

APPENDIX C-1

RAINWATER COLLECTION AND DISTRIBUTION SYSTEMS

The provisions contained in this appendix are reproduced from the International Green Construction Code, Section 707 and are adopted as part of this code.

C1-101.1 Scope. The provisions of this section shall govern the construction, installation, *alteration*, and *repair* of *rainwater collection and conveyance systems*.

C1-101.2 Permits. Deleted.

C1-101.3 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*.

C1-101.4 Non-Potable water connections. Where *non-potable* water from two or more different sources is combined in a single system, the system shall comply with the most stringent of the requirements of this code that are applicable to such sources.

C1-101.5 Installation. Except as provided for in this section, all systems shall be installed in compliance with the provisions of the *International Plumbing Code* and manufacturer's instructions.

C1-101.6 Applications. Untreated *rainwater* shall be utilized in accordance with Section C1-101.6.1. Treated *rainwater* shall be utilized in accordance with Section C1-101.6.2.

C1-101.6.1 Examples of Acceptable Uses without Treatment.

1. Outdoor Irrigation
2. Decorative Fountains
3. Yard Hydrants
4. Industrial Processes (eg. Dust Control, Indoor Hose Bibs Spray)
5. Vehicle Washing
6. Outdoor Hose Bibs (not routed through building wall)

C1-101.6.2 Examples of Acceptable Uses with Disinfection and Filtration.

1. Toilet Flushing
2. Urinal Flushing
3. Evaporative Cooling Tower Make-up
4. Trap Primers
5. Fire Suppression Systems
6. Clothes Washers
7. Outdoor Pools and Spas
8. Hose Bibs – Residential

C1-101.7 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 and shall be in compliance with the provisions of the International Plumbing Code.

C1-101.8 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 and shall be close-fitting or other approved methods. Screen materials shall be compatible with contacting system components and shall not accelerate corrosion of system components.

C1-101.9 Drainage. Water drained from first flush diverters or debris excluders shall not be drained to the sanitary sewer. Such water shall be diverted from the *storage tank* and discharge 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.

C1-101.10 Freeze protection. Where sustained freezing temperatures occur, provisions shall be made to keep *storage tanks* and the related piping from freezing.

C1-101.11 Trenching requirements. All water service piping, including piping containing *rainwater*, shall be separated from the *building sewer* by 5 feet (1524 mm) of undisturbed or compacted earth. Water service pipes, *potable* and *non-potable*, 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 *non-potable* water service pipe crosses a sewer pipe provided the water service pipe is sleeved to at least 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. Deleted.

C1-101.12 Rainwater catchment and collection systems. The design of *rainwater collection and conveyance systems* shall conform to accepted engineering practice.

707.12.1 Collection surface. *Rainwater* shall be collected only from above-ground impervious roofing surfaces. Collection of water from other surfaces shall be prohibited except where the water is used exclusively for acceptable uses without treatment listed in Section C1-101.6.1, or where additional appropriate treatment is designed by a registered design professional.

707.12.1.1 Potable water applications. Deleted.

C1-101.12.2 Debris excluders. Downspouts and leaders shall be equipped with a debris excluder or equivalent device to prevent the contamination of collected *rainwater* with leaves, sticks, pine needles and other undesirable material.

C1-101.12.3 Roof gutters and downspouts. Gutters and downspouts shall be constructed of materials compatible in accordance with Chapter 11 of the International Plumbing Code. Joints shall be sealed against leakage.

C1-101.12.3.1 Slope. Roof gutters, leaders, and *rainwater* collection piping shall slope continuously toward collection inlets and shall be free of leaks. Gutters and downspouts shall have a slope of not less than 1/8 inch per foot along their entire length, and shall not permit the collection or pooling of water at any point.

Exception. Deleted.

C1-101.12.3.2 Size. Gutters and downspouts shall be installed and sized in accordance with Section 1106.6 of the *International Plumbing Code* and local rainfall rates.

C1-101.12.3.3 Cleanouts. Cleanouts shall be provided in the water conveyance system so as to allow access to all filters, flushes, pipes and downspouts.

C1-101.12.4 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.

C1-101.12.4.1 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*.

C1-101.12.4.2 Size. Collection piping conveying *rainwater* from collection surfaces shall be sized in accordance with local Chapter 11 of the *International Plumbing Code* and local rainfall rates.

C1-101.12.4.3 Labeling and 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*.

C1-101.12.5 Filtration. Collected *rainwater* shall be filtered to the level required for the intended end use. Filters shall be accessible for inspection and maintenance.

C1-101.12.6 Disinfection. Where the intended application and initial quality of the collected *rainwater* requires disinfection or other treatment or both, as determined by a registered design professional, the collected *rainwater* shall be treated as needed to ensure that the required water quality is delivered at the point of use.

C1-101.12.7 Storage tank. The design of the *storage tank* shall be in accordance with Sections C1-101.12.7.1 through C1-101.12.7.11.

C1-101.12.7.1 Location. *Storage tanks* shall be permitted to be installed either above or below grade. Above grade *storage tanks* shall be constructed using opaque, UV resistant materials to prevent algae growth. *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 C1-101.12.7.1.

**TABLE C1-101.12.7.1
LOCATION OF RAINWATER STORAGE TANKS**

Element	Minimum Horizontal Distance from Storage Tank (feet)
Lot line adjoining private lots	5
Seepage pits	5
Septic tanks	5

C1-101.12.7.2 Materials. Where water is collected onsite, it shall be collected in an *approved* tank constructed of durable, nonabsorbent and corrosion-resistant materials. *Storage 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.

C1-101.12.7.2.1 Wooden tanks. Wooden *storage tanks* shall be provided with a flexible tank liner.

C1-101.12.7.3 Foundation and supports. *Storage tanks* shall be supported on a firm base capable of withstanding the storage tank's weight when filled to capacity. Where earthquake loads are applicable, above-ground collection tank supports shall be designed and installed for the seismic forces in accordance with the *International Building Code*.

C1-101.12.7.3.1 Ballast. Where the soil can become saturated, an underground *storage tank* shall be ballasted, or otherwise secured, to prevent the tank from floating out of the ground when empty. The combined weight of the tank and hold down ballast shall meet or exceed the buoyancy force of the tank. Where the installation requires a foundation, the foundation shall be flat and shall be designed to support the *storage tank* weight when full, consistent with bearing capability of adjacent soil.

C1-101.12.7.3.2 Structural support. When installed below grade, *storage tank* installations shall be designed to withstand earth and surface structural loads without damage and with minimal deformation when filled with water or empty.

C1-101.12.7.4 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 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.

C1-101.12.7.5 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 tank inlet pipes. The overflow pipe shall be protected from insects and vermin and shall be discharged in a manner consistent with storm water runoff requirements of the *jurisdiction* and at a sufficient distance from the tank to avoid damaging the tank-foundation. The overflow drain shall not be equipped with a shutoff valve.

C1-101.12.7.6 Access. A minimum of one access opening shall be provided to allow inspection and cleaning of the tank interior. All 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 an access extending above grade, 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). Finish grade shall be sloped away from the manhole to divert surface water from the manhole.

Exception: *Storage tanks* having a volume of less than 800 gallons 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.

C1-101.12.7.7 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.

C1-101.12.7.8 Inlets. *Storage tank* inlets shall be designed to introduce water into the tank so as to avoid agitating the contents.

C1-101.12.7.9 Outlets. Deleted.

C1-101.12.7.10 Drain. A maintenance outlet shall be located at the lowest point of aboveground storage tanks for maintenance purposes and shall discharge 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.

C1-101.12.7.11 Labeling and signage. *Storage tanks* shall bear signage that reads as follows: “CAUTION: NON-POTABLE 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 in height and shall be of a color that contrasts with the background on which they are applied.

C1-101.12.8 Valves. Valves shall be supplied in accordance with Sections C1-101.12.8.1 and C1-101.12.8.2.

C1-101.12.8.1 Influent diversion. Deleted.

C1-101.12.8.2 Backwater valve. A backwater valve shall be installed on each overflow that is directly connected to a storm sewer.

C1-101.12.9 Roof washer. Deleted.

C1-101.12.10 Vent piping. *Storage tanks* shall be provided with a vent in accordance with the requirements of Section C1-101.12.7.7. 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” 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 C1-101.8.

C1-101.12.11 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. Pressurized water shall be supplied at a pressure appropriate for the application.

C1-101.12.11.1 Standby power. Deleted.

C1-101.12.11.2 Inlet control valve alarm. Deleted.

C1-101.12.11.3 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*.

C1-101.12.12 Distribution pipe. *Distribution piping* shall comply with Sections C1-101.12.12.1 through C1-101.12.12.4.

C1-101.12.12.1 Materials. *Distribution piping* conveying *rainwater* shall conform to the standards and requirements specified by the *International Plumbing Code* for *non-potable* or *potable* water, as applicable.

C1-101.12.12.2 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*.

C1-101.12.12.3 Size. *Distribution piping* conveying *rainwater* water shall be sized in accordance with the *International Plumbing Code* for the intended application or.

C1-101.12.12.4 Labeling and marking. *Non-potable 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 at least 3 inches wide and have white or black lettering on purple field stating “CAUTION: NON-POTABLE WATER – DO NOT DRINK”. Identification tape shall be installed on top of *non-potable rainwater distribution pipes*, fastened at least every 10 feet 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: Deleted.

C1-101.13 Tests and inspections. Tests and inspection of components installed within a building shall be performed in accordance with Sections C1-101.13.1 through C1-101.13.10.

C1-101.13.1 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*.

C1-101.13.2 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*.

C1-101.13.3 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*.

C1-101.13.4 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*.

C1-101.13.5 Inspection vermin and insect protection. All 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 C1-101.8.

C1-101.13.6 Roof gutter inspection and test. Deleted.

C1-101.13.7 Roofwasher test. Deleted.

C1-101.13.8 Storage tank tests. *Storage tanks* shall be tested **with either air or water** in accordance with 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 a successful test of the overflow, the water level in the tank shall be reduced to a level that is at 2 inches below the makeup water trigger point by using the tank drain. The tank drain shall be observed for proper operation. The makeup water system shall be observed for proper operation, and successful automatic shutoff of the system at the refill threshold shall be verified. Water shall not be drained from the overflow at any time during the refill test.

4. If air testing, system shall be pressurized with air equivalent to the depth of the tank in accordance with Section 312.5 of the *International Plumbing Code*.

C1-101.13.9 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 C1-101.12.11.

C1-101.13.10 Water quality test. Deleted.

C1-101.14 Operation and maintenance manuals. Operations and maintenance materials shall be supplied in accordance with C1-101.14.1 through C1-101.14.4.

C1-101.14.1 Manual. A detailed operations and maintenance manual shall be supplied ~~in hardcopy form~~ with all *rainwater* collection systems.

C1-101.14.2 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.

C1-101.14.3 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.

C1-101.14.4 Operations procedures. The manual shall include system startup and shutdown procedures. The manual shall include detailed operating procedures for the system.

C1-101.15 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. All 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.

C1-101.16 Potable water applications. Deleted.

C1-101.16.1 Water quality testing. Deleted.

C1-101.16.1.1 Test methods. Deleted.

C1-101.16.1.1.1 Tests required. Deleted.

C1-101.16.1.2 Test frequency. Deleted.

C1-101.16.1.3 Test records. Deleted.