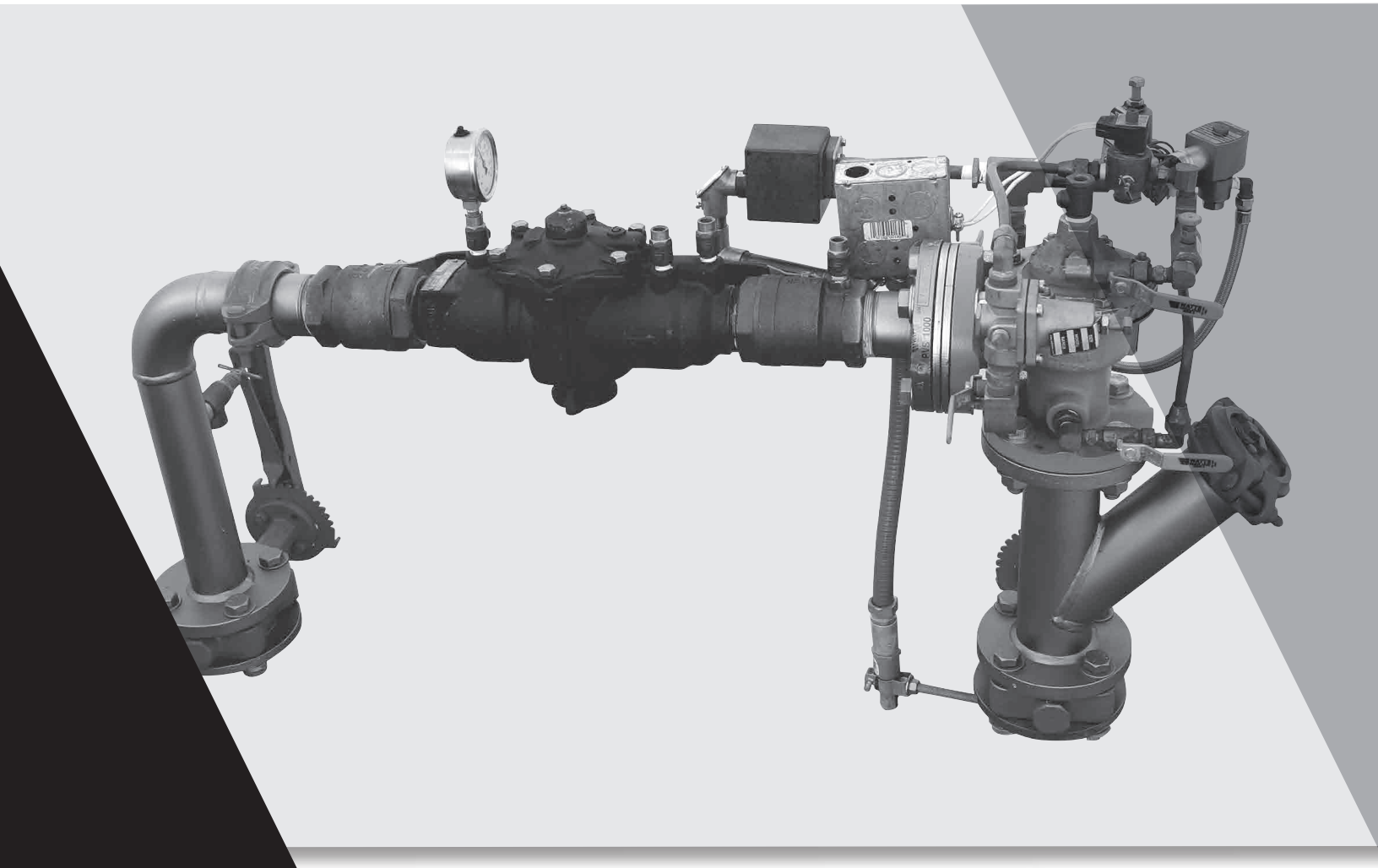
At A Glance

Backflow Irrigation Control Station

BIC-1000



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Purpose

There can be no compromise for what is known in advance to cause damage from system failure. To allow damage is questionable by all parties and ultimately more expensive over the life of the system.

The common system design suggests that a master valve and a flow meter be installed to prevent possible flooding due to broken pipes, missing sprinkler heads, vandalism, etc. These occurrences would ultimately result in additional costs and potential liability to the Owner or the City.

The focus remains on the master valve and flow meter; lending little or no consideration to the piping system from the meter-to the backflow-to the master valve. This part of the system (before the master valve) is subjected to the highest of all pressure available and is on 24 hours a day, seven days a week, 52 weeks of the year. The system after the master valve is only pressurized during the irrigation cycle that may last 2-4 hours day.

Popular belief implies that system failure occurs more frequently after the master valve and flow meter. It suggests that the system's only defense and safety mechanism is the flow meter. Without the flow meter, the system will continue to flow until the irrigation cycle has completed the run schedule.

What if there was a more accurate way to analyze the cause of break? From the break-to the flow meter-to the master valve-to the cause – PRESSURE. We take great pleasure to introduce a concept that was developed with a simple, clear, basic analysis of the entire system and its pressure response profile. A back-flow irrigation control station built with the best practice design principles.

The purpose of this system is to maximize operating performance and to further eliminate causes of damage to the system.

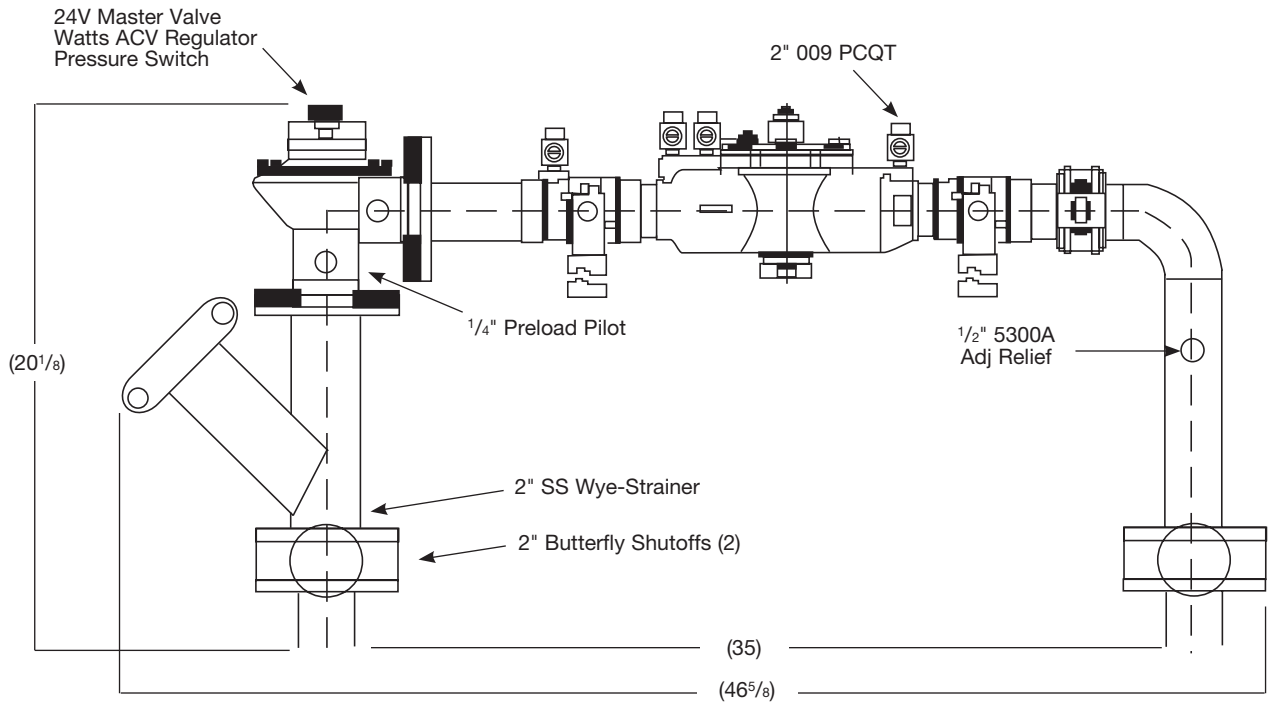
The Existing & Current Irrigation Design

- All or most components of operation and safety to the system are buried and are not easily accessible. This often requires cutting or breaking the line for replacement. The parts are often spread out and can be difficult to locate.
- The backflow assembly is sometimes installed incorrectly; upside down, wrong strainer, no unions, double checks have been installed where RP type is required, incorrect model, etc.
- Master valve repairs are time consuming due to additional steps needed for accessibility. Same for flow meter repairs (where applicable).
- The existing irrigation design does not allow automatic monitoring for control of excessive high pressure on piping when the irrigation system regulator should fail or creep to unacceptable pressure levels beyond the set point.
- The existing design allows irrigation system to work with severe high pressure. Most commonly, repairs are made and system is re-pressured to repeat the same breaks. These repairs are often of an urgent nature and may require costly overtime to complete and inconvenience to the customer.
- Allows piping system after the master valve to be subjected to damage when the master valve is turned on/off and piping system is loaded into a 0psi system.
- The existing irrigation design does not allow a quick visual of the current pressure reading at all times.
- High-pressure fatigue on piping system results in excessive failure and maintenance (where applicable). Further, unaccounted or non-billable water losses may occur.
- Allows backflow assembly to have in excess of 175psi or greater taking it out of warranty (where applicable) on the existing irrigation design.
- **Every line break** can be a major source of water loss to the system especially if it is before the master valve. The existing and current design with a flow meter only shuts off the irrigation system down stream of the master valve. In some installations, this allows the long run of piping from the water meter to be subject to breakage as it is not controlled by the master valve shutoff.

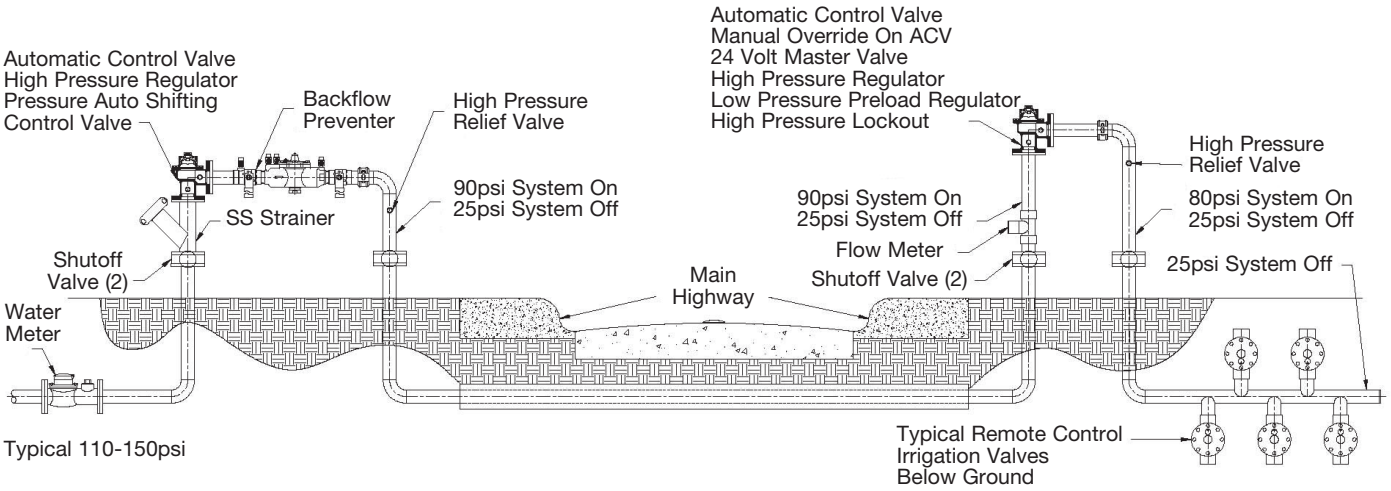
The Backflow Irrigation Control Station

- The Backflow Irrigation Control Station (BIC Station) takes into consideration by design with integrity and assurance to the system and the customer that the system is protected.
- Components of the BIC Station are above ground level on a stainless steel station. Repairs can be done without the conventional digging up of components buried underground.
- The BIC Station combines the master valve, regulator valve, preload valve, and high-pressure lockout switch and backflow preventer all in one easily located component.
- Unlike the current and existing irrigation design, repairs will not be subjected to mud, dirt, or debris going into the valve component body during removal and repair.
- The BIC Station's system components for electrical connections are also above ground. Moisture at the wire nut connection is highly unlikely. In the current system design, a high electrical resistance at this connection from moisture would cause a drop in voltage and possibly be a cause for failure. Sometimes, the entire component of the current system is replaced due to misdiagnosis.
- All of the BIC Station's components are flanged type, nut and bolt modular design for easy replacement.
- Proper selection and installation of the backflow preventer, strainer, unions / maintenance disconnects is ensured by certified factory assembly and test.
- This is a 24-hour monitoring system of the outlet pressure for excessive buildup above set operating pressure.
- The BIC Station's system monitoring of pressure will lockout the 24-volt circuit with a field adjustable excessive pressure switch; making it inoperable. This lockout will not let the irrigation pressure piping system be subjected to high-pressure shock or water hammer when remote control valves (RCV) open and close for days and months unnoticed like on conventional irrigation systems now being used.
- The BIC Station's ACV regulator component shifts the pilot and it preloads all pressure lines to a lower sustainable pressure of 20psi. This eliminates the need for high pressure on the system when the sprinkler irrigation is shut off. The BIC Station's operating design pressure is only activated when the master valve turns on.
- The BIC Stations uses a Diaphragm Actuated, Pilot Controlled, Automatic Control Valve (ACV) to set the pressure rather than using a Direct Acting (DA) regulator. The ACV pressure regulator fall off is significantly lower than a DA regulator and holds set pressure over a wide range of flow rates. As more flow or demand is called for, the ACV will open more while holding pressure at the system design setting. The existing conventional DA regulator drops off pressure when more flow is needed. Thus requiring a much higher DA regulator pressure initial set-point to start with to account for the loss or drop off.
- The entire irrigation pressure piping system after the master valve is never allowed to drain off to 0psi. In some cases, this drain off occurrence subjects the piping system to excessive damage when the master valve is turned on.
- The entire irrigation pressure piping system is preloaded with a field adjustable, low flow, low pressure control valve. This in combination with a higher set point on the regulator and master valve creates a buffer when turned on. This eliminates water hammer due to excessive velocities, pressure spikes, and excessive pressure buildup.
- The backflow assembly warranty is not exceeded.
- The backflow assembly is not severely damaged or worn out in a shorter period of time.
- Water is conserved by reducing or eliminating the line breaks caused by high pressure – water hammer, and by providing a shut-off at the beginning of the system rather than in the middle of the system.

Backflow Irrigation Control Station



Irrigation Component Control Station



When the master valve opens at cycle start of 25psi

All system pressures shift up to operating pressures of 80-90psi

From the operation of the ACV pressure auto shifting valve

When master valve closes at the end of the water cycle of 80psi

All system pressures drop to a stand by pressure of 25psi

From the operation of the ACV pressure auto shifting valve

Maintenance Costs

The following information is for comparison purposes only. The scenarios, method of solution, and costs are based on our experience in collaboration with landscape professionals.

Common Field Situation #1

Water flow has decreased and the system has shut down. It is determined that the regulator is damaged and needs immediate attention. The regulator's location is known and identified as a 2".

Current and Existing Irrigation Design

Action Taken:

1. Dig up ground to retrieve regulator.
2. Cut the mainline to remove the regulator component and replace.
3. Install the new regulator and retrofit using schedule 40 piping.
4. Backfill area with dirt and return ground to original state (groundcover, shrubs, etc.)

Generally, the pressure regulator is not repaired inline due to the difficulty of the repair. The mainline will have to be cut and retrofitted back.

Labor:	$300
Occurrence Rate:	$500
Materials:	$200
Average Occurrence P/Yr:	10
Annual Costs:	**$5,000**

Backflow Irrigation Control Station

Action Taken:

1. Perform diagnostic test on the BIC Station that will identify the component on the regulator that is damaged.
2. Repair the identified component parts only.

Labor:	$125
Occurrence Rate:	$170
Materials:	$45
Average Occurrence P/Yr:	10
Annual Costs:	**$1,700**

Common Field Situation #2

Low water coverage and continual leaking. It is determined that the master valve is damaged and needs immediate attention.

Current and Existing Irrigation Design

Action Taken:

1. Dig up ground to inspect and retrieve master valve.
2. Replace internal components if master valve is worth saving.
3. If not worth saving, the entire master valve is replaced from mainline.
4. Retrofit new master valve from mainline.
5. Backfill area with dirt and return ground to original state (groundcover, shrubs, etc.)

Labor:	$300
Occurrence Rate:	$475
Materials:	$175
Average Occurrence P/Yr:	10
Annual Costs:	**$4,750**

Backflow Irrigation Control Station

Action Taken:

1. Perform diagnostic test on the BIC Station that will identify the component on the valve that is damaged.
2. Repair the identified component parts only.

The internal wetted parts of the master valve are stainless steel. Repair and/or replacement of the master valve itself due to corrosion are less likely to occur.

Labor:	$125
Occurrence Rate:	$170
Materials:	$45
Average Occurrence P/Yr:	10
Annual Costs:	**$1,700**

Common Field Situation #3

There is a break in the mainline and the sprinkler system is down. Other than the fact that the break is in a turf area, the exact location is unknown. The size of piping is also unknown.

Current and Existing Irrigation Design

Action Taken:

1. Attempt to locate leak by excessive digging. Potential wire damage may occur during this process.
2. Leak is found; parts are ordered.
3. Cut and remove damaged pipe.
4. Repair as needed.
5. Backfill area with dirt and return ground to original state (groundcover, shrubs, etc.)

Labor:	**$500**
Occurrence Rate:	**$540**
Materials:	**$40**
Average Occurrence P/Yr:	**10**
Annual Costs:	**$5,400**

Backflow Irrigation Control Station

Action Taken:

1. The same actions as taken on the current design would still need to be taken.

However, the percentage of a mainline break occurring due to high-pressure buildup is extremely low with the BIC Station. The design of the system would activate a “high-pressure lockout” and would be inoperable until the issue is addressed. Therefore, the occurrence rate would drop to 1 instead of 10.

Labor:	**$500**
Occurrence Rate:	**$540**
Materials:	**$40**
Average Occurrence P/Yr:	**1**
Annual Costs:	**$540**

Annual Maintenance Cost Summary

Based On 10 Occurrences Only

Field Situation #	1	2	3	TOTALS
Existing	$5,000	$4,750	$5,400	$15,150
BIC Station	$1,700	$1,700	*$540	$3,940
BIC Station Total Savings	**$3,300**	**$3,050**	**$4,860**	**$11,210**

*1 occurrence, see explanation on previous page

Conclusion

Numerous common field situations such as the ones previously described create a significant cost burden and customer dissatisfaction levels. Our state-of-the art design will reduce and/or eliminate these costs by early detection and preventative methods.

Available Models:

Backflow Irrigation Station: BIC-1000

Satellite Station: IC-1000

ACV Only: 115-4-74

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