GRAYWATER SYSTEMS FOR RESIDENTIAL BUILDINGS

A. GRAYWATER SYSTEMS

Under the State regulations, graywater is defined as untreated wastewater that has not been contaminated by toilet waste or unhealthy bodily wastes. Graywater includes wastewater from bathtubs, showers, bathroom washbasins, clothes washing machines, and laundry tubs, but does not include wastewater from kitchen sinks or dishwashers.

A graywater system uses graywater for subsurface irrigation and may include tanks, valves, filters, pumps, or other appurtenances along with piping and receiving landscape. Graywater shall not be used in spray irrigation, allowed to pond or runoff, allowed to be discharged directly into or reach any storm water system or any surface body of water, and shall not be used to irrigate root crops or edible parts off food crops that touch the soil.

On-site treated non-potable graywater systems meeting Chapter 16 of the Plumbing Code are permitted to supply water closets, urinals, trap primers for floor drains and floor sinks, above the belowground irrigation.

B. PERMIT REQUIREMENT

A plumbing permit is required to be obtained from the County of Ventura Building and Safety Division prior to the erection, construction, reconstruction, installation, relocation or alteration of any graywater system. A Plumbing and Mechanical Plan Review will require the following in order to approve the plans and issue a permit for a graywater system:

1. A set of plans and specifications showing the graywater system. The graywater system shall be designed in accordance with the requirements in Chapter 16 of the 2013 California Plumbing Code.

   Exception: For simple residential system meeting all of the following conditions, a completed Graywater standard plan issued by Ventura County Building and Safety Division (attached) is acceptable
   a. Simple Systems: Graywater discharge is 250 gallons or less per day (CPC 1602.1.2).
   b. Gravity Systems: Systems that do not include pumps to distribute graywater.
   c. Stand Alone: Your system is not connected to any source of potable water or other irrigation systems.
   d. No Storage: Graywater is discharged into the irrigation field immediately without being stored.

C. EXEMPTION FROM PERMIT

A permit is not required from the Building and Safety Division for a graywater system in a one or two-family dwelling that is supplied by only a clothes-washer system provided the system does not require cutting of the existing plumbing piping and provided the requirements of the GW1 Handout are met.
GRAYWATER STANDARD PLAN
For Simple Residential Systems

Figure 1: Sample Piping Riser Diagram for Gray Water Systems
(For Reference Only)

ABBREVIATIONS

BT  BATHTUB
CO  CLEANOUT
F.U.  FIXTURE UNITS
KS  KITCHEN SINK
LAV  LAVATORY (BATHROOM SINK)
SH  SHOWER
VTR  VENT THROUGH ROOF
WC  WATER CLOSET (TOILET)
WM  WASHING MACHINE

GRAYWATER STANDARD PLAN
For Simple Residential Systems
GRAYWATER STANDARD PLAN
For Simple Residential Systems

Detail 1: Typical Detail for Disposal Field Piping
GRAYWATER STANDARD PLAN
For Simple Residential Systems

Detail 2: Typical Detail for Irrigation Field

COVER CAN BE REMOVED FOR INSPECTION & CLEANING

OUTLET SHIELD WITH SOLID COVER

2" PIPE

INSEMINATION BASIN WITH 3/4" WOOD CHIPS

2" SLOPE MIN.

BASIN WIDTH

BASIN WIDTH

BASIN DEPTH
### Table 1602.10 (2013 California Plumbing Code)

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Maximum absorption capacity in gallons per square foot of irrigation area per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Column 1)</td>
<td>(Column 2)</td>
</tr>
<tr>
<td>Coarse sand or gravel</td>
<td>5.0</td>
</tr>
<tr>
<td>Fine sand</td>
<td>4.0</td>
</tr>
<tr>
<td>Sandy loam</td>
<td>2.5</td>
</tr>
<tr>
<td>Sandy clay</td>
<td>1.7</td>
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<tr>
<td>Clay with considerable sand or gravel</td>
<td>1.1</td>
</tr>
<tr>
<td>Clay with small amounts of sand or gravel</td>
<td>0.8</td>
</tr>
</tbody>
</table>

### Table 703.2 (2013 California Plumbing Code)

#### MAXIMUM UNIT LOADING AND MAXIMUM LENGTH OF DRAINAGE AND VENT PIPING

<table>
<thead>
<tr>
<th>SIZE OF PIPE, inches (mm)</th>
<th>1 ¼ (32)</th>
<th>1 ½ (40)</th>
<th>2 (50)</th>
<th>2 ½ (65)</th>
<th>3 (80)</th>
<th>4 (100)</th>
<th>5 (125)</th>
<th>6 (150)</th>
<th>8 (200)</th>
<th>10 (250)</th>
<th>12 (300)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Units</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drainage piping</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
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<tr>
<td>Vertical</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Horizontal</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Drainage Piping</td>
<td>1 ½</td>
<td>2 ½</td>
<td>3 ½</td>
<td>4 ½</td>
<td>5 ½</td>
<td>6 ½</td>
<td>7 ½</td>
<td>8 ½</td>
<td>9 ½</td>
<td>10 ½</td>
<td>11 ½</td>
</tr>
<tr>
<td>Vertical, feet (m)</td>
<td>45 (14)</td>
<td>65 (20)</td>
<td>85 (26)</td>
<td>105 (34)</td>
<td>140 (45)</td>
<td>200 (65)</td>
<td>300 (90)</td>
<td>300 (90)</td>
<td>300 (90)</td>
<td>300 (90)</td>
<td>300 (90)</td>
</tr>
<tr>
<td>Horizontal (unlimited)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Note:

1. Excluding trap arm.
2. Except sinks, urinals, and dishwashers - exceeding one (1) fixture unit.
3. Except six-unit traps or water closets.
4. Only four (4) water closets or six-unit traps allowed on any vertical pipe or stack; and not to exceed three (3) water closets or six-unit traps on any horizontal branch or drain.
5. Based on one-fourth (1/4) inch per foot (20.8 mm/m) slope. For one-eighth (1/8) inch per foot (10.4 mm/m) slope, multiply horizontal fixture units by a factor of eight-tenths (0.8).

Note: The diameter of an individual vent shall be not less than one and one-fourth (1 1/4) inches (32 mm) nor less than one-half (1/2) the diameter of the drain to which it is connected. Fixture unit load values for drainage and vent piping shall be computed from Tables 702.1 and 702.2(b). Not to exceed one-third (1/3) of the total permitted length of any vent may be installed in a horizontal position. When vents are increased one (1) pipe size for their entire length, the maximum length limitations specified in this table do not apply. This table complies with the requirements of Section 901.2.
### TABLE 1602.4

**LOCATION OF GRAY WATER SYSTEM**

<table>
<thead>
<tr>
<th>MINIMUM HORIZONTAL DISTANCE IN CLEAR REQUIRED FROM</th>
<th>SURGE TANK (feet)</th>
<th>SUBSURFACE AND SUBSOIL IRRIGATION FIELD AND MULCH BASIN (feet)</th>
<th>DISPOSAL FIELD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building structures¹</td>
<td>52.3</td>
<td>23.8</td>
<td>5</td>
</tr>
<tr>
<td>Property line adjoining private property</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Water supply wells⁴</td>
<td>50</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Streams and lakes⁴</td>
<td>50</td>
<td>100⁵–⁷</td>
<td>100³</td>
</tr>
<tr>
<td>Sewage pits or cesspools</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Sewage disposal field¹⁰</td>
<td>5</td>
<td>4⁶</td>
<td>4⁶</td>
</tr>
<tr>
<td>Septic tank</td>
<td>0</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>On-site domestic water service line</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pressurized public water main⁷</td>
<td>10</td>
<td>10</td>
<td>10⁷</td>
</tr>
</tbody>
</table>

For SI units: 1 foot = 304.8 mm

**Notes:**

¹Building structures do not include porches and steps, whether covered or uncovered, breezeways, roofed carports, roofed porte cochères, roofed patios, carports, covered walks, covered driveways, and similar structures or appurtenances.

²The distance shall be permitted to be reduced to 0 feet for aboveground tanks where first approved by the Authority Having Jurisdiction.

³Underground tanks shall not be located within a 45 degree angle from the bottom of the foundation, or they shall be designed to address the surcharge imposed by the structure. The distance may be reduced to six (6) inches (153 mm) for aboveground tanks when first approved by the Enforcing Agency.

⁴Where special hazards are involved, the distance required shall be increased as directed by the Authority Having Jurisdiction.

⁵These minimum clear horizontal distances shall apply between the irrigation or disposal field and the ocean mean higher high tide line.

⁶Add 2 feet (610 mm) for each additional foot of depth in excess of 1 foot (305 mm) below the bottom of the drain line.

⁷For parallel construction or for crossings, approval by the Authority Having Jurisdiction shall be required.

⁸The distance shall be permitted to be reduced to 1 1/2 feet (457 mm) for drip and mulch basin irrigation systems.

⁹The distance shall be permitted to be reduced to 0 feet for surge tanks of 75 gallons (284 L) or less.

¹⁰The minimum horizontal distance may be reduced to 50 feet (15240 mm) for irrigation or disposal fields utilizing gray water which has been filtered prior to entering the distribution piping.
GRAYWATER STANDARD PLAN 1
For Simple Residential System

Project Address: _______________ Permit Number: _______________

Scope:
This plan applies only to simple residential systems meeting the following criteria:

- Simple Systems: Graywater discharge is 250 gallons or less per day.
- Gravity Systems: Systems that do not include pumps to distribute gray water.
- Stand Alone: Your system is not connected to any source of potable water or other irrigation systems.
- No Storage: Graywater is discharged into the irrigation field immediately without being stored.

Design Professional Information:

Name: _______________________________ Phone Number: _______________________________

Address: _______________________________

City: _______________ State: _______________ Zip Code: _______________

______ Homeowner _______ Contractor _______ Engineer/Architect

License # _______________ License Type _______________

License # _______________ License Type _______________

Checklist

<table>
<thead>
<tr>
<th>Check if Complete</th>
<th>Item</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide a site plan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Show the location of the graywater system on the site plan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Show the setback distances of graywater irrigation system per 1602.4( page 6 from GW-2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piping riser diagram to be completed prior to rough inspection and (See Example on page 2 GW-2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide manufacturer's literature for valves and pipes used</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graywater is not connected to any potable water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-way diverter valve is clearly labeled to indicate direction of flow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Backwater valve is installed on sewer side of 3-way valve in the horizontal position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drainage piping is sized per Plumbing code Table 703.2 on (page 5 from GW-2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irrigation field sizes are shown on site plan and meet minimum requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graywater discharge is minimum of 2&quot; below ground surface or have 2&quot; minimum mulch cover</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graywater is not irrigating edible portion of plants (i.e. No root crops)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundwater depth is below 3ft. and was checked with a test hole</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piping material is indicated on the site plan and on the riser diagram</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
GRAYWATER STANDARD PLAN 2
For Simple Residential System

1. Daily Graywater Flow Calculation
   a. Number of Bedrooms: _______
   b. Number of Occupants (1+number of bedrooms): _______
   c. Type of fixtures connected to graywater system (check all that apply)
      _____ Lavatory (bathroom sink) _____ Shower/Bath _____ Washing Machine/Wash Basin
   d. Daily Graywater Flow: _______ gallons per day (shall not exceed 250 gallons).
      Estimate graywater flow per occupant:
      Any combination of lavatory, shower or bath: 25 gallons per day per occupant
      Laundry (washing machine or wash basin): 15 gallons per day per occupant
      Daily graywater flow example:
      (4 occupants x 25 gals/day) + (4 occupants x 15 gals/day) = 160 gallons per day

2. Soil Type (from Table 1602.10 on page 5 of GW-2) ____________________________
   (default is clay with small amounts of sand or gravel)
   Note: Written verification of the soil type is required for designs involving the following soil types:
   Clay with considerable sand or gravel, sandy clay, sandy loam, fine sand, coarse sand or gravel.
   Options for "soil type" verification are: from Professional Engineer, provide soil report from an
   adjacent property, or provide septic tank design/percolation test from the Ventura County
   Environmental Health Department.

3. Maximum Absorption capacity of soil (from column 2 of Table 1602.10 on Page 5 of GW-2)
   _____ gallons/ft (default is 0.8)
4. Size of Irrigation Field

a. Minimum required irrigation field size: ______ square feet
   Minimum irrigation field size: Divide total gallons per day (from step 1d) by the maximum absorption capacity of the soil (step 3).
   Example: 160 gallons/day of graywater in fine sand soil would need 160/4.0 = 40 square feet of irrigation area.

b. Actual irrigation field size provided: ______ square feet

Notes:

1. Pipe shall be labeled "NON-POTABLE WATER, DO NOT DRINK"
2. All valves shall be readily accessible.
3. Installation does not violate other codes or damage the building. Any penetration in the building envelope shall be properly sealed.
4. Only pipes approved for waste shall be used in the plumbing drainage system.
5. Upgrades made to plumbing shall comply with the Plumbing Code.

   Project Address: ________________________________
GRAYWATER
SIMPLE RESIDENTIAL SYSTEM

Instructions:
1. Use this space to sketch your house, yard, and where you want to use Graywater System.
2. Indicate setbacks to property lines, house and structures.
3. Show Street Frontage.

Plot or Site Plan

Project Address: ____________________

APN: ____________________