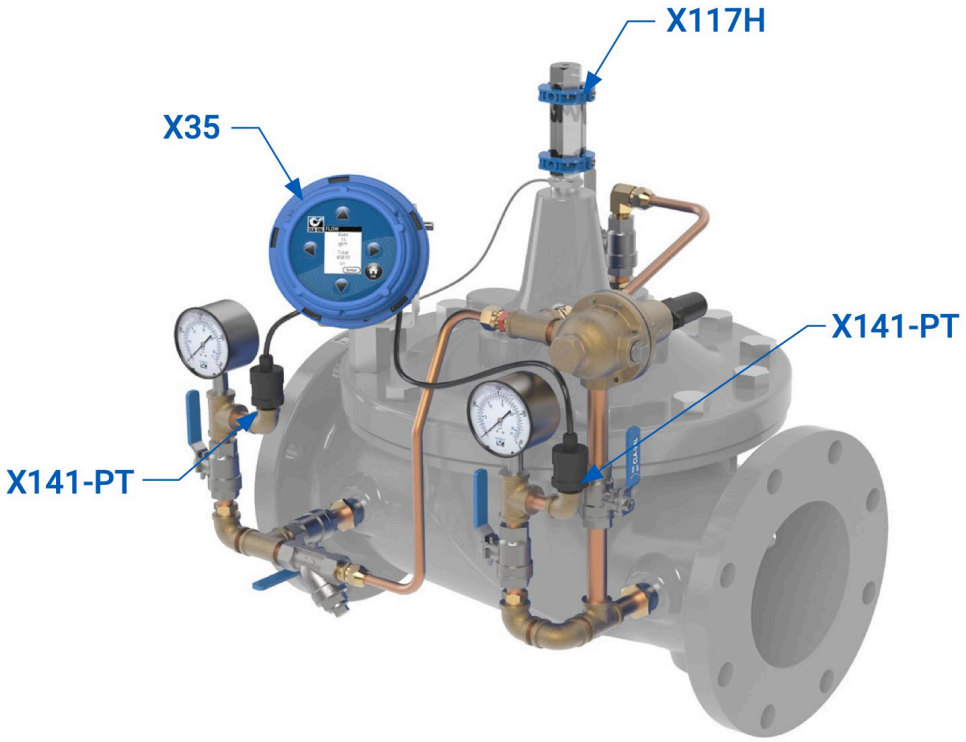


X144 Features

- Turns any Cla-Val Control Valve into a meter
- Simple retrofit: simply insert, orient and lock
- Compact: Requires very little space to provide complete metering capabilities
- Accurate flow measurement
- Adds metering capability to an existing Valve without disrupting the valve's original hydraulic or electronic function

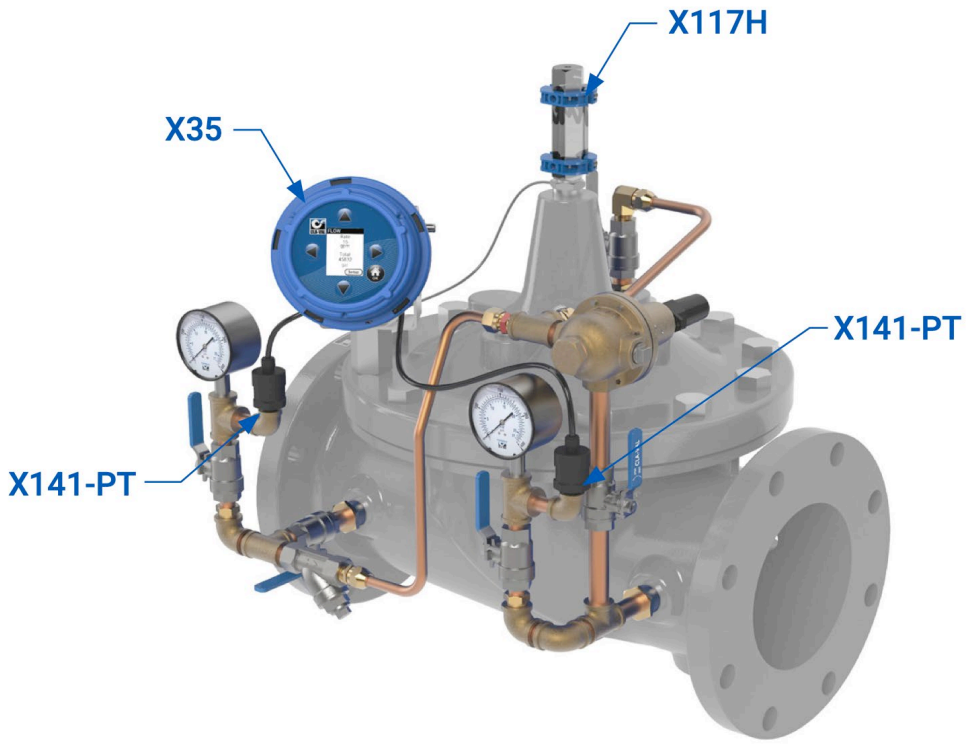
XP2F Metering Package

- Calculates flow based on pressure differential and valve position
- Package includes:
  - (2) X141-PT Pressure transmitters
  - (1) X117H Position Transmitter
  - (1) X35 Flow Module



Data Acquisition Valve

- X35 calculates flow and retransmits with 4-20mA signal
- Can also retransmit valve position, upstream pressure, and downstream pressure with 4-20mA
- X35 can data log and output to USB Drive



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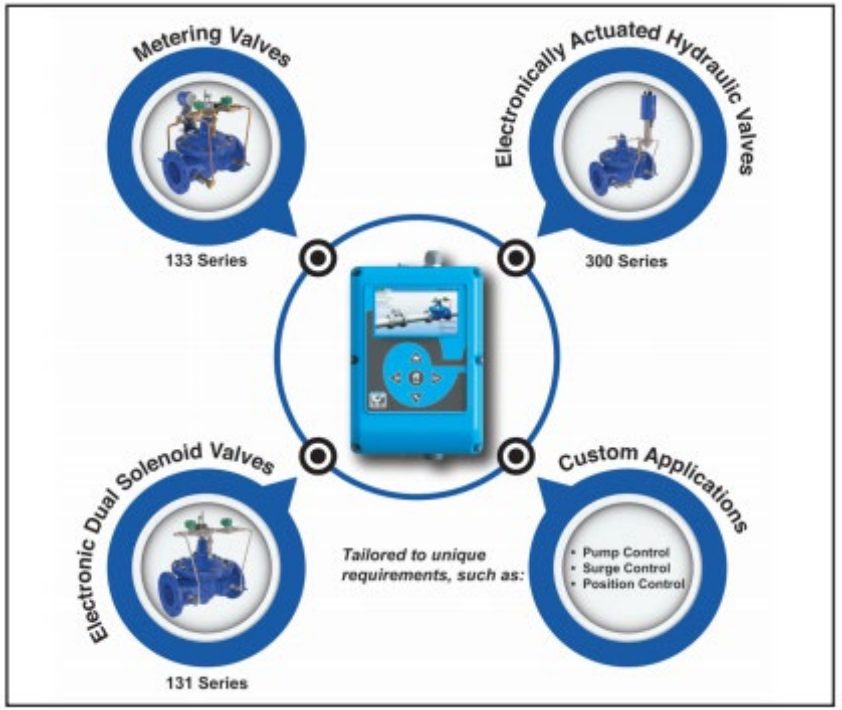
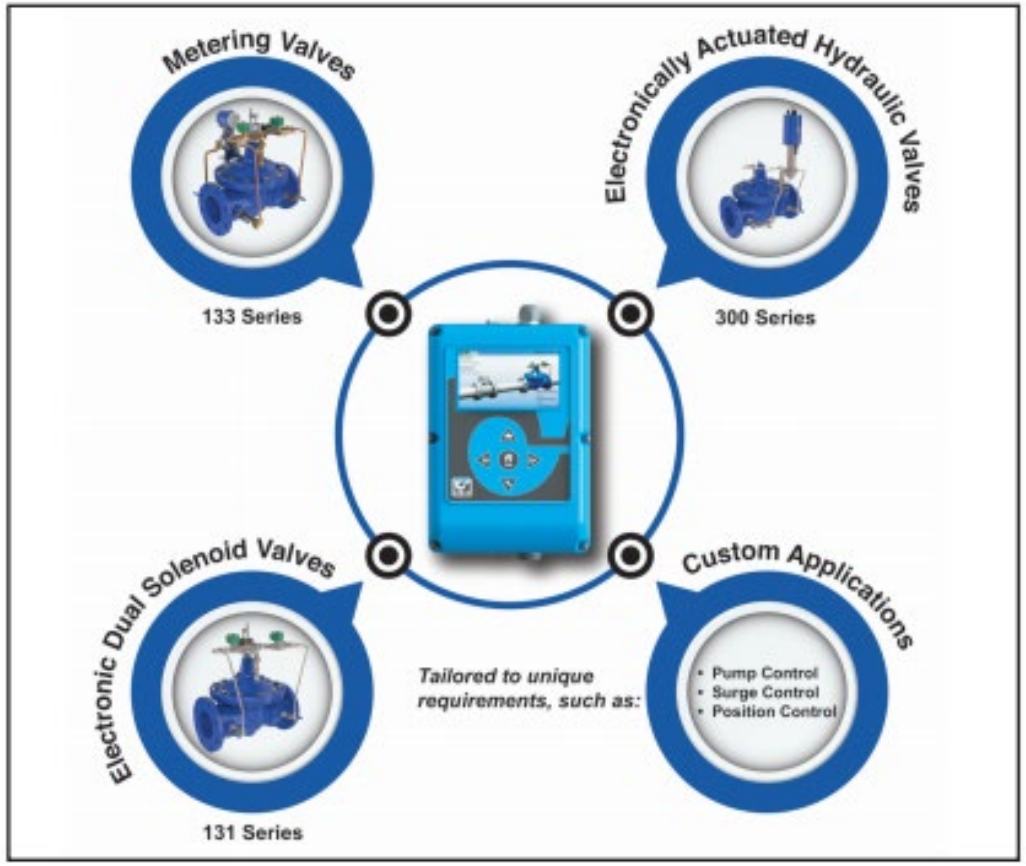
Electronic Valve Controller



Electronic Valve Controller

- A versatile Multi Purpose Controller
  - Control Electronic Pilots
  - Control Solenoid Control Valves
    - Flow, Pressure, Position, Level, Surge & Pumps;
  - Control & Calculate Flow Metering Valve
- Programmed with Standard or Custom ValvApps



How to Power Remote Sites

X143IP and X143MP Power Generators

Tap into the power within…your valve

Cimco-GC SYSTEMS

X144 powered by Cla-Val
X143IP Generator – Newport Beach

X144 e-FlowMeter

X143IP Intermediate Power Generator

Generates up to 14 watts power for:

- Electronic Control Valves
- Electronically Controlled Pilots
- Communications Equipment
- Products that capture and store information

X143MP Micro Power Generator

- Uses the hydraulic energy of the system to generate power
- Retrofits to an existing Cla-Val Control Valve
- Ideal for isolated locations and confined spaces
- Generates .7 watts of power to operate onsite equipment such as:
  - Cell phones and GSM communication devices
  - Data loggers that capture and store information

Conclusion

Advantages of Active Pressure Management

- Reduce pressures in the system when not flowing high flows
- Reduces leakage and Non-revenue water loss
- Reduces the Likelihood Breaks
- When integrated with flow metering provides system data, leak detection, & control.

Drawbacks of Active Pressure Management

- More complicated
- Multi-feed zones need to be balanced
- Usually requires power
- $$ investment

Electronic Control Valves

From **Reactive to Proactive**

- Level out flows for system efficiency
- Improve water quality
- Early warning and reaction to leaks
- Monitor pressures and flows
- Seismic reaction protocols

Why Electronic Controls?

- Enhance the functionality of your automatic control valves.
  - Bring a remote site “Online” and know what's happening at all times
- Combine the efficiency of hydraulic control with advanced technology electronics
  - Provide optimum waterworks control solutions and asset management
- Communicate system data acquisition, performance data & control to remote locations
- Provide power to remote sites with hydro power generators

Cimco-GC
SYSTEMS

How to Conserve Water with Electronic Control Valves and Active Pressure Management