CODE GUIDE

OFFICE OF PLANNING & DEVELOPMENT REVIEW

TOPIC: **Rainwater Harvesting – ICC – RES/34/#1 & UPC/6/#2**

CODE: **One & Two Family Dwelling Specialty Code: 2000 Edition; Plumbing Specialty Code: 2000 Edition**

APPROVED: **March 13, 2001 _____**

REFERENCE: **Section 3101.2 & Section 3401.1 – One & Two Family Dwelling Specialty Code**
Section 301.2 & Section 601.1 – Plumbing Specialty Code

SUBJECT: **Rainwater Harvesting Systems for Interior Use or Combined Interior and Exterior Use.**

QUESTION: 1. What is harvested rainwater?

RESPONSE: 1. Harvested rainwater is untreated rainwater collected for limited use in specific plumbing systems. The rainwater may be collected in a variety of ways, and is then stored in a cistern for use on an as need basis.

QUESTION: 2. Are there health concerns with using harvested rainwater?

RESPONSE: 2. Yes. Harvested rainwater is not considered drinkable (potable) water. Therefore, it may not be used for any purpose other than irrigation, hose bibbs, water closets or urinals. Because harvested rainwater is not potable water it must be managed to protect both household occupants and the municipal water system from contamination. Proper cross connection protection, system maintenance and system marking are critical for the prevention of contamination to household occupants and the municipal water system.

QUESTION: 3. Can harvested rainwater be used for drinking water?

RESPONSE: 3. To use rainwater for potable purposes the water must be treated and meet State and Federal safe drinking water standards. Such systems are often complicated and expensive, and require continual maintenance, monitoring and testing. For this reason, the Office of Planning and Development Review (OPDR) will review and consider these types of systems through the administrative appeal process on a system by system basis.

QUESTION: 4. What if I only use harvested rainwater for watering my lawn?

RESPONSE: 4. When harvested rainwater is intended for irrigation only and the system is completely separate from the municipal water system and any plumbing in your structure, the system is not regulated by this guide. Although no plumbing permit is required, these systems still need to be approved by the Bureau of Environmental Services (BES) for stormwater management. In addition, other permits, such as an electrical permit for any pumps installed or a grading permit for underground pipe installation, may be necessary depending upon system size and complexity.

QUESTION: 5. What are the parts of a rainwater harvesting system?

RESPONSE: 5. A rainwater harvesting system begins at the point of collection and ends with the termination of the waste for the final fixture served. The parts of the collection and distribution system include:

A. **The Roof Surface**. Rainwater harvesting systems rely on the collection of rainwater that has fallen on a building roof.
B. **Gutters and Downspouts**. Gutters and downspouts are used to convey the rainwater from the roof surface to the roof washer and the cistern.
C. **A Roof Washer**. The roof washer pre-treats rainwater before it enters the cistern.
D. **The Cistern**. The cistern is the central portion of the rainwater harvesting system. Protection and maintenance of the cistern is essential for the health of the system. It is also extremely important that the cistern be sized adequately for the size of the household and the use of the water.
E. **A Pump**. Often a pump is necessary to distribute the harvested rainwater from the cistern to the designated fixtures.
F. **The Piping System**. The piping system conveys the harvested rainwater and distributes it to various fixtures.

QUESTION: 6. Can rainwater harvesting systems be used in apartment houses, hotels, office buildings, retail stores, factories or other commercial buildings?

RESPONSE: 6. Maybe. Commercial applications for rainwater harvesting are unique for each application. For this reason, each rainwater

harvesting system proposed for use in commercial structures must be engineered and site specific. In general, OPDR will consider, on a case by case basis, the following rainwater application in commercial buildings:

A. Non-residential applications such as office buildings, factories or retail stores: water closets, urinal, irrigation or water feature usage.

B. Residential applications such as multi-family apartment houses or the sleeping room portions of hotels: Irrigation only.

QUESTION: 7. What are the definitions, requirements, installation standards and limitations for one or two family dwelling (home) rainwater harvesting systems with the City?

RESPONSE: 7. The balance of this guide provides a basic rainwater harvesting system for use inside a home to provide water to water closets or urinals and combination systems using water both inside and outside a home for hose bibbs and irrigation. Rainwater harvesting systems that are designed using the standards outlined below do not need to be approved through the code alternate appeal process.

A. **General.** All components of the system not specifically addressed by this guide shall meet all applicable code sections.

1. The requirements and allowances in this portion of the guide apply to one and two family dwellings only.
2. The rainwater harvesting system described below is based on a four-occupant home.
3. To ensure proper system installation, the code, this guide, and any applicable manufacturer's installation instructions must be followed.
4. Engineered systems shall be installed per plans and specifications of the engineer of record.
5. Harvested rainwater may only be used for water closets, urinals, hose bibbs and irrigation purposes.
6. Rainwater shall only be harvested from roof surfaces. Harvest shall not occur from the following locations:
   a. Any vehicular or pedestrian area;
   b. Surface water runoff; or
   c. Bodies of standing water.
7. The first 10 gallons generated by the rainwater harvesting system during any rain event shall be diverted away from the cistern.
8. Discharge of any diverted water shall go to a location approved by OPDR and BES.

B. **Definitions.** In addition to other definitions used in the One and Two Family Dwelling Specialty Code (code), the following definitions apply to rainwater harvesting systems:

1. **Auxiliary supply –** piping arranged and protected from contamination to provide an alternate means of filling a cistern.
2. **Cistern (Storage Tank) –** a reservoir for storing rainwater.
3. **Flat –** having a slope no greater than 1 in 50.
4. **Pump –** mechanical device for moving fluids (rainwater).
5. **Rainwater Harvesting System (RWS) –** cistern(s) pipe, fittings, pumps and other appurtenances required for and used to harvest and distribute rainwater.
6. **Return elbow –** a section of pipe with a 180-degree bend.
7. **Screen –** corrosion resistant wire or other approved mesh having openings in determined sizes.
8. **Slope or sloping –** having a slope greater than 1 in 50.
9. **Sun barriers –** a structure erected specifically to shelter a cistern from the direct rays of the sun.
10. **Reclaimed water –** rainwater harvested for the purpose of supplying water to hose bibbs, water closets, urinals or irrigation.
11. **Roof wash or roof washer –** A device or method for removal of contaminants from collection surface by diverting initial rainfall from entry into the cistern(s).

C. **Permits.** The following permits are necessary for the installation of a rainwater harvesting system:

1. A plumbing permit for rainwater harvesting systems.
2. An electrical permit for the pump or other electrical controls.
3. Building permits for cistern footings, foundations, enclosures and roof structures. Grading permits or erosion control may be necessary for underground tanks.

D. **Zoning Requirements.** Rainwater harvesting systems must comply with applicable provisions of the Planning and Zoning Code (Title 33) including design review requirements.

Rainwater harvesting cisterns and sun barriers will be reviewed as covered accessory structures under the provisions of Title 33. Base zone development, environmental zones, or design zones may affect or restrict cistern or sun barrier placement or design.

E. **Application.** The following information must be provided with the permit application for a rainwater harvesting system:

1. Site or plot plan, including site elevations
2. System demand (number of dwelling occupants)
3. Isometric drawing of rainwater harvesting system (including piping and section diagrams) and domestic potable water systems, including sizing and dimensions
4. Specifications and manufacturer's installation instructions for:
   a. Cistern(s)
   b. Pump
5. Engineering. Installation, including but not limited to the following systems, will require structural engineering:
   a. Cisterns that are located on top of a building structure; or
   b. Cisterns that are located on sloping sites.

Information in addition to that listed above may be necessary in some instances. The size and complexity of the building, site and system will determine the necessity for additional information.

F. **Requirements for System Components**

1. **Roof Surface.** The roof surface may be constructed of any material accepted by OPDR.

2. **Gutters and Downspouts.** Gutters and downspouts shall comply with the following:
   a. Gutters and downspouts may be manufactured of any material. Gutter and down spout materials are not required to meet material specifications found in the plumbing portion of the code.
   b. All gutters leading to the cistern shall be fitted with leaf screens the entire length of the gutter including the downspout opening. Screen openings shall be no larger than .5 inches.

3. **Roof washers.** All rainwater harvesting systems using impervious roof surfaces shall have at least one roof washer. A roof washer is not required for pervious roof surfaces such as eco-roofs. Roof washers shall meet the following design requirements:
   a. All collected rainwater shall pass through a roof washer before the water enters the cistern(s).
   b. If more than one cistern is used, a roof washer shall be provided for each cistern.
   c. The following requirements apply to all roof washers:

1) The inlet to the roof washer shall be provided with a debris screen that protects the roof washer from the intrusion of waste and vermin. The debris screen shall be corrosion resistant and shall have openings no larger than .5 inches and no smaller than .25 inches nominal.
2) The roof washer shall automatically divert a minimum of the first 10 gallons from each rainfall event away from the cistern. The device shall not rely on manually operated valves or other devices to do the diversion.
3) The roof washer shall have minimum dimensions of 30 inches tall, and be 24 inches in diameter or 24 inches square.
4) The roof washer shall contain 6 inches of pea gravel. The entire surface of the gravel shall be covered with filter fabric (LINQ 125EX; LINQ TYPAR3201; TNS E040; TNS R 040; AMOCO 4535 or Marafi 140NL). The filter fabric shall be topped with 18 inches of sand conforming to OAR 340-71-295 (3) (e) or silica sand meeting either NSF 61 or AWWA B100-53, Section A 2.4.
5) The outlet for the initial rainfall discharge shall be located in the side of the roof washer at or near the bottom. The outlet pipe shall be .5 inches nominal, capped with a 3/16 inch drain hole and the discharge shall be directed to an OPDR and BES approved location.
6) The outlet pipe to the cistern shall be located in the pea gravel layer of the roof washer. The pipe shall be 4 inch nominal and fitted with an approved clean-out fitting. Access to the clean-out fitting shall be provided.
7) The outlet pipe entering the cistern shall terminate in a return elbow a minimum of 12 inches above the cistern floor.
8) Roof washers shall be accessible for maintenance and service.

4. **Cisterns.** The following are the minimum requirements for cisterns in the City:

a. **General.**
1) All cisterns shall be listed for use with potable water.
2) Cisterns shall be capable of being filled from both the rainwater harvesting system and the municipal water system. The municipal system shall be protected from cross contamination by the following:
a) A reduced pressure backflow assembly listed on the Approved Backflow Prevention Assembly List published by the Oregon Health Division (OHD); and

b) An air gap.

Backflow assemblies shall be maintained and tested yearly. The test results shall be provided to the Water Bureau.

b. **Size.**
1) Any cistern, or total of cisterns used, shall have a minimum capacity of 1,500 gallons.
2) For above grade cisterns, the ratio of the cistern size shall not be greater that 1:1 height to width. The ratio for below grade cisterns is not limited.

c. **Location.**
1) Cisterns may be installed either above or below grade. All cisterns shall be listed for their intended use.
2) Below grade cisterns shall be provided with manhole risers a minimum of 8 inches above surrounding grade.
3) Above grade cisterns may be located in the following places:
   a) Basements or crawl spaces
   b) Garages
   c) Sheds
   d) Specially constructed sun barriers
4) All cisterns shall be installed in accordance with the manufacturer's installation instructions. Where the installation requires a foundation, the foundation shall be flat and shall be capable of supporting the cistern weight when the cistern is full.

d. **Protection.** Cisterns shall be protected from direct sunlight. Trees or other vegetation shall not constitute acceptable protection.

e. **Inlets, outlets and openings.**
1) All cistern openings shall be protected from unintentional entry by humans or vermin. Manhole covers shall be secured and locked to prevent tampering.
2) Where an opening is provided that could allow the entry of personnel, the opening shall be marked, "DANGER – CONFINED SPACE".
3) Cistern outlets shall be located at least 12 inches above the bottom of the cistern.

f. **Overflow.** The cistern shall be equipped with an overflow device.
1) The overflow device shall consist of a pipe 4 inches in diameter located within 2 inches of the top of the cistern.

2) The overflow outlet shall be protected with a screen having openings no greater than .25 inches.
3) OPDR and BES shall approve the discharge location of the overflow water.

5. **Pump.** Where a pump is provided in conjunction with the rainwater harvesting system the pump shall meet the following provisions:
   a. The pump and all other pump components shall be listed and approved for use with potable water systems.
   b. The pump shall be capable of delivering a minimum of 15psi residual pressure at the highest outlet served. Minimum pump pressure shall allow for friction and other pressure losses. Maximum pressure shall not exceed 80psi.

6. **Piping.**
   a. Piping for rainwater harvesting systems shall be separate from any domestic potable piping system.
   b. There shall be no direct connection of any rainwater harvesting pipe system and any domestic potable water pipe system.
   c. Materials.
      1) Pipe used to convey harvested rainwater shall be:
         a) Purple in color and shall conform to ASTM D-2737 (PE 3408); or
         b) Meet the requirements for potable water distribution pipe and be continuously wrapped with purple mylar tape meeting the following requirements:
            (1) Minimum nominal thickness of .0005 inches,
            (2) Minimum width of 2 inches,
            (3) Made of PVC with a synthetic rubber adhesive,
            (4) Have a clear polypropylene protective coating, and
            (5) Include the wording, “CAUTION: RECLAIMED WATER , DO NOT DRINK”

      2) Fittings and other system components shall be listed for use in conjunction with specified piping.
      3) Both piping and fittings shall be installed as required by applicable code and standards.
      4) All other products entering into the construction of a rainwater harvesting system shall be listed as required by code for the purpose intended, and suitable for use in a potable water system.

d. All rainwater pipe shall be marked "CAUTION: RECLAIMED WATER, DO NOT DRINK" every four feet along its length, but in no case less than once per room. The lettering shall be black against a purple background, and shall comply with Table 6-1 of the Oregon State Plumbing Specialty Code.

e. Where rainwater harvesting pipe and potable water pipe are installed in the same trench, wall cavity or other location, the potable water pipe shall be separated by a minimum distance of twelve inches (12") above and away from the rainwater harvesting pipe.

7. **Labeling.** Every water closet or urinal supply, hose bibb or irrigation outlet shall be permanently identified with an indelibly marked placard stating: "CAUTION: RECLAIMED WATER, DO NOT DRINK".

8. **Recording System.** Rainwater harvesting system installations shall be recorded against the title deed at the Multnomah County Recorder's Office (See attached). A copy of the recorded document shall be supplied to OPDR.

9. **Inspections.** Rainwater harvesting systems shall be inspected according to the following schedule:

   a. Inspection of all elements before they are covered (rough-in inspection)
   b. Other inspections as needed
   c. Final inspection including testing. In addition to other testing required by the code for plumbing systems, the following also apply:

      1) **Cisterns**. Cisterns 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.
      2) **Piping**. A flow test shall be performed through the system to the point of reclaimed water distribution and disposal. In addition, the water distribution system shall tested and proved tight at the working pressure. Where the manufacturer permits, a 50 psi air test may substitute for the test above. All lines and components shall be watertight.

10. **System Maintenance.** Rainwater harvesting systems shall be maintained in functioning order, for the life of the system. It is the property owner's responsibility to maintain the system until the system is abandoned as prescribed in this guide.

11. **System Abandonment.** If the owner of a rainwater harvesting system elects to cease use of, or fails to properly maintain such system, they shall abandon the system. To abandon the system one shall:

    a. Remove the system entirely;
    b. Replace the rainwater harvesting pipe system with an approved potable water supply pipe system. Where an existing potable pipe system is already in place, fixtures may be re-connected to the existing system; and
    c. Record the abandonment in the County noting the deletion of the system. A copy of the recorded document shall be supplied to OPDR. (See Attached)

Rainwater harvesting system abandonment and potable water installations require permit, inspection(s) and approval(s).

List of Attached Drawings & Examples for One or Two Family Rainwater Harvesting Systems only:

- Collection Detail
- Distribution Detail
- Cistern Detail
- Roofwasher Detail
- Notice of Residential Rainwater Harvesting System Installation
- Notice of Residential Rainwater Harvesting System Abandonment

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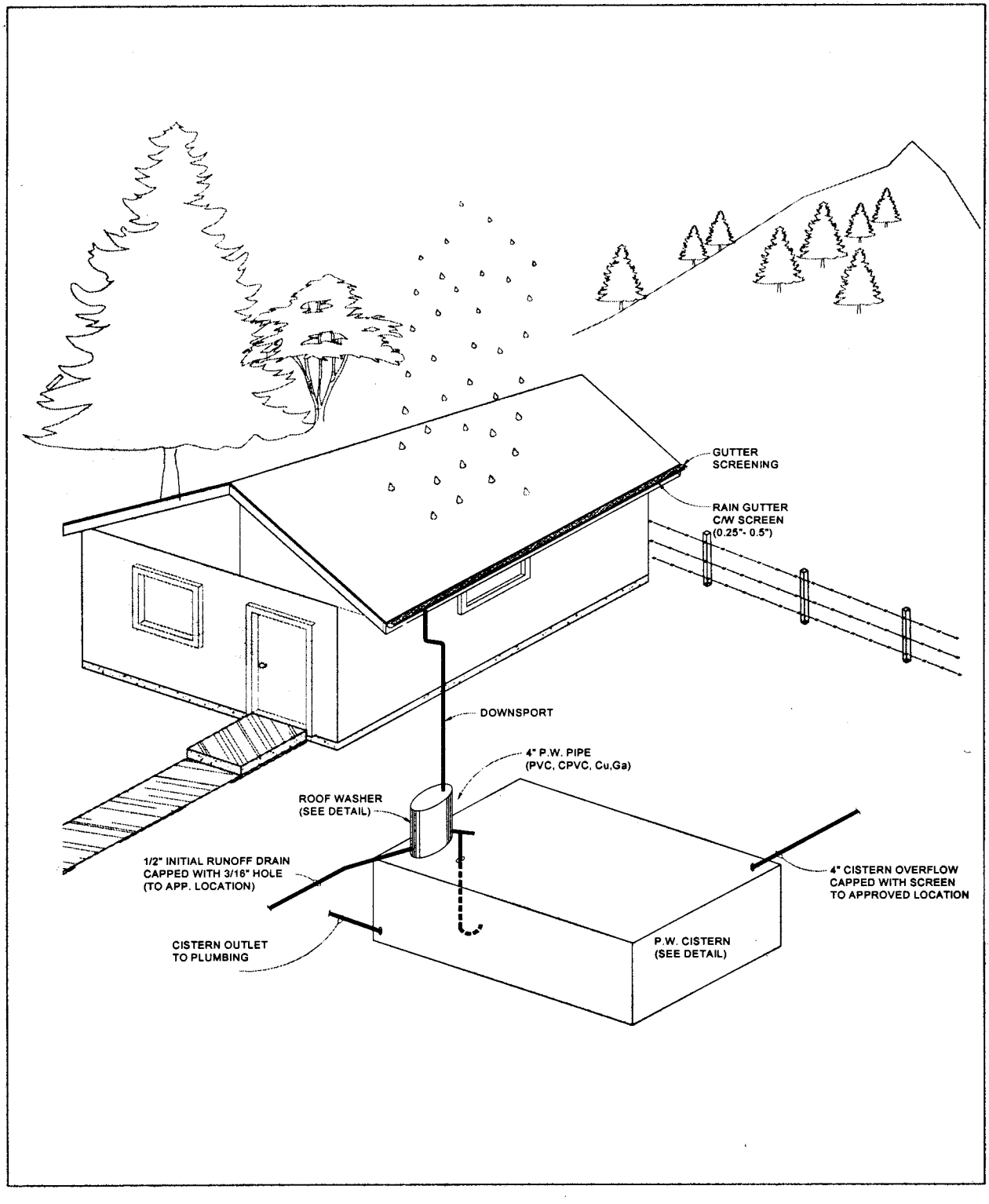
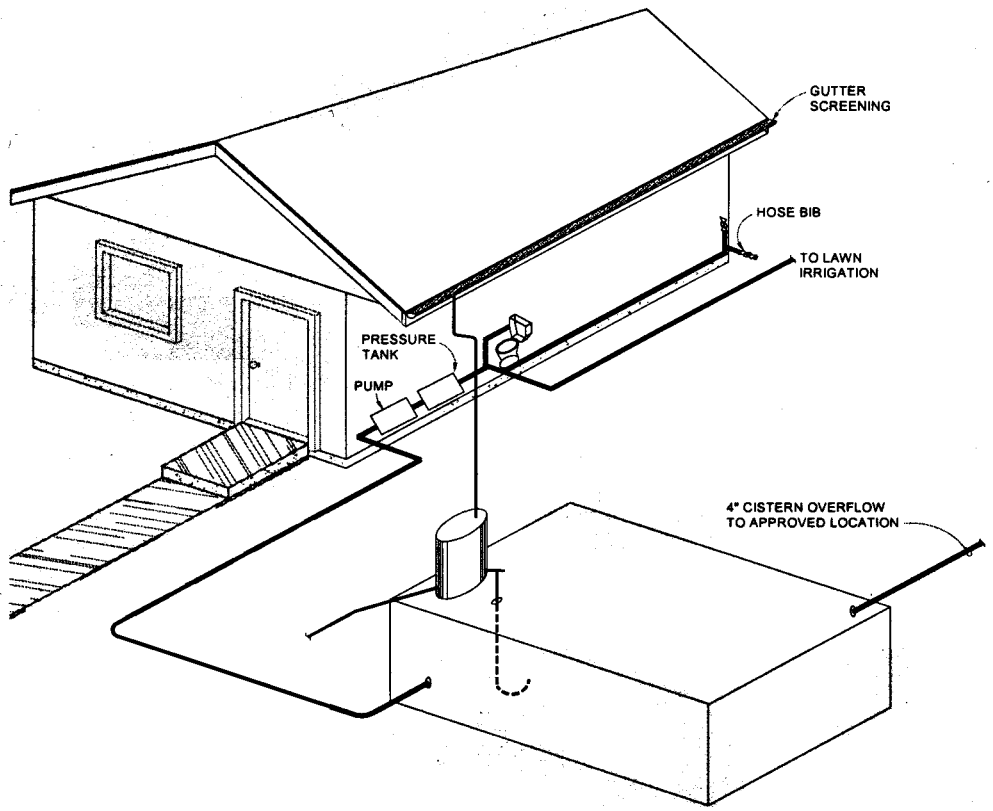
New March 13, 2001

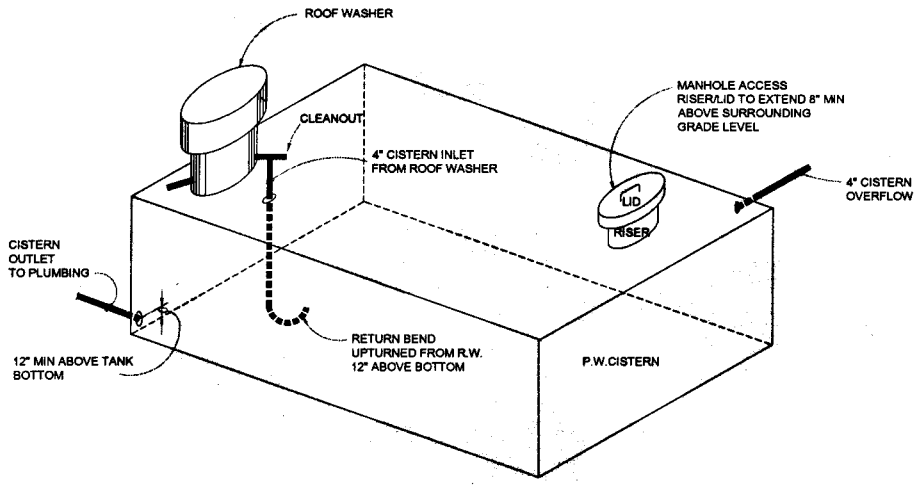
One or Two Family Rainwater System Diagram – Collection Detail



One or Two Family Rainwater System Diagram – Distribution Detail

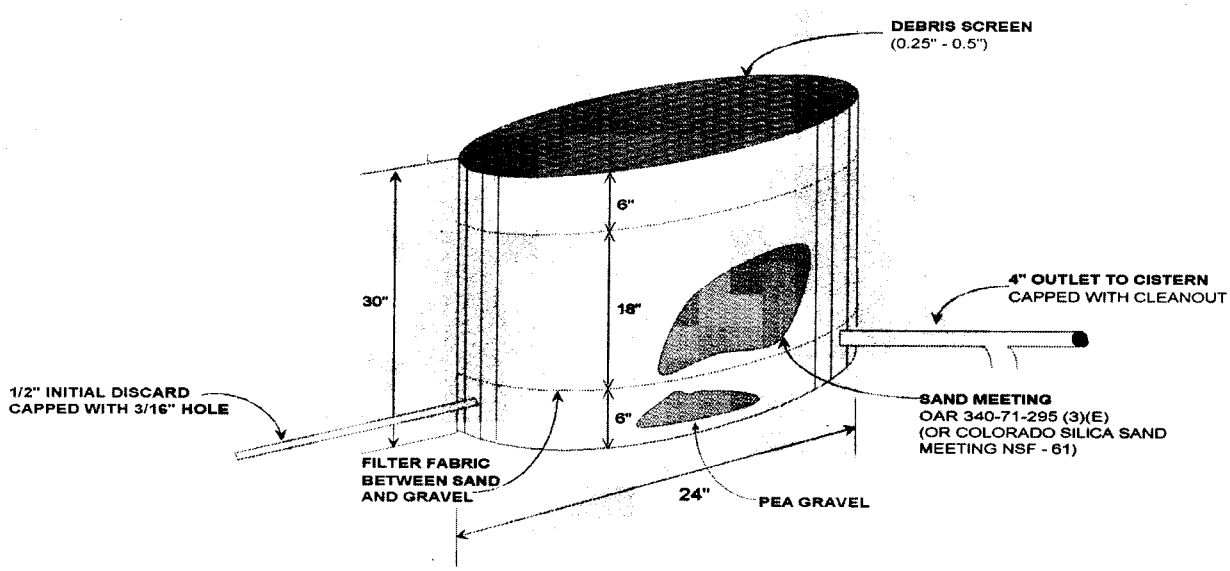


One or Two Family Rainwater System Diagram – Cistern Detail



CISTERN DETAIL

One or Two Family Rainwater System Diagram – Roofwasher Detaill



ROOFWASHER DETAIL

After Recording Return to:

Office of Planning and Development Review
Attn: DSC Resource Records 299/5000
1900 SW 4th Avenue
Portland OR 97201

City of Portland
Notice of Residential Rainwater Harvesting System Installation

This document verifies and legally records that the property located at[1]:

Acquired on[2]: _____

Is equipped with a functioning rainwater harvesting system in addition to the municipal water system. This system serves (check all that apply):

- ☐ Water closets
- ☐ Hose bibbs
- ☐ Other irrigation equipment

Signed by[3]:

_____ Date _____ _____ Date _____

_____ Date _____ _____ Date _____

_____ Date _____ _____ Date _____

STATE OF OREGON

County of _____

This instrument was acknowledged before me on _____, 20____ by[4]_____

Notary Public – State of Oregon _____

My commission expires: _____

Instructions for Filling out the Recording Document

(Do Not Record This Page. Doing so will result in additional recording fees.)

1. Please provide the full legal description as shown at the County recording office. Include the addition, lot and block. If the legal description takes up more room than the space provided, it may be attached to the recording document. Indicate that the legal description has been attached in the location provided for the description itself.

2. Include the month day and year that the property was acquired by the current owner(s).

3. All current property owners must sign the recording document in front of a public notary.

4. Notary will print all names of signing parties in this location.

5. Make check payable for recording fee to: Multnomah County Recorder

The fee to record this document is $19.00 1st page + $5.00 each additional page (January 2001). Call Multnomah County Recorder's Office at (503) 988-3034 for current rate.

After Recording Return to:

Office of Planning and Development Review
Attn: DSC Resource Records 299/5000
1900 SW 4th Avenue
Portland OR 97201

City of Portland
Notice of Residential Rainwater Harvesting System Abandonment

This document verifies and legally records that the rainwater harvesting system located at[1]:

Acquired on[2]: _____

Was abandoned on[3] _____and all fixtures have been connected to the municipal water system.

Signed by[4]:

_____ Date _____ _____ Date _____

_____ Date _____ _____ Date _____

_____ Date _____ _____ Date _____

STATE OF OREGON

County of _____

This instrument was acknowledged before me on _____, 20____ by[5]_____

Notary Public – State of Oregon _____

My commission expires: _____

Instructions for Filling out the Recording Document

(Do Not Record This Page. Doing so will result in additional recording fees.)

6. Please provide the full legal description as shown at the County recording office. Include the addition, lot and block. If the legal description takes up more room than the space provided, it may be attached to the recording document. Indicate that the legal description has been attached in the location provided for the description itself.

7. Include the month day and year that the property was acquired by the current owner(s).

8. Indicate the date that the system was abandoned.

9. All current property owners must sign the recording document in front of a public notary.

10. Notary will print all names of signing parties in this location.

11. Make check payable for recording fee to: Multnomah County Recorder

The fee to record this document is $19.00 1st page + $5.00 each additional page (January 2001). Call Multnomah County Recorder's Office at (503) 988-3034 for current rate.