AGENDA
DHCD Workgroup #4
2012 USBC IPC, IMC, IFGC, NEC, IGCC
May 30, 2012
9:30 a.m. – 3:30 p.m.

Location: Virginia Housing Center

Lunch Provided by Reservation Only:
Contact Janice Firestone at janice.firestone@dhcd.virginia.gov or 804-371-7150

1. Introduction

2. 2012 USBC regulatory schedule and public hearing

3. 2009 USBC technical amendments retain, amend or delete

4. 2012 International Plumbing Code
   - VDH hospital water well supply for emergencies
   - Sections 601,604 and 608.6.1 water works and hot water dispensers
   - Rainwater, gray and reclaim water, IGCC and VDH guidelines/regulations
   - Grease interceptors, cross connections and local water-sewer authorities
   - Boat marinas VDH regulations and 2015 regulations
   - Solar panels
   - 2012 ICC Swimming Code
   - 2015 IPC
   - Other code changes

5. 2012 International Mechanical Code
   - Hoods 2012 and 2015 code changes, churches and panini grills
   - Ducts 75 feet sprinkler protection
   - Smoke dampers - 2015 code changes
   - Sections 403, 412, 504, 507, 621 and ASTM2513
   - Wood burning gasket doors
   - CO alarms
   - Other code changes

6. 2012 International Fuel Gas Code
   - Purging gas lines 2015 code change
   - CSST gas piping Section 406.7
   - Per NFPA 58 – Retrofit requirements for propane tanks over 4,000 gallons

7. National Electric Code
   - Arc-fault devices
   - 2009 Technical amendments
   - Other major NEC/IRC code changes
8. New Business

9. Next meeting

10. Adjournment

tive cooler discharge water shall be collected and discharged to such collection system.

Exception: Where the reservoir water will adversely affect the quality of the nonpotable water supply making the nonpotable water unusable for its intended purposes.

703.9.5 Discharge water to drain. Where discharge water is not required to be recovered for reuse, the sump overflow pipe shall not directly connect to a drain. Where the discharge water is discharged into a sanitary drain, an air gap of not less than 6 inches (150 mm) shall be required between the termination of the discharge pipe and the drain opening. The discharge pipe shall terminate in a location that is readily visible to the building owners, tenants or maintenance personnel.

SECTION 704
WATER TREATMENT DEVICES AND EQUIPMENT

704.1 Water softeners. Water softeners shall comply with Sections 704.1.1 through 704.1.4.

704.1.1 Demand-initiated regeneration. Water softeners shall be equipped with demand-initiated regeneration control systems. Such control systems shall automatically initiate the regeneration cycle after determining the depletion, or impending depletion of softening capacity.

704.1.2 Water consumption. Water softeners shall have a maximum water consumption during regeneration of 5 gallons (18.9 L) per 1000 grains (17.1 g/L) of hardness removed as measured in accordance with NSF 44.

704.1.3 Waste connections. Waste water from water softener regeneration shall not discharge to reclaimed water collection systems and shall discharge in accordance with the *International Plumbing Code*.

704.1.4 Efficiency and listing. Water softeners that regenerate in place, that are connected to the water system they serve by piping not exceeding $1^1/_4$ inches (31.8 mm) in diameter, or that have a volume of 3 cubic feet (0.085 m^3) or more of cation exchange media shall have a rated salt efficiency of not less than 4,000 grains of total hardness exchange per pound of salt (477 g of total hardness exchange per kg of salt), based on sodium chloride equivalency and shall be listed and labeled in accordance with NSF 44. All other water softeners shall have a rated salt efficiency of not less than 3,500 grains of total hardness exchange per pound of salt (477 g of total hardness exchange per kg of salt), based on sodium chloride equivalency.

704.2 Reverse osmosis water treatment systems. Point-of-use reverse osmosis treatment systems shall be listed and labeled in accordance with NSF 58. The discharge pipe from a reverse osmosis drinking water treatment unit shall connect to the building drainage system in accordance with Section 611.2 of the *International Plumbing Code*. Point-of-use reverse osmosis systems shall be equipped with an automatic shutoff valve that prevents the production of reject water when there is no demand for treated water.

704.3 Onsite reclaimed water treatment systems. Onsite reclaimed water treatment systems, including gray water reuse treatment systems and waste water treatment systems, used to produce nonpotable water for use in water closet and urinal flushing, surface irrigation and similar applications shall listed and labeled to NSF 350.

SECTION 705
METERING

705.1 Metering. Water consumed from any source associated with the building or building site shall be metered. Each potable and reclaimed source of water, and each onsite nonpotable water source, shall be metered separately. Meters shall be installed in accordance with the requirements of the *International Plumbing Code*. For the purposes of Section 705.1.1, Each meter identified in Table 705.1.1 shall be capable of communicating water consumption data remotely and at a minimum, be capable of providing daily data with electronic data storage and reporting capability that can produce reports that show daily, monthly, and annual water consumption.

705.1.1 Metering. All potable and nonpotable water supplied to the applications listed in Table 705.1.1 shall be individually metered in accordance with the requirements indicated in Table 705.1.1. Similar appliances and equipment shall be permitted to be grouped and supplied from piping connected to a single meter.

SECTION 706
NONPOTABLE WATER REQUIREMENTS

706.1 Scope. The provisions of this section shall govern the use of nonpotable water and the construction, installation, and design of systems utilizing nonpotable water. The use and application of nonpotable water shall comply with laws, rules and ordinances applicable in the jurisdiction.

706.2 Signage required. Where nonpotable water is used for a water use application, signage shall be provided that reads as follows: "Nonpotable water is utilized for [APPLICATION NAME]. Caution: nonpotable water. DO NOT DRINK." The words shall be legibly and indelibly printed on a sign constructed of corrosion-resistant waterproof material. The letters of the words shall be not less than 0.5 inches (13 mm) in height and of a color in contrast to the background on which they are applied. In addition to the required wordage, the pictograph shown in Figure 706.2 shall appear on the signage required by this section. The required location of the signage and pictograph shall be in accordance with the applicable section of this code that requires the use of nonpotable water.

706.3 Water quality. Nonpotable water for each end use application shall meet the minimum water quality requirements as established for the application by the laws, rules and ordinances applicable in the jurisdiction.

TABLE 705.1.1
METERING REQUIREMENTS

APPLICATION	REQUIREMENTS
Irrigation	Irrigation systems that are automatically controlled shall be metered.
Tenant spaces	Tenant spaces that are estimated to consume over 1000 gallons of water per day shall be metered individually.
Onsite water collection systems	The makeup water lines supplying onsite water collection systems shall be metered.
Ornamental water features	Ornamental water features with a permanently installed water supply shall be required to utilize a meter on makeup water supply lines.
Pools and in-ground spas	Indoor and outdoor pools and in-ground spas shall be required to utilize a meter on makeup water supply lines.
Cooling towers	Cooling towers of 100 tons capacity or greater or groups of towers shall be required to utilize a meter on makeup water and blow-down water supply lines.
Steam boilers	The makeup water supply line to steam boilers anticipated to draw more than 100,000 gallons annually or having a rating of 500,000 Btu/h or greater shall be metered.
Industrial processes	Industrial processes consuming more than 1,000 gallons per day on average shall be metered individually.
Evaporative coolers	Evaporative coolers supplying in excess of 0.6 gpm, on average, makeup water shall be.
Fluid coolers and chillers	Water-cooled fluid coolers and chillers that do not utilize closed-loop recirculation shall be metered.
Makeup water for closed loop systems such as chilled water and hydronic systems	Makeup water supplying systems of 50 tons of cooling capacity or 500,000 Btu/h of heating capacity shall be metered.
Roof spray systems	Roof spray systems for irrigating vegetated roofs or thermal conditioning shall be metered.

For SI: 1 gallon = 3.8 L, 1 gallon per minute = 3.8 Lpm, 1 ton = 12,000 Btu, 1 British thermal unit per hour = 0.00029 kWh.

FIGURE 706.2
PICTOGRAPH—DO NOT DRINK

SECTION 707
RAINWATER COLLECTION AND DISTRIBUTION SYSTEMS

707.1 Scope. The provisions of this section shall govern the construction, installation, alteration, and repair of rainwater collection and conveyance systems.

707.2 Potable water connections. Where a potable system is connected to a rainwater collection and conveyance system, the potable water supply shall be protected against backflow in accordance with Section 608 of the *International Plumbing Code*.

707.3 Nonpotable water connections. Where nonpotable water from different sources is combined in a system, the system shall comply with the most stringent of the requirements of this code that are applicable to such sources.

707.4 Installation. Except as provided for in this section, all systems shall be installed in compliance with the provisions of the *International Plumbing Code* and the manufacturer's instructions.

707.5 Rainwater collected for landscape irrigation. Rainwater collected on the surface of the building site, or from the roof surfaces of the building, and used for landscape irrigation purposes shall not be limited regarding the method of application. Rainwater collected from elevated building locations that is to be used in building site irrigation, shall comply with the provisions of Section 707 with the exception of Sections 707.11.1, 707.11.1.1 and 707.11.7.3.

707.6 Approved components and materials. Piping, plumbing components, and materials used in the collection and conveyance systems shall be manufactured of material *approved* for the intended application and compatible with any disinfection and treatment systems used.

707.7 Insect and vermin control. Inlets and vents to the system shall be protected to prevent the entrance of insects and vermin into storage tanks and piping systems. Screens installed on vent pipes, inlets, and overflow pipes shall have an aperture of not greater than $^1/_{16}$ inch (1.6 mm) and shall be close fitting. Screen materials shall be compatible with contacting system components and shall not accelerate corrosion of system components.

707.8 Drainage. Water drained from the roof washer or debris excluder shall not be drained to the sanitary sewer. Such water shall be diverted from the storage tank and dis-

charge in a location that will not cause erosion or damage to property. Roof washers and debris excluders shall be provided with an automatic means of self-draining between rain events, and shall not drain onto roof surfaces.

707.9 Freeze protection. Where sustained freezing temperatures occur, provisions shall be made to keep storage tanks and the related piping from freezing.

707.10 Trenching requirements. All water service piping, including piping containing rainwater, shall be separated from the building sewer by 5 feet (1524 m) of undisturbed or compacted earth. Water service pipes, potable and nonpotable, shall not be located in, under or above cesspools, septic tanks, septic tank drainage fields or seepage pits. Buried rainwater collection and distribution piping shall comply with the requirements of Section 306 of the *International Plumbing Code* for support, trenching, bedding, backfilling and tunneling.

Exceptions:

1. The required separation distance shall not apply where the bottom of the water service pipe within 5 feet (1524 mm) of the sewer is a minimum of 12 inches (305 mm) above the top of the highest point of the sewer and the pipe materials shall comply with the *International Plumbing Code* for such applications.
2. Water service pipe is permitted to be located in the same trench with a building sewer, provided such sewer is constructed of materials that comply with the *International Plumbing Code* for such installations.
3. The required separation distance shall not apply where a potable or nonpotable water service pipe crosses a sewer pipe provided the water service pipe is sleeved to not less than 5 feet (1524 mm) horizontally from the sewer pipe centerline on both sides of such crossing with pipe materials that comply with the *International Plumbing Code* for such applications.
4. Irrigation piping located outside of a building and downstream of the backflow preventer is not required to meet the trenching requirements where rainwater is used for outdoor applications.

707.11 Rainwater catchment and collection systems. The design of rainwater collection and conveyance systems shall conform to accepted engineering practice.

707.11.1 Collection surface. Rainwater shall be collected only from above-ground impervious roofing surfaces constructed from *approved* materials. Collection of water from vehicular parking or pedestrian surfaces shall be prohibited except where the water is used exclusively for landscape irrigation. Overflow and bleed-off pipes from roof-mounted appliances including but not limited to evaporative coolers, water heaters, and solar water heaters shall not discharge onto rainwater collection surfaces.

707.11.1.1 Potable water applications. Where collected water is to be treated to potable water standards, wood or cedar shake roofing materials, roofing materials treated with biocides, and lead flashing are prohibited on collection surfaces. Painted surfaces are acceptable only where paint has been certified to ensure that the toxicity level of the paint is acceptable for drinking water contact. Lead, chromium or zinc-based paints are not permitted on rainwater collection surfaces. Flat roofing products shall be certified to NSF P151. Rainwater shall not be collected from vegetated roof systems.

707.11.2 Debris excluders. Downspouts and leaders shall be connected to a roof washer and shall be equipped with a debris excluder or equivalent device to prevent the contamination of collected rainwater with leaves, sticks, pine needles and similar material. Debris excluders and equivalent devices shall be self-cleaning.

707.11.3 Roof gutters and downspouts. Gutters and downspouts shall be constructed of materials that are compatible with the collection surface and the rainwater quality for the desired end use. Joints shall be water tight. Where the collected rainwater is to be used for potable applications, gutters, downspouts, flashing and joints shall be constructed of materials *approved* for drinking water applications.

707.11.3.1 Slope. Roof gutters, leaders, and rainwater collection piping shall slope continuously toward collection inlets. Gutters and downspouts shall have a slope of not less than 1 unit in 96 units along their entire length, and shall not permit the collection or pooling of water at any point.

Exception: Siphonic drainage systems installed in accordance with the manufacturer's installation instructions shall not be required to have slope.

707.11.3.2 Size. Gutters and downspouts shall be installed and sized in accordance with Section 1106.6 of the *International Plumbing Code*.

707.11.3.3 Cleanouts. Cleanouts shall be provided in the water conveyance system so as to allow access to all filters, flushes, pipes and downspouts.

707.11.4 Collection pipe materials. In buildings where rainwater collection and conveyance systems are installed, drainage piping *approved* for use within plumbing drainage systems shall be utilized to collect rainwater and convey it to the storage tank. Vent piping *approved* for use within plumbing venting systems shall be utilized for all vents within the rainwater system. Drains to a storm water discharge shall use *approved* waste piping.

707.11.4.1 Joints. Collection piping conveying rainwater shall utilize joints *approved* for use with the distribution piping and appropriate for the intended applications as specified in the *International Plumbing Code*.

707.11.4.2 Size. Collection piping conveying rainwater from collection surfaces shall be sized in accordance with Chapter 11 of the *International Plumbing Code* and local rainfall rates.

707.11.4.3 Marking. Additional marking of rainwater collection piping shall not be required beyond that

required for sanitary drainage, waste, and vent piping by the *International Plumbing Code*.

707.11.5 Filtration. Collected rainwater shall be filtered to the level required for the intended end use. Filters shall be accessible for inspection and maintenance.

707.11.6 Disinfection. Where the intended application and initial quality of the collected rainwater requires disinfection or other treatment or both, the collected rainwater shall be treated as needed to ensure that the required water quality is delivered at the point of use. Where chlorine is used for disinfection or treatment, water shall be tested for residual chlorine in accordance with ASTM D 1253. The levels of residual chlorine shall not exceed the levels allowed for the intended use in accordance with the requirements of the jurisdiction.

707.11.7 Storage tank. The design of the storage tank shall be in accordance with Sections 707.11.7.1 through 707.11.7.10.

707.11.7.1 Location. Storage tanks shall be installed either above or below grade. Above-grade storage tanks shall be protected from direct sunlight and shall be constructed using opaque, UV-resistant materials including, but not limited to, heavily tinted plastic, fiberglass, lined metal, concrete, wood, or painted to prevent algae growth, or shall have specially constructed sun barriers including, but not limited to, installation in garages, crawlspaces, or sheds. Storage tanks and their manholes shall not be located directly under any soil or waste piping or any source of contamination. Rainwater storage tanks shall be located with a minimum horizontal distance between various elements as indicated in Table 707.11.7.1.

TABLE 707.11.7.1
LOCATION OF RAINWATER STORAGE TANKS

ELEMENT	MINIMUM HORIZONTAL DISTANCE FROM STORAGE TANK (feet)
Critical root zone (CRZ) of protected trees	2
Lot line adjoining private lots	5
Seepage pits	5
Septic tanks	5

For SI: 1 foot = 304.8 mm.

707.11.7.2 Materials. Where water is collected onsite, it shall be collected in an *approved* tank constructed of durable, nonabsorbent and corrosion-resistant materials. Storage vessels shall be compatible with the material being stored.Where collected water is to be treated to potable water standards, tanks shall be constructed of materials in accordance with NSF 61. Storage tanks shall be constructed of materials compatible with the type of disinfection system used to treat water upstream of the tank and used to maintain water quality within the tank.

707.11.7.2.1 Wooden tanks. Wooden storage tanks shall not be required to have a liner. Where a tank is lined and used for potable water, the liner shall be in accordance with NSF standards. Where unlined tanks are used, the species of wood shall be decay resistant and untreated.

707.11.7.3 Makeup water. Where an uninterrupted supply is required for the intended application, potable or municipally supplied reclaimed or recycled water shall be provided as a source of makeup water for the storage tank. The potable or reclaimed or recycled water supply shall be protected against backflow in accordance with the *International Plumbing Code*.

707.11.7.4 Overflow. The storage tank shall be equipped with an overflow pipe having the same or larger area as the sum of the areas of all tank inlet pipes. The overflow pipe shall be protected from insects or vermin and the discharge from such pipe shall be disposed of in a manner consistent with storm water runoff requirements of the jurisdiction. The overflow pipe shall discharge at a sufficient distance from the tank to avoid damaging the tank foundation or the adjacent property. The overflow drain shall not be equipped with a shutoff valve. A minimum of one cleanout shall be provided on each overflow pipe in accordance with Section 708 of the *International Plumbing Code*.

707.11.7.5 Access. A minimum of one access opening shall be provided to allow inspection and cleaning of the tank interior. Access openings to storage tanks and other vessels shall have an *approved* locking device or shall otherwise be protected from unauthorized access. Below-grade storage tanks, located outside of the building, shall be provided with either a manhole not less than 24 inches (610 mm) square or a manhole with an inside diameter of not less than 24 inches (610 mm). Manholes shall extend not less than 4 inches (102 mm) above ground or shall be designed so as to prevent water infiltration. Finish grade shall be sloped away from the manhole to divert surface water from the manhole. Each manhole cover shall be secured to prevent unauthorized access. Service ports in manhole covers shall be not less than 8 inches (203 mm) in diameter and shall be not less than 4 inches (102 mm) above the finished grade level. The service port shall be secured to prevent unauthorized access.

Exception: Storage tanks having a volume of less than 800 gallons (3028 L) and installed below grade shall not be required to be equipped with a manhole where provided with a service port that is not less than 8 inches (203 mm) in diameter.

707.11.7.6 Venting. Tanks shall be provided with a vent sized in accordance with the *International Plumbing Code* and based on the diameter of the tank influent pipe. Tank vents shall not be connected to sanitary drainage system vents.

707.11.7.7 Inlets. Storage tank inlets shall be designed to introduce water into the tank with minimum turbulence, and shall be located and designed to avoid agitating the contents of the storage tank.

707.11.7.8 Outlets. Outlets shall be located not less than 4 inches (102 mm) above the bottom of the storage tanks and shall not skim water from the surface.

707.11.7.9 Draining of tanks. Where tanks require draining for service or cleaning, tanks shall be drained by using a pump or by a drain located at the lowest point in the tank. The discharge from draining the tank shall be disposed of in a manner consistent with the storm water runoff requirements of the jurisdiction and at a sufficient distance from the tank to avoid damaging the tank foundation.

707.11.7.10 Marking and signage. Each storage tank shall be marked with its rated capacity. Storage tanks shall bear signage that reads as follows: "CAUTION: NONPOTABLE WATER – DO NOT DRINK." Where an opening is provided that could allow the entry of personnel, the opening shall bear signage that reads as follows: "DANGER – CONFINED SPACE." Markings shall be indelibly printed on a tag or sign constructed of corrosion-resistant waterproof material mounted on the tank or shall be indelibly printed on the tank. The letters of words shall be not less than 0.5 inches (13 mm) in height and shall be of a color that contrasts with the background on which they are applied.

707.11.8 Valves. Valves shall be supplied in accordance with Section 707.11.8.1.

707.11.8.1 Backwater valve. Backwater valves shall be installed on each overflow and tank drain pipe. Backwater valves shall be installed so that access is provided to the working parts for service and repair.

707.11.9 Roof washer. A sufficient amount of rainwater shall be diverted at the beginning of each rain event, and not allowed to enter the storage tank, to wash accumulated debris from the collection surface. The amount of rainfall to be diverted shall be field adjustable as necessary to minimize storage tank water contamination. The roof washer shall not rely on manually operated valves or devices, and shall operate automatically. Diverted rainwater shall not be drained to the roof surface, and shall be discharged in a manner consistent with the storm water runoff requirements of the jurisdiction. Roof washers shall be accessible for maintenance and service.

707.11.10 Vent piping. Storage tanks shall be provided with a vent in accordance with the requirements of Section 707.11.7.6. Vents shall be sized in accordance with the *International Plumbing Code*, based on the aggregate diameter of storage tank influent pipe(s). Vents shall be protected from contamination by means of a U-bend installed with the opening directed downward or an *approved* cap. Vent outlets shall extend a minimum of 4 inches (102 mm) above grade, or as necessary to prevent surface water from entering the storage tank. Vent openings shall be protected against the entrance of vermin and insects in accordance with the requirements of Section 707.7.

707.11.11 Pumping and control system. Mechanical equipment including pumps, valves and filters shall be easily accessible and removable in order to perform repair, maintenance and cleaning. Where collected rainwater is to be treated to potable water standards, the pump and all other pump components shall be listed, labeled and *approved* for use with potable water systems. Pressurized water shall be supplied at a pressure appropriate for the application and within the range specified by the *International Plumbing Code*. Where water could be supplied at an excessive pressure, a pressure-reducing valve shall be installed in accordance with the requirements of the *International Plumbing Code*.

707.11.11.1 Water-pressure-reducing valve or regulator. Where the rainwater pressure supplied by the pumping system exceeds 80 psi (552 kPa) static, a pressure-reducing valve shall be installed to reduce the pressure in the rainwater distribution system piping to 80 psi (552 kPa) static or less. Pressure-reducing valves shall be specified and installed in accordance with Section 604.8 of the *International Plumbing Code*.

707.11.12 Distribution pipe. Distribution piping shall comply with Sections 707.11.12.1 through 707.11.12.4.

707.11.12.1 Materials. Distribution piping conveying rainwater shall conform to the standards and requirements specified by the *International Plumbing Code* for nonpotable or potable water, as applicable.

707.11.12.2 Joints. Distribution piping conveying rainwater shall utilize joints *approved* for use with the distribution piping and appropriate for the intended applications as specified in the *International Plumbing Code*.

707.11.12.3 Size. Distribution piping conveying rainwater shall be sized in accordance with the *International Plumbing Code* for the intended application.

707.11.12.4 Marking. Nonpotable rainwater distribution piping shall be of the color purple and shall be embossed or integrally stamped or marked with the words: "CAUTION: NONPOTABLE WATER – DO NOT DRINK" or shall be installed with a purple identification tape or wrap. Identification tape shall be not less than 3 inches (76 mm) wide and have white or black lettering on purple field stating "CAUTION: NONPOTABLE WATER – DO NOT DRINK." Identification tape shall be installed on top of nonpotable rainwater distribution pipes, fastened not greater than every 10 feet (3048 mm) to each pipe length and run continuously the entire length of the pipe. Lettering shall be readily observable within the room or space where the piping is located.

Exception: Piping located outside of the building and downstream of the backflow preventer is not required to be purple where rainwater is used for outdoor applications.

707.12 Tests and inspections. Tests and inspection shall be performed in accordance with Sections 707.12.1 through 707.12.10.

707.12.1 Drainage and vent tests. The testing of rainwater collection piping, overflow piping, vent piping and

storage tank drains shall be conducted in accordance with Section 312 of the *International Plumbing Code*.

707.12.2 Drainage and vent final test. A final test shall be applied to the rainwater collection piping, overflow piping, storage tank, and tank vent piping in accordance with Section 312.4 of the *International Plumbing Code*.

707.12.3 Water supply system test. The testing of makeup water supply piping and rainwater distribution piping shall be conducted in accordance with Section 312.5 of the *International Plumbing Code*.

707.12.4 Inspection and testing of backflow prevention assemblies. The testing of backflow preventers and backwater valves shall be conducted in accordance with Section 312.10 of the *International Plumbing Code*.

707.12.5 Inspection vermin and insect protection. Inlets and vents to the system shall be inspected to ensure that each is protected to prevent the entrance of insects or vermin into storage tank and piping systems in accordance with Section 707.8.

707.12.6 Roof gutter inspection and test. Roof gutters shall be inspected to verify that the installation and slope is in accordance with Section 707.11.3. Gutters shall be tested by pouring not less than 1 gallon (3.8 L) of water into the end of the gutter opposite the collection point. The gutter being tested shall not leak and shall not retain standing water.

707.12.7 Roofwasher test. Roofwashers shall be tested by introducing water into the gutters. Proper diversion of the first quantity of water in accordance with the requirements of Section 707.11.9 shall be verified.

707.12.8 Storage tank tests. Storage tanks shall be tested in accordance with the following:

1. Storage tanks shall be filled with water to the overflow line prior to and during inspection. Seams and joints shall be left exposed and the tank shall remain water tight without leakage for a period of 24 hours.
2. After 24 hours, supplemental water shall be introduced for a period of 15 minutes to verify proper drainage of the overflow system and verify that there are no leaks.
3. The makeup water system shall be observed for proper operation and successful automatic shutoff of the system at the refill threshold shall be verified.

707.12.9 Supply pressure test. The static water pressure at the point of use furthest from the supply shall be verified to be within the range required for the application, in accordance with Section 707.11.11.

707.12.10 Water quality test. The quality of the water for the intended application shall be verified at the point of use in accordance with the requirements of the jurisdiction. Except where site conditions as specified in ASTM E 2727 affect the rainwater, collected rainwater shall be considered to have the parameters indicated in Table 707.12.10.

TABLE 707.12.10
RAINWATER QUALITY

PARAMETER	VALUE
pH	6.0 – 7.0
Biological oxygen demand	Not greater than 10 mg/L
Nephelometric turbidity unit	Not greater than 2
Fecal coliform	No detectable fecal coli in 100 mL
Sodium	No detectable sodium in 100 mL
Chlorine	No detectable chlorine in 100 mL
Enteroviruses	No detectable enteroviruses in 100 mL

707.13 Operations and maintenance manuals. Operations and maintenance materials shall be supplied in accordance with 707.13.1 through 707.13.4.

707.13.1 Manual. A detailed operations and maintenance manual shall be supplied in hardcopy form with all rainwater collection systems.

707.13.2 Schematics. The manual shall include a detailed system schematic, the locations of all system components, and a list of all system components including manufacturer and model number.

707.13.3 Maintenance procedures. The manual shall provide a maintenance schedule and procedures for all system components requiring periodic maintenance. Consumable parts including filters shall be noted along with part numbers.

707.13.4 Operations procedures. The manual shall include system startup and shutdown procedures. The manual shall include detailed operating procedures for the system.

707.14 System abandonment. If the owner of a rainwater collection and conveyance system elects to cease use of, or fails to properly maintain such system, the system shall be abandoned and shall comply with the following:

1. System piping connecting to a utility-provided water system shall be removed or disabled.
2. The rainwater distribution piping system shall be replaced with an *approved* potable water supply piping system. Where an existing potable pipe system is already in place, the fixtures shall be connected to the existing system.
3. The storage tank shall be secured from accidental access by sealing or locking tank inlets and access points, or filling with sand or equivalent.

707.15 Potable water applications. Where collected rainwater is to be used for potable water applications, all materials contacting the water shall comply with NSF 61.

707.15.1 Water quality testing. Collected rainwater shall be tested. Accumulated water to be tested shall be the result of not less than two rainfall events. Testing shall be in accordance with Sections 707.15.1.1 and 707.15.1.2.

707.15.1.1 Test methods. Water quality testing shall be performed in accordance with the latest edition of

APHA–Standard Methods for the Examination of Water and Wastewater and in accordance with Sections 707.15.1.1.1 and 707.15.1.1.2.

707.15.1.1.1 Annual tests required. Accumulated rainwater shall be tested prior to initial use and annually thereafter for Escherichia coli, total coliform, heterotrophic bacteria and cryptosporidium.

707.15.1.1.2 Quarterly tests required. Accumulated rainwater shall be tested prior to initial use and quarterly thereafter for pH, filterable solids, residual chlorine if disinfection is used, and turbidity. The pH shall be tested in accordance with ASTM D 5464; filterable solids shall be tested in accordance with ASTM D 5907; residual chlorine shall be tested in accordance with ASTM D 1253 and turbidity shall be tested in accordance with ASTM D 6698.

707.15.1.2 Test records. Test records shall be retained for not less than two years.

SECTION 708
GRAY WATER SYSTEMS

708.1 Scope. The provisions of this section shall govern the construction, installation, alteration, and repair of gray water reuse systems.

708.2 Permits. Permits shall be required for the construction, installation, alteration, and repair of gray water systems. Construction documents, engineering calculations, diagrams, and other such data pertaining to the gray water system shall be submitted with each application for permit in accordance with the laws, rules and ordinances applicable in the jurisdiction.

708.3 Potable water connections. Where a potable water system is connected to a gray water system, the potable water supply shall be protected against backflow in accordance with Section 608 of the *International Plumbing Code*.

708.4 Nonpotable water connections. Where nonpotable water from different sources is combined in a system, the system shall comply with the most stringent of the requirements of this code that are applicable to such sources.

708.5 Installation. Except as provided for in this section, all systems shall be installed in compliance with the provisions of the *International Plumbing Code* and the manufacturer's instructions, as applicable.

708.5.1 Gray water systems for landscape irrigation. Gray water systems used for landscape irrigation purposes shall be limited to subsurface and surface irrigation applications. Gray water shall not be retained longer than 24 hours before being used for surface irrigation. Gray water to be used in gray water irrigation shall comply with the provisions of Section 708 with the exception of Sections 708.6 and 708.12.6.5. Subsurface gray water systems shall be in accordance with Section 708.14. Gray water shall be filtered by a 0.004-inch (100 micron) or finer filter. The control panel for the gray water irrigation system shall be provided with signage in accordance with Section 706.2.

708.6 Applications. Untreated gray water shall be utilized in accordance with Section 702 and local codes. Treated gray water shall be utilized in accordance with Section 706 and as permitted by local codes.

708.7 Approved components and materials. The piping, plumbing components, and materials used in gray water systems shall be manufactured of material *approved* for the intended application and compatible with any disinfection and treatment systems used.

708.8 Insect and vermin control. The inlets and vents to the system shall be protected to prevent insects and vermin from entering storage tanks and piping systems. Screens installed on vent pipes and overflow pipes shall have an aperture not greater than $^1/_{16}$ inch (1.6 mm) and shall be close-fitting. Screen materials shall be compatible with contacting system components and shall not accelerate corrosion of system components

708.9 Freeze protection. Where sustained freezing temperatures occur, provisions shall be made to keep storage tanks and the related piping from freezing.

708.10 Trenching requirements. Water service piping, including piping containing gray water, shall be separated from the building sewer by 5 feet (1524 m) of undisturbed or compacted earth. Gray water piping shall be separated from potable water piping underground by 5 feet (1524 m) of undisturbed or compacted earth. Nonpotable water service pipes shall not be located in, under or above cesspools, septic tanks, septic tank drainage fields or seepage pits. Buried gray water piping shall comply with the requirements of Section 306 of the *International Plumbing Code* for support, trenching, bedding, backfilling, and tunneling.

Exceptions:

1. The required separation distance shall not apply where the bottom of the gray water service pipe within 5 feet (1524 mm) of the sewer is not less than 12 inches (305 mm) above the top of the highest point of the sewer and the pipe materials comply with the requirements of the *International Plumbing Code* for such applications.
2. The required separation distance shall not apply where the bottom of the potable water service pipe within 5 feet (1524 mm) of the gray water pipe is not less than 12 inches (305 mm) above the top of the highest point of the gray water pipe and the pipe materials comply with the requirements of the *International Plumbing Code* for such applications.
3. Water service pipe is permitted to be located in the same trench with a building sewer, provided that such sewer is constructed of materials that comply with the requirements of the *International Plumbing Code* for such applications.
4. The required separation distance shall not apply where a potable or nonpotable water service pipe crosses a sewer pipe provided that the water service pipe is sleeved to not less than 5 feet (1524 mm) horizontally from the sewer pipe centerline on both sides of such crossing with pipe materials that com-

ply with the requirements of the *International Plumbing Code* for such applications.

5. The required separation distance shall not apply where a potable water service pipe crosses a gray water pipe provided that the potable water service pipe is sleeved for a distance of not less than 5 feet (1524 mm) horizontally from the centerline of the gray water pipe on both sides of such crossing with pipe materials that comply with the requirements of the *International Plumbing Code* for such applications.
6. Irrigation piping located outside of a building and downstream of the backflow preventer is not required to meet the trenching requirements where gray water is used for outdoor applications.

708.11 System abandonment. If the owner of a gray water system elects to cease use of, or fails to properly maintain such system, the system shall be abandoned and shall comply with the following:

1. System piping connecting to a utility-provided water system shall be removed or disabled.
2. Storage tanks shall be secured against accidental access by sealing or locking tank inlets and access points, or filling with sand or equivalent.

708.12 Gray water systems. The design of the gray water system shall conform to accepted engineering practice.

708.12.1 Gray water sources. Gray water reuse systems shall collect waste discharge from only the following sources: bathtubs, showers, lavatories, clothes washers, and laundry trays. Water from other *approved* nonpotable sources including swimming pool backwash operations, air conditioner condensate, rainwater, cooling tower blowdown water, foundation drain water, steam system condensate, fluid cooler discharge water, food steamer discharge water, combination oven discharge water, industrial process water, and fire pump test water shall also be permitted to be collected for reuse by gray water systems, as *approved* by the *code official* and as appropriate for the intended application.

708.12.1.1 Prohibited gray water sources. Waste water containing urine or fecal matter shall not be diverted to gray water systems and shall discharge to the sanitary drainage system of the building or premises in accordance with the *International Plumbing Code*. Water from reverse osmosis system reject water, water softener discharge water, kitchen sink waste water, dishwasher waste water, and waste water discharged from wet-hood scrubbers shall not be collected for reuse within a gray water system.

708.12.2 Traps. Traps serving fixtures and devices discharging waste water to gray water reuse systems shall have a liquid seal of not less than 2 inches (51 mm) and not more than 4 inches (102 mm). Where a trap seal is subject to loss by evaporation, a trap seal primer valve shall be installed in accordance with the *International Plumbing Code*.

708.12.3 Collection pipe. Gray water reuse systems shall utilize drainage piping *approved* for use within plumbing drainage systems to collect and convey untreated gray water. Vent piping *approved* for use within plumbing venting systems shall be utilized for vents within the gray water system. Drains to the sanitary sewer shall use *approved* waste piping.

708.12.3.1 Joints. Collection piping conveying untreated gray water shall utilize joints *approved* for use with the distribution piping and appropriate for the intended applications as specified in the *International Plumbing Code*.

708.12.3.2 Size. Collection piping conveying rainwater from collection surfaces shall be sized in accordance with storm drainage sizing requirements specified in the *International Plumbing Code*.

708.12.3.3 Marking. Additional marking of untreated gray water collection piping shall not be required beyond that required for sanitary drainage, waste, and vent piping by the *International Plumbing Code*.

708.12.4 Filtration. Collected gray water shall be filtered as required for the intended end use. Filters shall be accessible for inspection and maintenance. Filters shall utilize a pressure gage or other *approved* method to provide indication when a filter requires servicing or replacement. Filters shall be installed with shutoff valves installed immediately upstream and downstream to allow for isolation during maintenance.

708.12.5 Disinfection. Where the intended application for collected gray water requires disinfection or other treatment or both, collected gray water shall be disinfected as needed to ensure that the required water quality is delivered at the point of use. Where chlorine is used for disinfection or treatment, water shall be tested for residual chlorine in accordance with ASTM D 1253. The levels of residual chlorine shall not exceed the levels allowed for the intended use in accordance with the requirements of the jurisdiction. Untreated gray water shall be retained in collection reservoirs for a maximum of 24 hours in accordance with Section 708.12.6.1.

708.12.6 Storage tank. The design of the storage tank shall be in accordance with Sections 708.12.6.1 through 708.12.6.10.

708.12.6.1 Sizing. The holding capacity of the storage tank shall be sized in accordance with the anticipated demand. Where gray water is to be used in untreated form for groundwater recharge or subsurface irrigation, the storage tank shall be sized to limit the retention time of gray water to a maximum of 24 hours.

708.12.6.2 Location. Storage tanks shall be installed above or below grade. Above-grade storage tanks shall be protected from direct sunlight and shall be constructed using opaque, UV-resistant materials such as, but not limited to, heavily tinted plastic, fiberglass, lined metal, concrete, wood, or painted to prevent algae growth, or shall have specially constructed sun barriers including, but not limited to, installation in garages,

crawlspaces, or sheds. Storage tanks and their manholes shall not be located directly under any soil or waste piping or any source of contamination. Gray water storage tanks shall be located with a minimum horizontal distance between various elements as indicated in Table 708.12.6.2. Storage tanks containing untreated gray water shall be located a minimum horizontal distance of 5 feet (1524 mm) from buildings, in addition to the requirements in Table 708.12.6.2.

TABLE 708.12.6.2
LOCATION OF GRAY WATER STORAGE TANKS

ELEMENT	MINIMUM HORIZONTAL DISTANCE FROM STORAGE TANK (feet)
Critical root zone (CRZ) of protected trees	2
Lot line adjoining private lots	5
Seepage pits	5
Septic tanks	5
Water wells	50
Streams, lakes, wetlands and other bodies of water	50
Water service	5
Public water main	10

For SI: 1 foot = 304.8 mm.

708.12.6.3 Materials. Where collected onsite, water shall be collected in an *approved* tank constructed of durable, nonabsorbent and corrosion-resistant materials. The storage tank shall be constructed of materials compatible with any disinfection systems used to treat water upstream of the tank and with any systems used to maintain water quality within the tank.

708.12.6.3.1 Wood tanks. Wooden storage tanks that are not equipped with a makeup water source shall be provided with a flexible liner.

708.12.6.4 Makeup water. Where an uninterrupted supply of makeup water is required for the intended application, potable or municipally supplied reclaimed/recycled water shall be provided as a source of makeup water for the storage tank. The potable, reclaimed or recycled water supply shall be protected against backflow by means of an air gap not less than 4 inches (102 mm) above the overflow or an *approved* backflow device in accordance with the *International Plumbing Code*. There shall be a full-open valve located on the makeup water supply line to the storage tank. Inlets to storage tank shall be controlled by fill valves or other automatic supply valves installed so as to prevent the tank from overflowing and to prevent the water level from dropping below a predetermined point. Where makeup water is provided, the water level shall not be permitted to drop below the gray water inlet or the intake of any attached pump.

708.12.6.5 Overflow. The storage tank shall be equipped with an overflow pipe having the same or larger area as the sum of the areas of all reservoir inlet pipes. The overflow pipe shall be trapped and shall be indirectly connected to the sanitary drainage system. The overflow drain shall not be equipped with a shutoff valve. A minimum of one cleanout shall be provided on each overflow pipe in accordance with Section 708 of the *International Plumbing Code*.

708.12.6.6 Access. A minimum of one access opening shall be provided to allow inspection and cleaning of the tank interior. Access openings shall have an *approved* locking device or other *approved* method of securing access. Below-grade storage tanks, located outside of the building, shall be provided with either a manhole not less than 24 inches (610 mm) square or a manhole with an inside diameter not less than 24 inches (610 mm) and extending not less than 4 inches (102 mm) above ground. Finished grade shall be sloped away from the manhole to divert surface water from the manhole. Each manhole cover shall have a locking device. Service ports in manhole covers shall be not less than 8 inches (203 mm) in diameter and shall be not less than 4 inches (102 mm) above the finished grade level. The service port shall have a locking cover or a brass cleanout plug.

Exception: Storage tanks under 800 gallons (3024 L) in volume installed below grade shall not be required to be equipped with a manhole, but shall have a service port not less than 8 inches (203 mm) in diameter.

708.12.6.7 Venting. The tank shall be provided with a vent sized in accordance with the *International Plumbing Code* and based on the diameter of the tank influent pipe. The reservoir vent shall not be connected to sanitary drainage vent system.

708.12.6.8 Outlets. Outlets shall be located not less than 4 inches (102 mm) above the bottom of the storage tank, and shall not skim water from the surface.

708.12.6.9 Drain. A drain shall be located at the lowest point of the storage tank and shall be indirectly connected to the sanitary drainage system. The total area of all drains shall not be smaller than the total area of all overflow pipes. Not less than one cleanout shall be provided on each drain pipe in accordance with Section 708 of the *International Plumbing Code*.

708.12.6.10 Signage. Each storage tank shall be marked with its rated capacity and the location of the upstream bypass valve. The contents of storage tanks shall be identified with the words "CAUTION: NON-POTABLE WATER – DO NOT DRINK." Where an opening is provided that could allow the entry of personnel, the opening shall be marked with the words, "DANGER – CONFINED SPACE." Markings shall be indelibly printed on a tag or sign constructed of corrosion-resistant waterproof material mounted on the tank or shall be indelibly printed on the tank. The letters of the words shall be not less than 0.5 inches (13 mm) in height and shall be of a color in contrast with the background on which they are applied.

708.12.7 Valves. Valves shall be supplied in accordance with Sections 708.12.7.1 and 708.12.7.2.

708.12.7.1 Bypass valve. One three-way diverter valve listed and labeled to NSF 50 or other *approved* device shall be installed on gray water collection piping upstream of each storage tank, or drainfield, as applicable, to divert untreated gray water sources to the sanitary sewer to allow servicing and inspection of the system. Bypass valves shall be installed downstream of fixture traps and vent connections Bypass valves shall be marked to indicate the direction of flow, connection and storage tank or drainfield connection. Bypass valves shall be installed in accessible locations. Two shutoff valves shall not be installed to serve as a bypass valve.

708.12.7.2 Backwater valve. Overflow and tank drain piping shall be protected against backwater conditions by the installation of one or more backwater valves. Backwater valves shall be installed so that access is provided to the working parts for service and repair.

708.12.8 Vent piping. Storage tanks shall be provided with a vent in accordance with the requirements of Section 708.12.6.8. Vents shall be sized in accordance with the *International Plumbing Code*, based on the aggregate diameter of storage tank influent pipes. Open vents shall be protected from contamination by means of a U-bend installed with the opening directed downward or an *approved* cap. Vent outlets shall extend not less than 4 inches (102 mm) above grade, or as necessary to prevent surface water from entering the storage tank. Vent openings shall be protected against the entrance of vermin and insects in accordance with the requirements of Section 708.8.

708.12.9 Pumping and control system. Mechanical equipment including pumps, valves and filters shall be accessible and removable in order to perform repair, maintenance and cleaning. Pressurized water shall be supplied at a pressure appropriate for the application and within the range specified by the *International Plumbing Code*. Where water could be supplied at an excessive pressure, a pressure-reducing valve shall be installed in accordance with the requirements of the *International Plumbing Code*.

708.12.9.1 Standby power. Where required for the intended application, automatically activated standby power, capable of powering all essential treatment and pumping systems under design conditions shall be provided.

708.12.9.2 Inlet control valve alarm. Makeup water systems shall be provided with a warning mechanism that alerts the user to a failure of the inlet control valve to close correctly. The alarm shall activate before the water within the collection reservoir storage tank begins to discharge into the overflow system.

708.12.9.3 Water-pressure-reducing valve or regulator. Where the gray water pressure supplied by the pumping system exceeds 80 psi (552 kPa) static, a pressure-reducing valve shall be installed to reduce the pressure in the gray water distribution system piping to 80 psi (552 kPa) static or less. Pressure-reducing valves shall be specified and installed in accordance with Section 604.8 of the *International Plumbing Code*.

708.12.10 Distribution pipe. Distribution piping shall comply with Sections 708.12.10.1 through 708.12.10.4.

708.12.10.1 Materials. Distribution piping conveying gray water shall conform to standards and requirements specified by the *International Plumbing Code*.

708.12.10.2 Joints. Distribution piping conveying gray water shall utilize joints *approved* for use with the distribution piping and appropriate for the intended applications as specified in the *International Plumbing Code*.

708.12.10.3 Size. Distribution piping conveying gray water shall be sized in accordance with the *International Plumbing Code* for the intended application or applications.

708.12.10.4 Marking. All gray water distribution piping shall be either the color purple and embossed or integrally stamped or marked "CAUTION: NONPOTABLE WATER – DO NOT DRINK" or shall be installed with a purple identification tape or wrap. Identification tape shall be not less than 3 inches (76 mm) wide and have white or black lettering on purple field stating "CAUTION: NONPOTABLE WATER – DO NOT DRINK." Identification tape shall be installed on top of gray water distribution pipes, fastened not greater than every 10 feet (3048 mm) to each pipe length and run continuously the entire length of the pipe. Lettering shall be readily observable within the room or space where the piping is located.

Exception: Outside of the building, purple piping is not required downstream of the backflow preventer where gray water is used for outdoor applications.

708.13 Tests and inspections. Tests and inspections shall be performed in accordance with Sections 708.13.1 through 708.13.8.

708.13.1 Drainage and vent test. A pressure test shall be applied to the gray water collection piping, overflow piping, storage tank drainage piping and tank vent piping in accordance with Section 312 of the *International Plumbing Code*.

708.13.2 Drainage and vent final test. A final test shall be applied to the gray water collection piping, overflow piping, and tank vent piping in accordance with Section 312.4 of the *International Plumbing Code*.

708.13.3 Water supply system test. The testing of makeup water supply piping and rainwater distribution piping shall be conducted in accordance with Section 312.5 of the *International Plumbing Code*.

708.13.4 Inspection and testing of backflow prevention assemblies. The testing of backflow preventers and backwater valves shall be conducted in accordance with Section 312.10 of the *International Plumbing Code*.

708.13.5 Inspection vermin and insect protection. Inlets and vents to the system shall be inspected to verify that each is protected to prevent the entrance of insects and

vermin into the storage tank and piping systems in accordance with Section 708.8.

708.13.6 Storage tank tests. Storage tanks shall be tested in accordance with all of the following:

1. Storage tanks shall be filled with water to the overflow line prior to and during inspection. All seams and joints shall be left exposed and the tank shall remain water tight without leakage for a period of 24 hours.
2. After 24 hours, supplemental water shall be introduced for a period of 15 minutes to verify proper drainage of the overflow system and verify that there are no leaks.
3. Following the successful test of the overflow, the water level in the tank shall be reduced to a point that is 2 inches (51 mm) below the makeup water trigger point using the tank drain. The tank drain shall be observed for proper operation. The makeup water system shall be observed to verify proper operation, and successful automatic shutoff of the system at the refill threshold. Water shall not be drained from the overflow at any time during the refill test.

708.13.7 Supply pressure test. The static water pressure at the point of use furthest from the supply shall be verified to be within the range required for the application, in accordance with Section 707.12.9.

708.13.8 Water quality test. The quality of the water for the intended application shall be verified at the point of use in accordance with the requirements of the jurisdiction.

708.14 Subsurface gray water irrigation systems. Gravity subsurface gray water irrigation systems, where provided in accordance with Section 404.1.1, shall be designed and installed in accordance with Sections 708.14.1 through 708.14.6. Gray water collection and storage systems shall comply with this section and the provisions of Section 708 except for Sections 708.6 and 708.12.6.5.

708.14.1 Estimating gray water discharge. The irrigation system shall be sized in accordance with the gallons-per-day-per-occupant number based on the type of fixtures connected to the gray water system. The discharge shall be calculated by the following equation:

$$C = (A \times B) - D \qquad \textbf{(Equation 7-1)}$$

where:

A = Number of occupants:

Residential—For dwelling units regulated by this code in accordance with Section 101.3, the number of occupants shall be determined by the actual number of occupants, but not less than two occupants for one bedroom and one occupant for each additional bedroom.

Commercial—Number of occupants for buildings without dwelling units shall be determined by the *International Building Code*.

B = Estimated flow demands for each occupant:

Residential— For dwelling units regulated by this code in accordance with Section 101.2, 25 gallons per day (94.6 Lpd) per occupant for showers, bathtubs and lavatories and 15 gallons per day (56.7 Lpd) per occupant for clothes washers or laundry trays.

Commercial—For buildings, without dwelling units, based on type of fixture or water use records minus the discharge of fixtures other than those discharging gray water.

C = Estimated gallons (L) of gray water discharge based on the total number of occupants.

D = Estimated gallons (L) of gray water to be used within the interior of the building.

708.14.2 Percolation tests. The permeability of the soil in the proposed absorption system shall be determined by percolation tests or permeability evaluation.

708.14.2.1 Percolation tests and procedures. Not less than three percolation tests in each system area shall be conducted. The holes shall be spaced uniformly in relation to the bottom depth of the proposed absorption system. Additional percolation tests shall be made where necessary, depending on system design.

708.14.2.1.1 Percolation test hole. The test hole shall be dug or bored. The test hole shall have vertical sides and a horizontal dimension of 4 inches to 8 inches (102 mm to 203 mm). The bottom and sides of the hole shall be scratched with a sharp-pointed instrument to expose the natural soil. All loose material shall be removed from the hole and the bottom shall be covered with 2 inches (51 mm) of gravel or coarse sand.

708.14.2.1.2 Test procedure, sandy soils. The hole shall be filled with clearwater to a depth of not less than 12 inches (305 mm) above the bottom of the hole for tests in sandy soils. The time for this amount of water to seep away shall be determined, and this procedure shall be repeated if the water from the second filling of the hole seeps away in 10 minutes or less. The test shall proceed as follows:

1. Water shall be added to a point not more than 6 inches (152 mm) above the gravel or coarse sand.
2. Thereupon, from a fixed reference point, water levels shall be measured at 10-minute intervals for a period of 1 hour.
3. Where 6 inches (152 mm) of water seeps away in less than 10 minutes, a shorter interval between measurements shall be used, but in no case shall the water depth exceed 6 inches (152 mm). Where 6 inches (152 mm) of water seeps away in less than 2 minutes, the test shall be stopped and a rate of less than 3 minutes per inch (7.2 s/mm) shall be reported.

4. The final water level drop shall be used to calculate the percolation rate.

Soils not meeting the above requirements shall be tested in accordance with Section 708.14.2.1.3.

708.14.2.1.3 Test procedure, other soils. The hole shall be filled with clear water, and a water depth of not less than 12 inches (305 mm) shall be maintained above the bottom of the hole for a 4-hour period by refilling whenever necessary or by use of an automatic siphon. Water remaining in the hole after 4 hours shall not be removed. Thereafter, the soil shall be allowed to swell not less than 16 hours or more than 30 hours. Immediately after the soil swelling period, the measurements for determining the percolation rate shall be made as follows:

1. Any soil sloughed into the hole shall be removed and the water level shall be adjusted to 6 inches (152 mm) above the gravel or coarse sand.
2. From a fixed reference point, the water level shall be measured at 30-minute intervals for a period of 4 hours, unless two successive water level drops do not vary by more than $^1/_{16}$ inch (1.59 mm). Not less than three water level drops shall be observed and recorded.
3. The hole shall be filled with clear water to a point not more than 6 inches (152 mm) above the gravel or coarse sand whenever it becomes nearly empty. Adjustments of the water level shall not be made during the three measurement periods except to the limits of the last measured water level drop.
4. When the first 6 inches (152 mm) of water seeps away in less than 30 minutes, the time interval between measurements shall be 10 minutes and the test run for 1 hour. The water depth shall not exceed 5 inches (127 mm) at any time during the measurement period.
5. The drop that occurs during the final measurement period shall be used in calculating the percolation rate.

708.14.2.1.4 Mechanical test equipment. Mechanical percolation test equipment shall be of an *approved* type.

708.14.3 Permeability evaluation. Soil shall be evaluated for estimated percolation based on soil structure and texture in accordance with accepted soil evaluation practices. Borings shall be made in accordance with Section 708.14.2.1 for evaluating the soil.

708.14.4 Subsurface landscape irrigation site location. The surface grade of all soil absorption systems shall be located at a point lower than the surface grade of any water well or reservoir on the same or adjoining lots. Where this is not possible, the irrigation system shall be located so that surface water drainage from the building site is not directed toward a well or reservoir. The soil absorption system shall be located with a minimum horizontal distance between various elements as indicated in Table 708.14.4 and as provided in Section 708.12.6.2. Surface water shall be diverted away from any soil absorption site on the same or adjoining lots.

TABLE 708.14.4
LOCATION OF GRAY WATER SYSTEM

ELEMENT	MINIMUM HORIZONTAL DISTANCE (feet) TO IRRIGATION DISPOSAL FIELD
Buildings	2
Lot lines other than lot lines adjoining public ways	5
Water wells	100
Streams, lakes, wetlands other bodies of water	100
Critical root zone (CRZ) of protected trees	2
Seepage pits	5
Septic tanks	5
Water service	5
Public water main	10

For SI: 1 foot = 304.8 mm.

708.14.5 Installation. Absorption systems shall be installed in accordance with Sections 708.14.5.1 through 708.14.5.5 to provide landscape irrigation without surfacing of gray water. Excavations shall not encroach upon the critical root zone (CRZ) of protected trees.

708.14.5.1 Absorption area. The total absorption area required shall be computed from the estimated daily gray water discharge and the design-loading rate based on the percolation rate for the site. The required absorption area equals the estimated gray water discharge divided by the design-loading rate from Table 708.14.5.1.

TABLE 708.14.5.1
DESIGN LOADING RATE

PERCOLATION RATE (minutes per inch)	DESIGN LOAD FACTOR (gallons per square foot per day)
Less than 10	1.2
10 to less than 30	0.8
30 to less than 45	0.72
45 and greater	0.4

For SI: 1 minute per inch = min/25.4 mm, 1 gallon per square foot = 40.7 L/m^2.

708.14.5.2 Seepage trench excavations. Seepage trench excavations shall be not less than 1 foot (304 mm) and not greater than 5 feet (1524 mm) wide. Trench excavations shall be spaced not less than 2 feet (610 mm) apart. The soil absorption area of a seepage trench shall be computed by using the bottom width of the trench multiplied by the length of pipe. Individual seepage trenches shall not exceed 100 feet (30 480 mm) in developed length.

708.14.5.3 Seepage bed excavations. Seepage bed excavations shall be not less than 5 feet (1524 mm) wide and shall have more than one distribution pipe.

The absorption area of a seepage bed shall be computed by using the bottom of the trench area. Distribution piping in a seepage bed shall be uniformly spaced a not greater than 5 feet (1524 mm) and not less than 3 feet (914 mm) apart, and not greater than 3 feet (914 mm) and not less than 1 foot (305 mm) from the sidewall or headwall.

708.14.5.4 Excavation and construction. The bottom of a trench or bed excavation shall be level. Seepage trenches or beds shall not be excavated where the soil is so wet that such material rolled between the hands forms a soil wire. All smeared or compacted soil surfaces in the sidewalls or bottom of seepage trench or bed excavations shall be scarified to the depth of smearing or compaction and the loose material removed. Where rain falls on an open excavation, the soil shall be left until sufficiently dry so a soil wire will not form when soil from the excavation bottom is rolled between the hands. The bottom area shall then be scarified and loose material removed.

708.14.5.5 Aggregate and backfill. Not less than a 6-inch-thick (152 mm) layer of aggregate ranging in size from $^1/_2$ to $2^1/_2$ inches (12.7 mm to 64 mm) shall be laid into the trench below the distribution piping elevation. The aggregate shall be evenly distributed in a layer not less than 2 inches (51 mm) thick over the top of the distribution pipe. The aggregate shall be covered with *approved* synthetic materials or 9 inches (229 mm) of uncompacted marsh hay or straw. Building paper shall not be used to cover the aggregate. Not less than 9 inches (229 mm) of soil backfill shall be placed on top of the synthetic material or marsh hay or straw.

708.14.6 Distribution piping. Distribution piping shall be not less than 3 inches (76 mm) in diameter. The top of the distribution pipe shall be not less than 8 inches (203 mm) below the original surface. The slope of the distribution pipes shall be not less than 2 inches (51 mm) and not greater than 4 inches (102 mm) per 100 feet (30 480 mm).

708.15 Operation and maintenance manuals. Operations and maintenance materials shall be supplied with gray water systems in accordance with Sections 708.15.1 through 708.15.4.

708.15.1 Manual. A detailed operations and maintenance manual shall be supplied in hardcopy form with all gray water systems.

708.15.2 Schematics. The manual shall include a detailed system schematic, locations of all system components, and a list of all system components including manufacturer and model number.

708.15.3 Maintenance procedures. The manual shall provide a maintenance schedule and procedures for all system components requiring periodic maintenance. Consumable parts including filters shall be noted along with part numbers.

708.15.4 Operations procedures. The manual shall include system startup and shutdown procedures. The manual shall include detailed operating procedures for the system.

SECTION 709
RECLAIMED WATER SYSTEMS

709.1 Scope. The provisions of this section shall govern the construction, installation, alteration, and repair of systems supplying nonpotable reclaimed water.

709.2 Permits. Permits shall be required for the construction, installation, alteration, and repair of reclaimed water systems. Construction documents, engineering calculations, diagrams, and other such data pertaining to the reclaimed system shall be submitted with each application for permit.

709.3 Potable water connections. Connections between a reclaimed water system and a potable water system shall be protected against backflow in accordance with Section 608 of the *International Plumbing Code*.

709.4 Installation. Except as provided for in this section, systems shall be installed in compliance with the provisions of the *International Plumbing Code* and the manufacturer's instructions, as applicable.

709.5 Applications. Reclaimed water shall be utilized in accordance with Section 706 and local codes.

709.5.1 Reclaimed water for landscape irrigation. Reclaimed water used for landscape irrigation purposes shall be limited to subsurface applications. Reclaimed water used in irrigation systems shall comply with the provisions of Section 709 except for Section 709.5. Reclaimed water shall be filtered by a 0.004-inch (100 micron) or finer filter. The control panel for the reclaimed water irrigation system shall be provided with signage in accordance with Section 706.2.

Exception: Subject to the approval of the *code official* based on the extent of purification occurring in reclamation process, reclaimed water shall be permitted in sprinkler irrigation applications.

709.6 Approved components and materials. Piping, plumbing components, and material used in the reclaimed water systems shall be manufactured of material *approved* for the intended application.

709.7 Water-pressure-reducing valve or regulator. Where the reclaimed water pressure supplied to the building exceeds 80 psi (552 kPa) static, a pressure-reducing valve shall be installed to reduce the pressure in the reclaimed water distribution system piping to 80 psi (552 kPa) static or less. Pressure-reducing valves shall be specified and installed in accordance with Section 604.8 of the *International Plumbing Code*.

709.8 Trenching requirements. Water service piping, including piping containing reclaimed water, shall be separated from the building sewer by 5 feet (1524 m) of undisturbed or compacted earth. Reclaimed water piping shall be separated from potable water piping underground by 5 feet (1524 m) of undisturbed or compacted earth. Reclaimed water service pipes shall not be located in, under or above cesspools, septic tanks, septic tank drainage fields or seepage

pits. Buried reclaimed water piping shall comply with the requirements of Section 306 of the *International Plumbing Code* for support, trenching, bedding, backfilling and tunneling.

Exceptions:

1. The required separation distance shall not apply where the bottom of the reclaimed water service pipe within 5 feet (1524 mm) of the sewer is not less than 12 inches (305 mm) above the top of the highest point of the sewer and the pipe materials comply with the requirements of the *International Plumbing Code* for the application.
2. The required separation distance shall not apply where the bottom of the potable water service pipe within 5 feet (1524 mm) of the reclaimed water pipe is not less than 12 inches (305 mm) above the top of the highest point of the reclaimed water pipe and the pipe materials comply with the requirements of the *International Plumbing Code* for the application.
3. Water service pipe is permitted to be located in the same trench with a building sewer, provided such sewer is constructed of materials that comply with the requirements of the *International Plumbing Code* for the application.
4. The required separation distance shall not apply where a potable or nonpotable water service pipe crosses a sewer pipe provided the water service pipe is sleeved to not less than 5 feet (1524 mm) horizontally from the sewer pipe centerline on both sides of such crossing with pipe materials that comply with the requirements of the *International Plumbing Code* for the application.
5. The required separation distance shall not apply where a potable water service pipe crosses a reclaimed water pipe provided the potable water service pipe is sleeved to not less than 5 feet (1524 mm) horizontally from the reclaimed water pipe centerline on both sides of such crossing with pipe materials that comply with the requirements of the *International Plumbing Code* for the application.

709.9 Reclaimed water systems. The design of the reclaimed water systems shall conform to ASTM E 2635 and accepted engineering practice.

709.9.1 Distribution pipe. Distribution piping shall comply with Sections 709.9.1.1 through 709.9.1.4.

709.9.1.1 Materials. Distribution piping conveying reclaimed water shall conform to standards and requirements specified by the *International Plumbing Code*.

709.9.1.2 Joints. Distribution piping conveying reclaimed water shall utilize joints *approved* for use with the distribution piping and appropriate for the intended applications as specified in the *International Plumbing Code*.

709.9.1.3 Size. Distribution piping conveying reclaimed water shall be sized in accordance with the *International Plumbing Code* for the intended application.

709.9.1.4 Marking. Reclaimed water distribution piping shall be either the color purple and embossed or integrally stamped or marked "CAUTION: NONPOTABLE WATER – DO NOT DRINK" or be installed with a purple identification tape or wrap. Identification tape shall be not less than 3 inches (76 mm) wide and have white or black lettering on purple field stating "CAUTION: NONPOTABLE WATER – DO NOT DRINK." Identification tape shall be installed on top of reclaimed water distribution pipes, fastened not greater than every 10 feet (3048 mm) to each pipe length and run continuously the entire length of the pipe. Lettering shall be readily observable within the room or space where the piping is located.

Exception: Outside of the building, purple piping is not required downstream of the backflow preventer where reclaimed water is used for outdoor applications.

709.10 Tests and inspections. Tests and inspections shall be performed in accordance with Sections 709.10.1 and 709.10.2.

709.10.1 Water supply system test. The testing of makeup water supply piping and reclaimed water distribution piping shall be conducted in accordance with Section 312.5 of the *International Plumbing Code*.

709.10.2 Inspection and testing of backflow prevention assemblies. The testing of backflow preventers shall be conducted in accordance with Section 312.10 of the *International Plumbing Code*.

SECTION 710
ALTERNATE ONSITE NONPOTABLE WATER SOURCES

710.1 Alternate nonpotable sources of water. Other onsite sources of nonpotable water including, but not limited to, stormwater, reverse osmosis reject water, foundation drain water and swimming pool backwash water, shall be permitted to be used for nonpotable uses provided that they have been treated to the quality level necessary for their intended use and in accordance with requirements of the jurisdiction having authority.