



## **Graywater Design Criteria Document**

Dated November 1, 2022

Revision 0

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### Revision History

Revision	Date	Description
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### Acronyms

ANSI	American National Standards Institute	
mg/L	Milligrams per liter	
NSF	NSF International, formerly National Sanitation Foundation	

## 1. Introduction

Graywater may be used on lands within the boundaries of the City of Fort Collins where both the water provider and wastewater provider have consented in writing to the use of graywater on the subject land. Graywater systems are allowed with an approved plan and inspection through Building Services for single-family, non-single family (multi-family and commercial) and new construction. Building Services' website ([fcgov.com/building](http://fcgov.com/building)) contains more information.

This Graywater Design Criteria Document covers the minimum design requirements for all graywater treatment works installed in the City of Fort Collins, consistent with Fort Collins Municipal Code ("City Code"), [Chapter 5, Article V, Division 3 \(Graywater\)](#). The definitions of City Code, Chapter 5, Article V, Division 3 shall apply herein. In addition to the design requirements set forth in this document, all graywater use and graywater treatment works in Fort Collins must comply with City Code requirements.

To the extent that there are various versions of this document, the most recent version shall control and superseded all previous versions.

All applicable laws and regulations incorporated by reference cited herein include only those versions that were in effect as of November 1, 2022, and no later amendments to the incorporated material.

Materials referenced in this document may be examined online at [cdphe.colorado.gov/water-quality/clean-water/graywater](http://cdphe.colorado.gov/water-quality/clean-water/graywater).

## 2. Design Criteria for All Graywater Treatment Works

The following minimum design criteria are required for all graywater treatment works in Fort Collins, pursuant to City Code. All graywater treatment works must:

- a) Meet all design requirements herein and any additional design requirements of the [Colorado Plumbing Code](#).
- b) Each treatment component, or combination of multiple components, must have a design flow greater than the calculated peak graywater production, if upstream of the storage tank or if no tank is present.

- c) Include a diversion valve that directs graywater to either the graywater treatment works or a closed sewerage system. The diversion valve must be:
  - i. Easily operable.
  - ii. Clearly labeled.
  - iii. Constructed of material that is durable, corrosion resistant and watertight.
  - iv. Designed to accommodate the inlet and outlet pipes in a secure and watertight manner.
  - v. Indirectly connected to the bypass line of the closed sewerage system.
  
- d) Not have any piping that allows the treatment process(es) or a storage tank to be bypassed prior to graywater use.
  
- e) Include a tank to collect and store graywater. The storage tank must:
  - i. Be constructed of durable, non-absorbent, water-tight and corrosion resistant materials.
  - ii. Be closed and have access openings for inspection and cleaning.
  - iii. Be vented:
    - 1. For indoor tanks, the tanks must be vented to the atmosphere outside of the house.
    - 2. For outdoor tanks, the storage tank must:
      - a. Have a downturned screened vent.
      - b. Have an overflow line:
        - i. With the same, or larger, diameter line as the influent line.
        - ii. Have no shut off valve.
        - iii. That is trapped to prevent the escape of gas vapors from the tank.
        - iv. That is indirectly connected to the closed sewerage system.
  - iv. Have a valved drain line with the same, or larger, diameter line as the influent line that is indirectly connected to the closed sewerage system.
  - v. Be a minimum of 50 gallons.
  - vi. Be placed on a stable foundation.
  - vii. If located outdoors, not be exposed to direct sunlight.
  - viii. Have a permanent label that states, "CAUTION! NON-POTABLE WATER. DO NOT DRINK."

- f) Indoor toilet or urinal flushing systems graywater treatment works must have a backup potable water system connection that meet the following requirements:
- i. For non-public water systems: uncontrolled connections between a potable water system and a graywater treatment works are prohibited.
  - ii. For non-public water systems: all connections between a potable water system and a graywater treatment works must be protected by a reduced pressure principle backflow prevention zone assembly or an approved air gap.
  - iii. For public water system/potable water systems: cross connections (as defined in City Code, Chapter 5, Article V, Division 3) are prohibited. Uncontrolled connections between a public water system and a graywater treatment works are prohibited. The graywater treatment works design must protect the public water system from cross connections by meeting the requirements of Regulation No. 11 – , [Colorado Primary Drinking Water Regulations, 5 CCR 1002-11](#).
  - iv. Not be used as a factor to reduce the design or capacity for an onsite wastewater treatment system or domestic wastewater treatment works.
  - v. Have any wastewater from graywater treatment works (e.g., filter backwash water) be properly contained and disposed into a closed sewerage system or an approved underground injection control (UIC) well.
  - vi. Have all graywater piping clearly distinguished and must be clearly labeled, including pipe identification and flow arrows.
- g) If located in a 100-year floodplain area, the graywater treatment works must meet or exceed the floodplain requirements of the Federal Emergency Management Agency, Colorado Water Conservation Board and the City of Fort Collins. The Floodplain Regulations for the City of Fort Collins are found in [Chapter 10](#) of City Code. A Floodplain Use Permit is required for all graywater treatment works in the 100-year floodplain.
- i. The graywater treatment works must be designed to minimize or eliminate infiltration of floodwaters into the system and prevent discharge from the system into the floodwaters. Certification of this standard by a Colorado Registered Professional Engineer is required.
  - ii. It must be anchored to prevent floatation.
  - iii. Cannot be located in floodways.
  - iv. Meet all applicable additional standards for construction in a floodplain per Chapter 10 of City Code.

- v. Be located within the confines of the legal property boundary and not within an easement that could allow other uses of the property that could conflict with the graywater treatment works.
- h) The following minimum design criteria are required for graywater treatment works for **single family, indoor toilet and urinal flushing**:
- i. The allowable use is up to 400 gallons per day.
  - ii. The graywater treatment works must be certified under “Class R” of NSF/ANSI (American National Standards Institute) 350 Onsite Residential and Commercial Water Reuse Treatment Systems.
  - iii. If a disinfection process is not part of NSF/ANSI 350-2011 equipment, separate disinfection system equipment is required. For graywater treatment works that use sodium hypochlorite (bleach), the graywater treatment works must be capable of providing a free chlorine residual of 0.2 to 4.0 milligrams per liter (mg/L) in the graywater throughout the indoor graywater plumbing system.
  - iv. The graywater treatment works must include a dye injection system that can provide a dye concentration that is visibly distinct from potable water.
- i. The following minimum design criteria are required for **non-single family (multi-family and commercial), indoor toilet and urinal flushing**:
- i. The allowable use is up to 2,000 gallons per day.
  - ii. The graywater treatment works must be certified under “Class R” or “Class C” of NSF/ANSI 350 Onsite Residential and Commercial Water Reuse Treatment Systems. Required classification shall be dictated by the size of the graywater treatment works and if the graywater sources are residential or commercial as defined by NSF/ANSI 350.
  - iii. Separate disinfection system equipment is required if a disinfection process is not part of NSF/ANSI 350-2011 equipment. A graywater treatment works must be capable of providing a free chlorine residual of 0.2 to 4.0 mg/L in the graywater throughout the indoor graywater plumbing system.
  - iv. The graywater treatment works must include a dye injection system that can provide a dye concentration that is visibly distinct from potable water.
  - v. For graywater treatment works that have a capacity to receive greater than 2,000 gallons per day (gpd), the design must be prepared under the supervision of and submitted with the seal and signature of a professional engineer licensed to practice engineering in the State of Colorado in



accordance with the requirements of the Colorado Department of Regulatory Agencies – Division of Registrations.

### **3. Signage Requirements for Non-Single Family Graywater Treatment Works**

All non-single family (multi-family and commercial) graywater treatment works must comply with the following signage requirements:

- a) All required notifications shall include posting of signs of sufficient size to be clearly read with the language below in the dominant language(s) expected to be spoken at the site.
- b) A permanent warning sign must be visible at all fixtures from which graywater is collected.
- c) The signs must state that, “WATER FROM THIS FIXTURE IS REUSED. CHEMICALS, EXCRETA, PETROLEUM OILS AND HAZARDOUS MATERIALS MUST NOT BE DISPOSED DOWN THE DRAIN.”
- d) Each room that contains graywater treatment works components must have a sign that says, “CAUTION GRAYWATER TREATMENT WORKS, DO NOT DRINK, DO NOT CONNECT TO THE POTABLE DRINKING WATER SYSTEM. NOTICE: CONTACT BUILDING MANAGEMENT BEFORE PERFORMING ANY WORK ON THIS WATER SYSTEM.”

Non-single family, indoor toilet and urinal flushing graywater treatment works must comply with the following signage requirement:

- a) Each toilet and urinal must have a sign that says, “TO CONSERVE WATER, THIS BUILDING USES TREATED NON-POTABLE GRAYWATER TO FLUSH TOILETS AND URINALS.”

### **4. Post Installation Requirements**

The City of Fort Collins has exclusive enforcement authority regarding compliance with the ordinance or resolution and, if applicable, rule. The City of Fort Collins is authorized

to perform inspections and take enforcement actions to ensure compliance with these rules.

If a property with a compliant graywater treatment works is annexed or de-annexed into a jurisdiction with differing graywater requirements, within 365 days the property owner must:

- a) Ensure the graywater treatment works is physically removed or permanently disconnected; or
- b) Ensure the graywater treatment works is incorporated into another city, city and county, or county's local graywater control program. This includes conforming to the minimum requirements of the new local graywater control program and may include improving or modifying the graywater treatment works.

All graywater systems must have an operation and maintenance (O&M) manual. The O&M manual must remain with the graywater treatment works throughout the life of the system. The O&M manual must include the following items:

- a) A graywater treatment works description including an equipment list, design basis data including but not limited to design volumes, design flow rates of each component and service area, system as-built drawing, and process description.
- b) Maintenance information for the graywater treatment works including but not limited to component maintenance schedule, instructions for component repair, replacement, or cleaning, replacement component source list, testing and frequency for potable containment device, and instructions for periodic removal of residuals.
- c) Operational ranges for parameters including but not limited to disinfectant concentration levels, filter replacement parameters, pressure ranges, tank level, and valve status under normal operation.
- d) Step-by-step instructions for starting and shutting down the graywater treatment works including but not limited to valve operation, any electrical connections, cleaning procedures, visual inspection, and filter installation.
- e) A guide for visually evaluating the graywater treatment works and narrowing any problem scope based on alarm activations, effluent characteristics, system operation, and history.

- f) A list of graywater control measures in which the graywater treatment works must be operated.
- g) Be updated at the time the system is modified.
- h) Upon change of ownership or occupancy of the property where the graywater treatment works is located, transfer to the new owner or tenant and notify Building Services within 60 days.

The City of Fort Collins can approve or deny the installation of new graywater treatment works or modifications to an existing graywater treatment works. As part of the review process, the City of Fort Collins must consider the design documentation associated with the graywater system, which must include the following information:

- a) The graywater uses.
- b) Location of the graywater treatment system.
  - i. Design flow calculations for the graywater treatment works.
  - ii. The fixture(s) that are the source(s) of the graywater.
  - iii. A description of the products or components.
  - iv. If applicable, contact information for system designer or professional engineer and operator.
  - v. Name and address of the legally responsible party.
  - vi. Must be signed by the legally responsible party.
- c) Require that graywater treatment works be inspected or verified and accepted by the City of Fort Collins.