

**BACKFLOW PREVENTION BY
CONTAINMENT PROGRAM**

**THE CITY OF LAWRENCEVILLE,
GEORGIA WATER DEPARTMENT**

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POLICY AND PROCEDURES
for
BACKFLOW PREVENTION BY CONTAINMENT

SECTION I. INTENT, PURPOSE AND CONTROL

1. INTENT:

To recognize that all Consumer's water systems have connections to apparatus, vessels, etc., that could have impurities in varying degrees and, if not properly controlled and contained, could contaminate or pollute both the consumer's water system and the public potable water supply/system. It is also the intent to apply the principle that the type of protection required shall be determined by whether the impurities are hazardous contaminants or non-hazardous pollutants.

2. PURPOSE:

- (A.) To assist the consumer in protecting his own potable water system against actual or potential backflow and/or backsiphonage of any contamination or pollution by controlling each cross connection or potential cross connection within the consumer's premises.
- (B.) To protect the City of Lawrenceville's water system/supply against actual or potential backflow by containing, within the consumer's premises, any pollution or contamination that has entered, or may enter, into the consumer's potable water system through any undiscovered or uncontrolled cross connection on said premises.
- (C.) To eliminate uncontrolled cross connections to non-potable systems as well as uncontrolled interconnections to any potable water system that is not part of the City of Lawrenceville's water system, by installing or requiring to be installed an appropriate backflow prevention device(s) to isolate such system(s) from the City of Lawrenceville's potable water system/supply.
- (D.) To establish, coordinate, execute and maintain a total backflow prevention program.

3. **CONTROL:**

Requires cooperation between City of Lawrenceville Water Department, the Department of Planning and Zoning, the City of Lawrenceville Plumbing Inspector (the “Plumbing Inspector”), and it’s water consumers in the execution of, and the adherence to the duties and responsibilities of each, as set forth by this policy and these procedures, in conjunction with other applicable codes, rules and requirements.

SECTION II. RESPONSIBILITIES

1. **THE CITY OF LAWRENCEVILLE WATER DEPARTMENT (PURVEYOR)**

The Director of Utilities for the City of Lawrenceville or his designee, as authorized through ordinances adopted by the City of Lawrenceville City Council, is primarily responsible for preventing contamination and pollution of the public water system/supply by instituting a program of Backflow Prevention by Containment.

Such responsibility begins at the point of origin for the public potable water supply and includes all of the distribution system, and terminates at the service connection for the consumer’s water system. The required consumer supplied backflow prevention device at the service connection shall provide maximum (Reduced Pressure Principle Backflow Prevention Assembly) or minimum (Double Check Valve Backflow Prevention Assembly) protection as concluded by the Director of Utilities or his designee. In addition, the Director of Utilities or his designee shall exercise reasonable vigilance to ensure that the consumer adheres to this policy and these procedures as stated and outlined herein.

2. **THE CITY OF LAWRENCEVILLE PLUMBING INSPECTOR**

The City of Lawrenceville Plumbing Inspector is primarily responsible for enforcing the plumbing code of Georgia to prevent contamination and pollution within the consumer’s water system through a program of backflow prevention by cross connection control requiring that all outlets terminate through an air gap or be controlled by an approved mechanical backflow prevention assembly. Such responsibility begins at the service connection to the premises and extends to the extremities of the consumer’s potable water supply.

3. **THE CONSUMER (CUSTOMER)**

The consumer has the responsibility for protecting both potable water in his own system from degradation due to conditions originating on his premises,

by complying with the State of Georgia plumbing code, and also by protecting the quality of water in the City of Lawrenceville's water system/supply against any potential or actual health hazard(s) generated on or from his premises through uncontrolled cross connections, by backflow prevention at the service connection.

Therefore, after the City of Lawrenceville Water Department has determined the type of backflow protection that is required at the consumer's service connection, the consumer is then responsible for the costs of procurement, installation, testing, repair and maintenance of said assembly.

SECTION III. GUIDELINES

This program presents guidelines which have been developed to protect the City of Lawrenceville's water system/supply against contamination or pollution resulting from the backflow of objectionable fluids through cross connections. It is the intent of these guidelines to provide this protection at the service connection that may result from the backflow through cross connections. All water users are encouraged to utilize separate systems for their process water use so as to prevent possible pollution or contamination of their internal water supply.

A. Installation of an approved cross connection control device may be required of water users who represent potential sources of contamination or pollution to the public water system.

A potential source of contamination or pollution is defined as, but not limited to, any of the following:

- Agricultural processing facilities
- Aircraft and missile plants.
- Amusement parks.
- Animal clinics, animal grooming shops.
- Any premises on which chemicals, oils, solvents, pesticides, disinfectants, cleaning agents, acids or other pollutants and/or contaminants are handled in a manner by which they may come in direct contact with potable water, or there is evidence of the potential to contact potable water.
- Apartments-single and multiple structures (three stories or more).
- Aspirator.
- Automotive plants.
- Automotive repair shops.
- Autopsy facilities.
- Auxiliary water systems (interconnected).
- Auxiliary water systems (non-interconnected).
- Beauty schools and colleges.

- Beverage bottling plants.
- Blood plasma equipment.
- Blueprint machines.
- Bottle washer, bedpan washer, and garbage can washer.
- Box plants-glue pots, soaking vats, steaming processes.
- Breweries.
- Brine lines.
- Buildings greater than three (3) stories or thirty –four feet (34') in height.
- Buildings with house pumps or potable storage.
- Buildings with sewer ejectors.
- Canneries, packing houses and reduction plants.
- Car wash facilities.
- Centralized heating and air conditioning plants.
- Chemical plants (manufacturing, processing, compounding, or treatment).
- Chemically treated potable or non-potable water systems.
- Civil works (government owned or operated facilities not open for inspection by the water department).
- Clinics.
- Cold storage plants.
- Commercial dishwashers, food processing and/or preparation equipment, carbonation equipment, or other food service processes utilizing potable water.
- Commercial laundries.
- Condominiums-single and multi structures (three stories or more).
- Cooling tower, boiler, condenser, chiller, and other cooling systems utilizing potable water.
- Creameries.
- Cuspidors.
- Dairies and creameries.
- Decorative fountain, baptismal, or any location where water is exposed to atmosphere.
- Dental buildings.
- Dental cuspidors-water operated.
- Dishwashers.
- Drinking fountains.
- Dry cleaners.
- Dye works.
- Fertilizer plants.
- Fertilizer (liquid) and spray distributors.
- Film processing labs.
- Fire systems.
- Fish ponds-pump connected.

- Foamite lines.
- Fountains-display, public, private.
- Funeral homes.
- Grease traps.
- Greenhouses.
- High schools and colleges.
- Holding tank disposal stations.
- Hose bibs.
- Hospitals (human or animal).
- Hotels and motels-single or multi structure (three stories or more).
- Icemakers (other than a residential service).
- Irrigation systems.
- Labs using contaminating or polluting materials.
- Manufacturing, processing and fabricating plants using contaminating or polluting materials.
- Meat packing house and rendering plants.
- Medical and dental buildings.
- Mobile home parks.
- Motion picture studios.
- Multi-story buildings (three stories or more).
- Multiple services that are interconnected.
- Nursery, botanical.
- Nursing homes, convalescent homes, rest homes or sanitariums.
- Office buildings-single and multi structure (three stories or more).
- Oil and gas production, storage or transmission facilities.
- Oil refineries.
- Paper and paper product plants.
- Pasteurizers.
- Penal institutions and jails.
- Pesticide, herbicide, fertilizer, and chemical applicators (other than typical in home use).
- Petroleum processes and storage plant.
- Pickling tanks.
- Power plants.
- Priming lines.
- Printing companies.
- Private wells.
- Radioactive material or substances-Facilities that process or use radioactive materials.
- Railroad terminals.
- Reclaimed water customers.
- Recreational vehicle dump stations (sewer), or any other location where potable water may be exposed to bacteria, virus or gas.
- Restaurants.

- Restricted establishments.
- Reverse osmosis purifiers-brine line
- Rubber plants.
- Sand and gravel plants.
- Schools and colleges.
- Sewage treatment plants.
- Sewage pumping stations.
- Shopping centers.
- Shrinking, blueing, dyeing machines with direct connections to circulating systems.
- Soaking tanks.
- Soda fountains.
- Steam soap washing devices.
- Stockyards.
- Swimming pools, ponds and fountains connected to potable water system.
- Tanks, vessel, receptacle, and all other water connections, including mobile units without approved air gaps.
- Tanneries.
- Therapeutic tanks and hot tubs.
- Vegetable and food processing plants.
- Veterinary hospitals.
- Wastewater treatment plants.
- Water cooled equipment, boosters, pumps, or autoclaves.
- Water Softeners
- Water treatment plants.
- X-Ray equipment.

- B. Cross connection control devices will be installed on each service connection at the point of delivery and ahead of any outlet. If the water line is divided at the point of delivery, a device should be installed on each branch.
- C. The type of cross connection control device required will depend on the degree of hazard involved, which will be determined by the City of Lawrenceville Water Department.
- D. All plans for new construction will be checked prior to construction to determine the degree of hazard and the type of cross connection control device that will be required.
- E. All cross connection control devices will be readily accessible for maintenance and testing as required by the City of Lawrenceville installation instructions. They shall not be located where any part of the device will be submerged in water or buried in dirt at any time.

- F. All cross connection control devices shall be inspected and tested by a certified cross connection control tester at least once a year. A written report of the inspection and testing shall be submitted to the City of Lawrenceville Water Department Backflow Program.

- G. Water user is encouraged to maintain an ongoing internal cross connection program by designating one of their employees as the contact official. Duties of the contact official follows:
 - (1.) Inform the City of Lawrenceville Water Department Backflow Department of any change in water use that may effect the degree of hazard to the public water system.

 - (2.) Perform routine maintenance of any cross connection control devices.

 - (3.) Oversee any in-plant piping of plumbing changes.

SECTION IV. IMPLEMENTATION and ENFORCEMENT

1. This policy and these procedures shall be implemented immediately for backflow prevention by containment; in conjunction with the Georgia Uniform Codes Act effective in October, 1991; in conjunction with the Georgia EPD “Rules for Safe Drinking Water”, Section 391-3-5.-13 Cross Connections Amended; in conjunction with the State of Georgia Plumbing Code; and in conjunction with the City of Lawrenceville Ordinance for the Control of Backflow and Cross Connections.

2. The Georgia Rules for Safe Drinking Water (391-3-5.-13.2) require that a supplier of water or any person having possession or control of facilities which may cause that contamination of a public water system has the responsibility to prevent water from unapproved sources or any contaminants from entering the public water system. The Director of Utilities or his designee shall be responsible for the protection of the public potable water distribution system from contamination or pollution due to the backflow of contaminants or pollutants through the water service connection. If, in the judgement of said Director of Utilities or his designee an approved backflow prevention assembly is required at the consumer’s water service connection; or, within the consumer’s private water system for the safety of the water system, the Director of Utilities or his designated agent shall give notice in writing to said consumer to install such an approved backflow prevention assembly(s) at a specific location(s) on his premises. The consumer shall immediately install such an approved backflow prevention assembly(s) at the consumer’s own expense; and, failure, refusal, or inability on the part of the consumer to install, have tested and maintained said assembly(s), shall constitute grounds for discontinuing water service to the premises until such requirements have been satisfactorily met.

3. Enforcement of this policy and these procedures shall be administered by the City of Lawrenceville Water Department, utilizing its staff in cooperation with those of the

Department of Planning and Zoning, Plumbing Inspection as authorized by the City of Lawrenceville Mayor and City Council.

4. If the City of Lawrenceville Water Department discovers that a customer has not installed a required backflow prevention assembly or that a backflow prevention assembly has been improperly tested or maintained, bypassed or removed or that an unprotected cross connection exists in the customer's water system, the water service to that water service connection shall be disconnected if the situation is not remedied within the time specified in the notice sent to the customer as required by this program. The service shall not be restored until the condition is remedied.

SECTION V. INSPECTION of FACILITIES

1. The consumer, upon request, shall furnish to the City of Lawrenceville Water Department any pertinent information regarding the consumer's water system on such premises where backflow and/or backsiphonage are deemed possible through uncontrolled plumbing connections and/or cross connections.

2. Nothing herein shall relieve the consumer of the responsibility for conducting or causing to be conducted periodic surveys of water use practices in his premises to determine whether there are actual or potential uncontrolled cross connections within the consumer's water system through which contaminants or pollutants could flow back into his own and/or the City of Lawrenceville's potable water system/supply. If the premises are classified restrictive or high security with no admittance, maximum (RPZ) protection at the service connection is required.

3. Facilities considered to pose an actual or potential contamination and/or pollution threat to the public potable water system/supply will be subject to inspection by an authorized representative(s) of the City of Lawrenceville Water Department and when deemed necessary, in accompaniment with a representative(s) from the Plumbing Inspector. Inspections will focus on plumbing outlets and potential contaminating or polluting substances within a facility. Inspections will be scheduled at a time mutually agreeable with the consumer's representative(s) and the City of Lawrenceville Water Department representative(s). Using information gathered, the City of Lawrenceville Water Department will determine the degree of potential backflow hazard and specify the type of backflow protection required at the consumer's service connection.

4. If, upon inspection, a facility is found not to be in full compliance with the plumbing code, maximum protection will be required. If the owner brings the facility up to full protection within a ninety (90) day period, minimum protection will be allowed at the service connection provided potential hazards within the premises are isolated.

5. After reasonable notice to the consumer, of a violation of this policy and/or procedures existing on the premises, water service shall be discontinued, a reconnection fee charged and any other precautionary measures taken that are deemed necessary to protect the quality of the water in the City of Lawrenceville potable water system. Water

service shall not be restored until the danger has been eliminated in compliance with the provisions of this procedure.

6. While in the course of a routine inspection or special investigation, the inspector(s) discovers a condition of imminent or actual high hazard system contamination, the inspecting department's representative shall be authorized to **immediately discontinue service** to the facility. Service will not be restored until the hazardous condition has been corrected and reinspected.

7. In the event of accidental contamination or pollution of the public water system/supply, the consumer, if he is so aware, shall immediately notify the City of Lawrenceville Water Department so that the appropriate measures may be taken to contain and isolate the contaminant and/or pollutant.

NOTE: COST LIABILITIES ARE THE CONSUMER'S RESPONSIBILITY, AND KNOWN FAILURE TO REPORT IS A CRIMINAL OFFENSE PUNISHABLE UNDER CITY, COUNTY, STATE AND FEDERAL LAW.

SECTION VI. WATER from OTHER SOURCES and FIRE HYDRANTS

1. When any premise is served by the City of Lawrenceville Water Department and said premise continues to have a well or any other source of water, it shall be in violation of this policy and procedures for the plumbing on said premises to be installed or so interconnected that water in the City of Lawrenceville's water system/supply and the private water supply can, in any way, become intermingled. **Georgia State Plumbing Code Section 608.6.1**

2. Upon discovery of an uncontrolled interconnection on any premises being furnished water through the City of Lawrenceville water system, as in item #1 above, the owner of said premises shall be notified that the interconnection must be removed and/or controlled within thirty (30) days, and that failure to remove or correct the interconnection will result in removal of the meter. If the correction is not made within a thirty (30) day period, the meter will be removed and will not be reinstalled until the maximum type backflow protection is installed at the service connection, and the owner has paid for all associated costs.

3. Booster pumps installed on the service line to or within any premises **must be approved and permitted** by the City of Lawrenceville Water Department. Such permitted pumps shall be equipped with a low-pressure cut-off device designed to shut off the booster pump when the pressure on the suction line of the service of the service side of the pump drops to 15 psi or below. It shall be the duty of the water consumer to maintain the low-pressure cut-off device in proper working order at all times and to certify to the City of Lawrenceville Water Department, at least once per year that the device is operable.

SECTION VII. SELECTION of DEVICES

1. Vacuum breakers and backflow preventers shall be selected on the basis of the impurities involved and the type cross connection. The impurities shall be classified as contaminants, hazardous and/or pollutants, non-hazardous; and the cross connection by whether it is a pressure or a non pressure as follows:

- (a.) CROSS CONNECTION, NON-PRESSURE TYPE: This type of connection, when not protected by a minimum air gap, shall be protected by appropriate backflow preventer (BFP).
- (b.) CROSS CONNECTION, PRESSURE TYPE: An appropriate BFP type shall protect this type connection only.

CAUTION: A pressure vacuum breaker shall not be used alone on a pressure type cross connection.

NOTE: Because an irrigation system serves an environment that is open to the atmosphere, it would not be classified as a pressure type cross connection. However, due to the special nature of the installation, minimum protection against backflow shall be a reduced pressure principle backflow prevention assembly, regardless if chemicals are injected into the system or not.

2. Vacuum breakers shall be corrosion resistant. All other backflow prevention assemblies, including accessories; components and fittings in sizes through 2 inch shall be bronze with threaded connections. Sizes above 2 inch shall be bronze; or iron that has a fused epoxy-coating inside and out, and have flanged connections.

3. Each device shall have a brass identification tag; securely attached with corrosion resistant mechanical fasteners, and/or be embossed to notate the manufacturer's name, serial number and maximum working pressure and temperature.

SECTION VIII. APPROVAL of DEVICES

Any backflow prevention assembly required herein shall be a make, model and size approved by the Director of Utilities. The term "Approved Backflow Prevention Assembly" shall mean an assembly that has been manufactured in full conformance with the standards established by the American Water Works Association (AWWA), the American Society of Sanitary Engineering (ASSE), the American National Standards Institute (ANSI), the State of Georgia Plumbing Code and have met completely the laboratory and field performance specifications of the Foundation for Cross Connection Control and Hydraulic Research of the University of Southern California (USC FCCCHR) established in:

Specifications of Backflow Prevention Assemblies-Section 10 of the most current edition of the *Manual of Cross Connection Control*.

The following testing laboratory has been qualified by the GA EPD and the City of Lawrenceville to test and approve backflow prevention assemblies:

Foundation for Cross Connection Control and Hydraulic Research
University of Southern California
KAP-200 University Park MC-2531
Los Angeles, California 90089-2531

Testing laboratories other than the laboratory listed will be added to an approved list as the GA EPD and the City of Lawrenceville qualify them.

Backflow preventers, which may be subjected to backpressure or backsiphonage, that have been fully tested and have been granted a Certificate of Approval by said qualified laboratory and are listed on the laboratory's current list of approved backflow prevention assemblies may be used without further test or qualification.

SECTION IX. LOCATION and INSTALLATION of DEVICES

1. Location of all backflow prevention assemblies shall be in an area that provides a safe working environment for testing and maintenance. The area shall be readily accessible, dry, and free from extreme cold, heat and/or electrical hazards.

2. Installation of all backflow prevention assemblies shall be in accordance with the following procedures, the State of Georgia Plumbing Code, the City of Lawrenceville Backflow Prevention Assembly Installation Instructions and other applicable codes and regulations. Installations for containment shall be by a duly licensed plumber mechanical and/or utility contractor; and as approved by the City of Lawrenceville Water Department.

(a.) When a dual check or double check valve backflow prevention assembly is used in the containment concept, it shall be installed at the service connection or as close as feasibly possible to the service connection, in an approved meter box, covered vault or insulated enclosure.

(b.) When a reduced pressure principle backflow prevention assembly is installed at the service connection, it shall be above ground in a structure that is protected from freezing. A reduced pressure principle backflow prevention assembly shall **never** be installed below ground.

NOTE: When a backflow prevention assembly is installed in a service pipe inside a structure on any premises for the purpose of containing said premises; it shall be unlawful to tap into such service pipe between the backflow prevention assembly and the service connection. Any branch connection on any existing service pipe shall be permanently disconnected or equipped with a backflow prevention assembly commensurate with the degree(s) of hazard.

SECTION 608.1, State of Georgia Plumbing Code.

3. Facilities that must have a continuous uninterrupted water supply shall install backflow prevention assemblies in parallel for testing and maintenance purposes. In no case shall a bypass arrangement be installed unless it is also equipped with an approved backflow prevention assembly.

4. Vacuum breakers and backflow prevention assemblies equipped with atmospheric vents, or with relief openings, shall be so installed and so located as to prevent any vent or any relief from being submerged. They shall be installed in the position recommended by the manufacturer, and as prescribed in the following:

- (a.) **VACUUM BREAKER, ATMOSPHERIC TYPE (AVB):** This device shall be at least 6 inches above the highest outlet or the overflow level on the non-potable system. This device is intended for protection against backsiphonage only. No shutoff valves or pumps may be installed downstream of device and the device must be installed in the vertical upright position. Atmospheric type vacuum breakers are intended for intermittent use only (12 hours maximum in any given 24 hour period).
- (b.) **VACUUM BREAKER, PRESSURE TYPE (PVB):** This assembly shall be installed at least 12 inches above the highest outlet or the overflow level on the non-potable system. This assembly is intended for protection against backsiphonage only. No shutoff valves or pumps may be installed downstream of assembly and the assembly must be installed in the vertical upright position. The assembly must have resilient seated test cocks provided for field testing and must have resilient seated shutoffs attached at each end of the assembly. This assembly is accepted for installations in high (contaminant) or low (pollutant) hazard situations.
- (c.) **VACUUM BREAKER, HOSE TYPE (HVB):** This device shall be installed directly on the hose bib, if not an integral part of the valve. It may not be subject to continuous pressure, static or flowing; and/or to freezing temperatures, unless it is a model that drains automatically.
- (d.) **BACKFLOW PREVENTION ASSEMBLY, DUAL CHECK (DuC):** This device shall not be buried in earth but shall be installed below ground in a meter box. A union shall be provided on each end and a full port ball valve shall be near the inlet and outlet sides to allow removal for maintenance. The two checking devices shall be capable of independent operation as per ASSE Standard 1024. This assembly is intended for domestic installations only.
- (e.) **BACKFLOW PREVENTION ASSEMBLY, DOUBLE CHECK VALVE (DCV):** This device shall not be buried in earth but shall be installed below ground in a meter box. When possible, this assembly shall be installed at least 12 inches from the bottom of the meter box floor, but

in no case less than 6 inches. An approved DCV shall never be installed more than 36 inches above grade. There shall be a minimum of 2 inches of gravel in the bottom of the meter box. There shall be adequate clearance above and to the sides of unit for operation of valves, assembly testing and unit repair. This assembly is approved for protection against backpressure or backsiphonage. This assembly must have resilient seated shut off valves and must have resilient seated test cocks provided for testing purposes. This assembly is intended for low (pollution) hazard installations only. Please reference the City of Lawrenceville Backflow Prevention Assembly Installation Instructions for a complete list of installation requirements and specifications.

- (f.) **BACKFLOW PREVENTION ASSEMBLY, REDUCED PRESSURE PRINCIPLE (RP):** This assembly shall never be installed below ground. Where relief valve discharge could cause water damage, it shall be piped via an approved air gap or a funnel at the vent/relief port to a floor drain or other approved location. Installation of this assembly must have a minimum height of 12 inches above ground and a maximum height of 36 inches above grade. Assembly installation must allow for adequate clearance above and to the sides of the unit for operation of the valves, testing purposes and unit repair. The RP assembly must have resilient seated shut off valves and must have resilient seated test cocks for field testing. The assembly must be installed with a proper enclosure to protect from freezing and the enclosure must allow for proper drainage of the assembly. This assembly is approved for protection against backpressure or backsiphonage. This assembly is accepted for installations in high (contaminant) or low (pollutant) hazard situations. Please reference the City of Lawrenceville Backflow Prevention Assembly Installation Instructions for a complete list of installation requirements and specifications.
- (g.) **BACKFLOW PREVENTION ASSEMBLY, AIR GAP:** An air gap is not an assembly, but a physical separation between the free flowing discharge end of a potable water supply pipeline and an open or non-pressure receiving vessel. Every air gap installation shall have a minimum vertical air space of 2 pipe diameters above the flood rim of the receiving vessel and have a minimum distance of 1 inch in all situations. An approved air gap is approved for protection against backpressure or backsiphonage. An approved air gap is accepted for installations in high (contaminant) or low (pollutant) hazard situations. An approved air gap is a method of protection. It does not require “testing” as the other devices. The air gap should be inspected periodically to make sure it has not been nullified with objects such as hoses or pipes.

SECTION X. THERMAL EXPANSION

A check valve is designed to only allow water to flow in one direction. On a normal service line to a house or supply line to a device, such as a boiler or water heater, the flow pathway is not blocked. Water can flow into the area, and when needed and flow out again. Due to the risk of contaminating the potable water line, either in the distribution main or in the plant or business, some form of backflow prevention is normally installed to contain the backflow to the property or isolate the device from other internal plumbing. These devices may range from the Reduced Pressure Principle Backflow Prevention Assembly to the Double Check Valve Backflow Prevention Assembly to the Dual Check Device.

By blocking the flow path away from the higher-pressure area, a closed-loop system has been created. Normal pressure imbalances created by pumps, valves, normal water use, and heating systems can no longer find equalization in the upstream piping. Pumps and valves tend to generate pressure waves called water hammer that can damage pipes, valves, fittings and even backflow devices. Other seemingly innocent devices, such as a water heater, can create problems in the system, though these problems do not appear as drastically as they tend to appear more slowly.

A water heater generates pressure through a relationship to Boyles' Law. This law states that at a constant temperature, the volume occupied by a fixed quantity of gas is inversely proportional to the applied pressure ($PV=Constant$). When put together with some other laws, the outcome is the Ideal Gas Law ($PV=T$), which basically states that as the temperature of a gas increases, the pressure and volume increase. Often times this pressure increase shows up at sink and tub faucets in the form of drips. As the pressure increases in the closed loop system, the pressure begins to seek a way out of the pipes—often distorting the elastomer components of faucets and even toilets.

Whenever a loop of pipe is closed with a backflow prevention assembly, some method is required to deal with thermal expansion. While many devices are sold for this purpose, certain jurisdictions may require a specific device to be used or even to not be used. Thermal expansion devices generally include:

- Expansion Tanks
- Ballcock Reliefs
- Pressure Relief Valves (pop-off's)

Section 607.3 of the Georgia State Plumbing Code states:

Thermal Expansion-When water is heated and stored in a consumer's water system, or branch of the system, that has been closed by the installation of backflow-prevention device, or any other checking device; an auxiliary relief valve, or expansion chamber, shall be installed to limit thermal expansion of the water being heated to not more than 80 psi static (no-flow) pressure at any fixture on the system.

SECTION XI. FIRE PROTECTION SYSTEMS

1. For the purposes of Backflow Prevention by Containment, if the service connection to a premises, from the City of Lawrenceville Water Department potable system/supply is intended to be used for fire protection service it shall be classified and/or defined as follows:

- (a.) **DEDICATED SERVICE CONNECTION**-One that is designated to supply potable water for fire protection service ONLY.
- (b.) **COMBINATION SERVICE CONNECTION**-One that is designated to supply potable water for BOTH domestic use and fire protection service.

2. To further associate the sources of water that may be used for fire protection and classes of fire protection systems, the following Georgia State Fire Code Classes shall also apply for Backflow Prevention by Containment:

CLASS 1: Directly supplied from public water mains only; no pumps, tanks or reservoirs; no physical connection from other water supplies; no antifreeze or additives of any kind; all sprinkler drains discharging to atmosphere, dry wells or other safe outlets.

CLASS 2: Directly supplied from public water mains same as Class 1, except that authorization has been obtained for a booster pump to be installed in the supply line.

NOTE: Must have a special approval and be permitted by the City of Lawrenceville.

CLASS 3: Directly supplied from public water mains, same as Class 1, plus one or more of the following: elevated storage tanks or pressure tanks; fire pumps taking suction from above ground covered reservoirs or tanks. All storage facilities shall be filled from potable water supply and maintained in potable condition.

CLASS 4: Directly supplied from public water mains, similar to Classes 1 and 2, and with an auxiliary water supply on or available to the premises; or an auxiliary water supply located within approximately 1,700 feet of the pumper connection.

CLASS 5: Directly supplied from public water mains, and interconnected with auxiliary supplies, such as: pumps taking suction from reservoirs exposed to contamination or rivers and ponds; driven wells; mills or other industrial water systems; or where antifreeze or additives are used.

CLASS 6: Directly supplied from public water mains only, with or without gravity storage or pump suction tanks, and/or interconnections with industrial systems.

3. The following terminology and definitions for types of fire protection systems shall also be applicable;

(a.) Sprinkler System: includes express riser pipes that convey water to laterals that supply sprinkler heads.

(b.) Standpipe System: includes bulk riser pipes equipped with hose connections, usually at each floor and roof, for exclusive use by the fire department; plus laterals on each floor of certain facilities that supply water to hose cabinets for use by the occupants to control incipient fires until the fire department arrive.

(c.) Combined Systems: includes bulk and express riser pipes that supply both sprinkler and standpipe systems.

4. Fire systems shall be further classified and defined as:

(a.) NONHAZARDOUS: containing impurities Class 3 or lower.

(b.) HAZARDOUS: containing impurities Class 4 or higher.

5. Fire protection systems as defined by the State of Georgia Fire Code shall be contained from the City of Lawrenceville potable water system/supply by backflow prevention assemblies as indicated and that have approvals as required under Section VII of this procedure, and classified or listed by the Underwriters Laboratories and Factory Mutual Insurance, as follows:

Class 1, 2 and 3 Sprinkler Systems and Nonhazardous Standpipe or Combined Systems: shall be contained by the installation of a DOUBLE DETECTOR CHECK backflow prevention assembly.

Class 4, 5 and 6 Sprinkler Systems and Hazardous Standpipe or Combined Systems: shall be contained by the installation of a REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY backflow prevention assembly.

Class 1, 2, 3, 4, 5 and 6 Systems with Combination Hazards: shall be contained from the public water main by procedures applicable to the component that requires the higher degree of protection.

6. The purpose of certain checking devices used, or likely to be used, within fire protection systems is outlined below to call attention to those that are approved for use as backflow prevention devices or assemblies and those that are not.

(a.) DIRECTIONAL CHECKS: to provide flow only.
NOT an approved backflow prevention device or assembly.

(b.) ALARM CHECK: to signal an alarm; to summon the fire department, etc., when a sprinkler head flows water; and, on wet pipe systems, to provide directional flow.

NOT an approved backflow prevention device or assembly.

- (c.) **SINGLE DETECTOR CHECK**: to detect unauthorized use of water for other than fire service; to detect leaks in fire protection systems; and, with by-pass check, to provide directional flow.
NOT an approved backflow prevention device or assembly.
- (d.) **DOUBLE CHECK VALVE BACKFLOW PREVENTION ASSEMBLY (DCV)**: to prevent backflow of polluted water into a potable water system/supply; and to provide directional flow.
APPROVED for use with full service Master or FM meters on a combination service connection only.
- (e.) **DOUBLE DETECTOR CHECK VALVE BACKFLOW PREVENTION ASSEMBLY (DDC)**: to prevent backflow of polluted water from a fire protection system into a potable water system/supply; to detect leaks in the fire protection system; and, to provide directional flow.
APPROVED for use on a dedicated service connection.
- (f.) **REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY (RPZ)**: to prevent backflow of contaminated water into a potable water system/supply; and to provide directional flow.
APPROVED for use on Combination service as in item (d.) above.
- (g.) **REDUCED PRESSURE PRINCIPLE DETECTOR CHECK BACKFLOW PREVENTION ASSEMBLY (RPDC)**: to prevent backflow of contaminated water from a fire protection system into a potable water system/supply; to detect unauthorized use of water; to detect leaks in the fire protection system; and, to provide directional flow.
APPROVED for use on a **Dedicated** service as in item (e.) above.

7. Single detector checks that are used on nonhazardous fire protection systems Class 1, 2 or 3 may not be considered as a component of a DDC backflow prevention assembly. Specifically, the addition of a second single check to one of these devices may not be substituted for a double detector check valve backflow prevention assembly (DDC), which is approved for backflow prevention.

8. It is intended that the approved Double Detector Check Valve Backflow Prevention Assembly (DDC) be in lieu of; not in addition to, the two checking devices already required in the supply to Class 1 and 2; or the Double Check Valve Backflow Prevention Assembly (DCV) already required on Class 3 Nonhazardous systems, and that the approved Reduced Pressure Principle Detector Check Backflow Prevention Assembly (RPDC) be in lieu of the Reduced Pressure Principle Backflow Prevention Assembly (RPZ) already required on hazardous systems. The only additional checking device intended is a ¾ inch Double Check Valve Backflow Prevention Assembly (DCV) or, a

Reduced Pressure Principle Backflow Prevention Assembly (RPZ) in the ¾ inch copper bypass line, in conjunction with the bronze detector meter.

9. The two shut-off valves required for periodic testing of the backflow prevention assembly shall be OS&Y, FDA approved fused epoxy coated inside and out, with resilient seats and the inlet valve shall include an approved test cock on the upstream side. Underwriter's Laboratories and Factory Mutual Insurance shall list all components for fire protection service.

SECTION XII. TESTS, MAINTENANCE and REPAIRS

1. All backflow prevention assemblies, both existing and new, and all parts thereof, shall be maintained in a safe and reliable condition.

2. The consumer shall be responsible for the cost of testing, maintenance and repair of all backflow prevention assemblies downstream of the service connection within the premises and on his own private system.

3. The consumer is responsible for backsiphoned material or contamination and/or pollution through backflow and, if contamination or pollution of the City of Lawrenceville's public potable water system/supply occurs through an illegal cross connection and/or improperly installed, maintained or repaired assembly, or an assembly that has been bypassed, he/she shall be liable for all associated costs of clean up required for the public potable water system/supply.

4. Tests, maintenance and repairs on backflow prevention assemblies are to be made in accordance with the following schedule or more frequently where inspections indicate a need or are specified in manufacturing instructions.

- (a.) **FIXED AIR GAP SEPARATIONS:** shall be inspected at the time of installation and at least annually thereafter.
- (b.) **PRESSURE VACUUM BREAKERS:** shall be inspected and tested at the time of installation, after any repairs have been made and at least annually thereafter.
- (c.) **DUAL CHECK VALVES:** shall be inspected and tested at the time of installation and on a schedule as determined by the City of Lawrenceville Water Department.
- (d.) **DOUBLE CHECK VALVE BACKFLOW PREVENTION ASSEMBLY:** shall be inspected and tested at the time of installation, after any repairs have been made and at least annually thereafter.

- (e.) **REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY:** shall be inspected and tested at time of installation, after any repairs have been made and at least annually thereafter.
 - (f.) **SYNTHETIC COMPONENTS WITHIN A DEVICE:** shall be replaced every five (5) years or sooner if required.
5. Test procedures for all backflow prevention assemblies shall be as outlined in the University of Southern California: FCCCHR; Manual of Cross Connection Control.
6. Testing of backflow prevention assemblies shall be performed by a specialist who is certified to understand the design and intended operation of the assembly or assemblies being tested, and has proven his competency to the City of Lawrenceville Water Department.
7. A test and maintenance record for each RPZ, DCV and PVB assembly shall be maintained by the consumer. Following each test or repair, a report must be sent to the City of Lawrenceville Water Department Backflow Program. The test and/or repair report shall be received by the Backflow Program within fifteen (15) days of the test or repair date. Copies of the City of Lawrenceville Water Department Backflow Prevention Device Test Data and Maintenance Report can be obtained by contacting the City of Lawrenceville Water Department Backflow Program.
8. All backflow prevention assemblies and test data shall be subject to periodic inspection by a representative of the City of Lawrenceville Water Department. If an assembly or device is found to be inoperative or malfunctioning, the consumer will be given a reasonable amount of time to complete corrections required by the inspector or representative. With the exception of cases involving actual or imminent system contamination, the time allotted for corrections will be determined by potential hazard posed to the City of Lawrenceville public potable water system/supply.
9. If the corrective measures have not been taken in the allotted time, termination of water service will be recommended. If the Director of Utilities or his designee concurs, the consumer will receive a certified letter of intent to terminate service. Termination procedures will be initiated ten (10) days after receipt. If the consumer completes the corrections prior to deadline, termination procedures will be halted.

SECTION XIII. PUBLIC AWARENESS

A public education/information article will be published in the local newspaper periodically to inform and update the public on cross connection issues in the City of Lawrenceville. Brochures pertaining to cross connection control and backflow prevention will be available in various locations at City Hall, located at 70 South Clayton Street, Lawrenceville, GA 30044. Cross connection and backflow prevention issues will be discussed at monthly public meetings of the City of Lawrenceville City Council as necessary.

SECTION XIV. ADDITIONAL INFORMATION

Any questions regarding this policy and/or procedures may be directed to the:

**City of Lawrenceville
Water Department
Backflow Program
70 South Clayton Street
Lawrenceville, GA 30044
Phone: 678-442-9256
e-mail: lawwater@bellsouth.net**

APPENDIX A

TERMINOLOGY FOR BACKFLOW PREVENTION BY CONTAINMENT PROGRAM

AIR GAP: The term “air gap” shall mean a physical separation between the free flowing discharge end of a potable water supply pipeline and an open or non-pressure receiving vessel. An approved air gap shall be at least double the diameter of the supply pipe measured vertically above the overflow rim of the vessel-in no case less than 1 inch (2.54 cm).

AUTHORITY: The individual, official, board, department or agency established and authorized by county, city and/or political subdivision created by law to administer and enforce the provisions of the State of Georgia Plumbing Code, The Federal and State Safe Drinking Water Acts, and the Ordinances, Rules, Regulations and Policies of the City of Lawrenceville, Georgia.

BACKFLOW: A reversal of flow in a water system from the normal or intended direction.

BACKFLOW PREVENTION ASSEMBLY: A device designed to prevent reverse flow in a water system. The term should normally be used where backpressure type backflow is implied.

BACKFLOW PREVENTION ASSEMBLY, DOUBLE CHECK VALVE (DCV): A backpressure type backflow prevention assembly designed for continuous or intermittent pressure, including backpressure, where pollutants are involved.

BACKFLOW PREVENTION ASSEMBLY, DOUBLE DETECTOR CHECK VALVE (DDC): A backpressure type backflow prevention assembly designed to serve also as a detector check on fire protection systems where pollutants are involved. It includes a line-size approved double check valve backflow prevention assembly with a metered bypass, into which has also been incorporated an approved double check valve backflow prevention assembly.

BACKFLOW PREVENTION ASSEMBLY, DUAL CHECK (DuC): A backpressure type backflow prevention assembly designed especially for containing water systems to residences where pollutants only are involved. These are to be used for domestic purposes only.

BACKFLOW PREVENTION ASSEMBLY, REDUCED PRESSURE PRINCIPLE VALVE (RPZ): A backpressure and backsiphonage type backflow prevention assembly designed to operate under continuous pressure, including backpressure, where contaminants are involved.

BACKFLOW PREVENTION ASSEMBLY, REDUCED PRESSURE PRINCIPLE DETECTOR CHECK (RPDC): A backpressure and backsiphonage type device designed to serve also as a detector check on fire protection systems where contaminants are involved. It includes a line sized reduced pressure principle backflow prevention assembly with a metered bypass, into which has also been incorporated an approved reduced pressure principle backflow prevention assembly.

BACKFLOW PREVENTION: A program, an ordinance, a code or a policy designed to discover, eliminate and to prevent all unauthorized and uncontrolled backflow and cross connections.

BACKFLOW PREVENTION by CROSS CONNECTION CONTROL: the installation of a backflow prevention assembly at each cross connection on a premise to protect both the premises and the public potable water system/supply (The First Line of Defense).

BACKFLOW PREVENTION by CONTAINMENT: the installation of a backflow prevention assembly at the service connection to the premises to protect only the public potable water system/supply (The Second Line of Defense).

BACKPRESSURE: An increase in pressure in a consumer's water system, or branch of the system, above that at the service connection which could cause, or tend to cause, a reversal in the normal direction of flow. It is generally caused by pumps, thermal expansion, or reasons other than a reduction or loss of the incoming pressure. Backpressure is generally more evident in a closed water system.

BACKSIPHONAGE: A reversal of flow in a water system caused by a negative pressure in the incoming pipe, when the point of use is at atmospheric pressure. Backsiphonage is generally more evident in an open water system.

BACKSIPHONAGE PREVENTER: A device designed to prevent reversal of flow in a water system. The term should be used only where a negative supply pressure is implied.

CLOSED WATER SYSTEM: One with a checking device or assembly installed in the service pipe. A check valve, backflow prevention assembly or a pressure reducing valve would create a closed system.

CONSUMER: The owner or operator of an on-site water system having a service connection to a public potable water system/supply.

CONSUMER'S WATER SYSTEM: All potable water piping, valves, fittings and appurtenances on the premise side of the service connection.

CONTAMINANT: Any substance that, if introduced into the potable water system, could create a health hazard.

CROSS CONNECTION: Any unprotected actual or potential connection or structural arrangement between a public or a consumer’s potable water system and any other source or system through which it is possible to introduce into any part of the public potable water system any used water, industrial fluid, gas, or substance other than the intended potable water with which the system is supplied. Bypass arrangements, jumper connections, removable sections, swivel or change over devices and other temporary or permanent devices through which or because of which backflow can occur are considered to be cross connections.

- a. The term “direct cross connection” shall mean a cross connection which is subject to both backsiphonage and backpressure.
- b. The term “indirect cross connection” shall mean a cross connection which is subject to backsiphonage only.
- c. The term “non-pressure type cross connection” shall mean a low inlet installation where a potable water pipe is connected or extended below the overflow rim of a receptacle, or an environment, that contains a non-potable fluid and is at atmospheric pressure.
- d. The term “pressure type cross connection” shall mean an installation where a potable water pipe is connected to a closed vessel, or piping system, that contains non-potable fluid, and is above atmospheric pressure.

DIRECTOR: The Director of Public Utilities of the City of Lawrenceville, in the state of Georgia.

HAZARD-DEGREE OF: A polluttional (non-health) or contamination (health) hazard that is derived from the evaluation of conditions within a system.

HAZARD-PLUMBING: An internal or plumbing-type cross connection in a consumer’s potable water system that may be either a polluttional or contamination type hazard. A danger or potential danger to health, due to pollutants or contaminants entering the public potable water system/supply via uncontrolled cross connection, which can range in severity from mildly toxic to lethal.

HAZARD-SYSTEM: An actual or potential threat of severe danger to the physical properties of the public or the consumer’s potable water system/supply or of a pollution or contamination which would have a protracted effect on the quality of the potable water in the system.

INSPECTOR: An individual qualified in a vocation and authorized to make inspections, interpret codes, regulations and procedures.

OPEN WATER SYSTEM: One with no checking device or assembly installed in the service pipe. Water from the consumer's system is free to backflow into the main, for whatever reason.

POLLUTANT: Any substance that, if introduced into the public potable water system/supply, could be objectionable but could not create a health hazard.

POTABLE WATER: Any water that, according to recognized standards, is safe for human consumption.

PUBLIC WATER SYSTEM/SUPPLY: A water system (including but not limited to supply, treatment, transmission and distribution facilities and appurtenances) operated as a public utility that supplies potable water to the service connection of the consumer's water system. Herein defined, as the City of Lawrenceville Water Department.

REPRESENTATIVE: A person authorized to represent the Director of Utilities of the City of Lawrenceville, Georgia.

SERVICE CONNECTION: The point of delivery of water to premises. If a water meter is installed at the end of the service connection, then the service connection shall mean the downstream end of the water meter. It is the end of the water purveyor's jurisdiction and the beginning of the plumbing official's and the consumer's, and defined as follows:

- a. **Combination Service Connection:** A single service connection that is designated for more than one use; (i.e., domestic and fire protection).
- b. **Dedicated Service Connection:** A single service connection that is designated for one use only; (i.e., domestic, fire protection, or irrigation).

VACUUM BREAKER (VB): A backsiphonage prevention device or assembly that introduces air into the potable water system when the system pressure approaches zero. It is designed for use when the receptacle or environment being served is subject to atmospheric pressure only.

VACUUM BREAKER, ATMOSPHERIC TYPE (AVB): A backsiphonage prevention device designed for use under flow conditions only, not to exceed 12 consecutive hours in any given 24 hour period, and where it will be subject to no static pressure and no backpressure.

VACUUM BREAKER, HOSE TYPE (HVB): A backsiphonage prevention device designed for hose connections only, but not for continuous pressure, static or flowing.

VACUUM BREAKER, PRESSURE TYPE (PVB): A backsiphonage prevention assembly designed to operate under continuous pressure; static or flowing, but no backpressure.

WATER PURVEYOR: The public or private owner or operator of the potable water system supplying an approved water supply to the public.

COMMON BACKFLOW ABBREVIATIONS

AG	Air Gap
AVB	Atmospheric Vacuum Breaker
DCV	Double Check Valve Assembly (DC, DCVA)
DDC	Double Check Detector Check Assembly (DCDA)
DuC	Dual Check Assembly (residential use only)
HVB	Hose Type Vacuum Breaker (non-testable, residential only)
PVB	Pressure Vacuum Breaker
RPDC	Reduced Pressure Principle Detector Check Assembly (or RP Detector)
RPZ	Reduced Pressure Principle Backflow Prevention Assembly (RP, RPBP, RPPA, RPBFPP)
VB	Vacuum Breaker

REFERENCES

- Cross Connection Control Manual, 1989, United States Environmental Protection Agency
- Rules for Safe Drinking Water, Section 391-3-5.13, Georgia Department of Natural Resources, Environmental Protection Division
- Section 608, Protection of Potable Water Supply, The State of Georgia Plumbing Code, 1997
- Backflow prevention and Cross Connection Control Manual M-14, American Water Works Association, 1974
- Manual of Cross Connection Control, 9th edition 1993, Foundation for Cross Connection Control and Hydraulic Research, University of Southern California
- City of Lawrenceville Code of Ordinances, Chapter 20A

SAMPLE DEVICE TEST DATA and MAINTENANCE REPORT

To obtain copies of the City of Lawrenceville Water Department Backflow Prevention Device Test Data and Maintenance Report, please contact Robert Paul with the Backflow Program at 678-442-9256. All completed copies of Device Test Data and Maintenance Reports must be type written and received by the Backflow Program within 15 days of completion of test and maintenance on each assembly. Completed copies shall be mailed to:

**City of Lawrenceville
Water Department/Backflow Program
70 South Clayton Street
Lawrenceville, GA 30046**

PROCEDURES FOR FILING TEST REPORT FORMS

1. **ALL** Device Test Data and Maintenance Reports **must** be typewritten to be accepted by this office. **NO** exceptions will be made.
2. **ALL** Device Test Data and Maintenance Reports **must** be submitted to this office within fifteen (15) days of the test to be considered valid. This does not include faxed copies of the report. Only the typewritten, hard copy will be sufficient. Any report submitted to this office beyond this period will be returned to the tester and considered null and void. In such cases, it is expected that the tester will perform the test again at **no charge** to the customer. Anyone charging an additional testing fee to the customer will be removed from our Certified Backflow Device Testers List. Faxed copies of field tests are allowed only for the convenience of the customer for Temporary Certificates of Occupancy. This allows the tester to get back to their office to do the necessary paperwork without causing the customer additional problems.
3. Normal testing is done on an **annual** basis. The exception to this rule would be consolidation of tests for a service address that allows for one due date for **all** tests. This benefits all of us (the customer, the tester, and this office). Testing earlier than the due dates on annual tests require the customer to bear additional testing costs and will not be tolerated. Testing accounts early will also result in removal from the Certified Backflow Testers List.
4. If a device is located at the meter, you will need to put in writing where the meter is located, "at meter" or "past meter" is no longer sufficient.
5. If the meter is located inside the building, you will need to put in writing where the meter is located inside the building.
6. It is the tester's responsibility to keep all required information up to date with this department. This information includes: (1) Current and valid copy of Business

License which the tester is working under, (2) Current and valid copy of the Tester's Certification and (3) Current and valid copy of the test kit calibration/certification statement. If any tester allows any of the necessary records to become expired or invalid, his/her name will be removed from the testers list immediately. It will be the tester's responsibility to submit current and valid information to this office in order to be reinstated to the testers list. If you have any questions regarding information submittal, please call Robert Paul at 678-442-9256. Information may be faxed to this office at 770-513-7126 or can be mailed to:

**City of Lawrenceville
Water Department/Backflow Program
70 South Clayton Street
Lawrenceville, GA 30046**

OTHER TESTER AND INSTALLER INFORMATION

Solicitation of Testing

Testers who choose to send letters to City of Lawrenceville water customers for the purpose of soliciting backflow prevention testing are prohibited from identifying themselves in any manner that suggests they are representing the City of Lawrenceville. It is requested that sample copies of solicitation letters be submitted to the City of Lawrenceville Backflow Program for review and approval prior to distribution.

Misrepresentation of the tester's authority with respect to the City of Lawrenceville, due dates, City response to failure to provide current test reports, etc., may result in the tester being removed from the approved testers list.

SAMPLE INSTALLATION INSTRUCTIONS

The following installation instructions shall be followed for each backflow prevention assembly located within the City of Lawrenceville. The City of Lawrenceville accepts the drawings that Gwinnett County provides to its testers and installers by reference. These drawings can be found online at www.gwinnettbackflow.com. Any questions or comments should be forwarded to Robert Paul with the City of Lawrenceville Backflow Program at 678-442-9256. Additional copies of installation instructions can be obtained by contacting the City of Lawrenceville Backflow Program.