

# Welcome to the 3<sup>rd</sup> Greywater Roundtable

Sponsored by:  
**Greywater Alliance**  
July 29, 2010

# Permit for Branched Drain System: Oakland

One shower from a two bedroom house, irrigates front yard.

**Cost:** Permit Fee: \$167

Materials: \$272

Total: about \$450 (permit fee just raised slightly)

**Time:** Plumbing- 3 hours (1 person working)

Landscape 5 hours (2 people working)

# Water Calculations

## Water Reuse:

- **Actual:**

- 1.25 gpm shower head (ultra low flow)
- x 2 people taking six min. showers=12 min.
- = 15 gpd x 7 months irrigation season (210 days) =
- **3,150 gallons per year.**

- **Code:**

- 75 gpd (higher water use house) x 210 days =
- **15,750 gallons per year**

# “Branched Drain” System Summary

1. Diverter valve installed in shower drain
2. Greywater flows by gravity through a 2” pipe in crawlspace to the front yard.
3. Flow is divided to irrigate 8 locations. 1 ½” pipe used in landscape after 1<sup>st</sup> split.
4. Greywater flows into “mulch basins”, mulch provides surge area and prevents runoff or pooling.
5. Perennial plants near outlet points access water through their roots under the ground.

1.

For SEWER  
Turn Towards

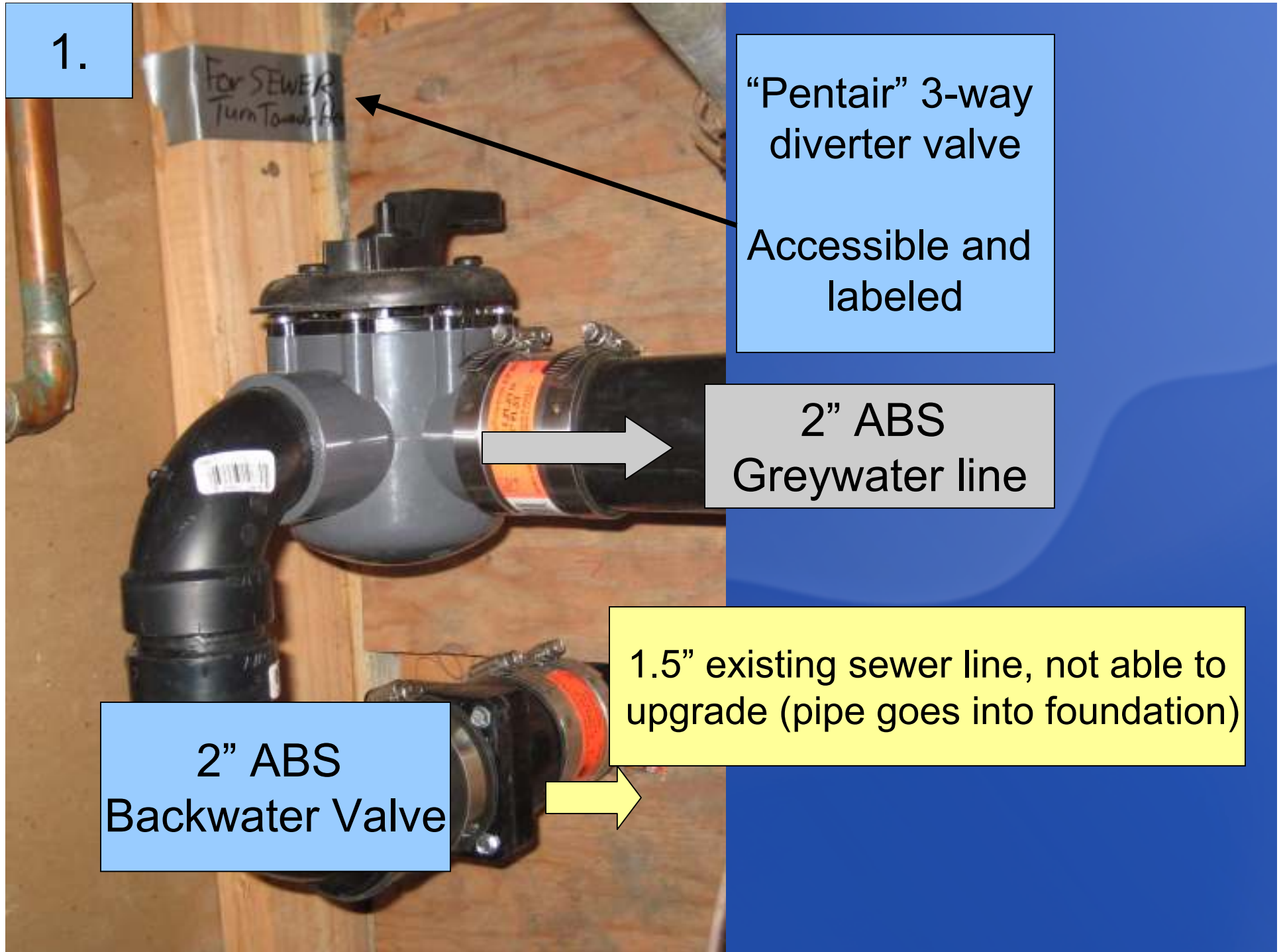
“Pentair” 3-way  
diverter valve

Accessible and  
labeled

2” ABS  
Greywater line

1.5” existing sewer line, not able to  
upgrade (pipe goes into foundation)

2” ABS  
Backwater Valve



Old steel 1.5" shower drain

GREYWATER

SEWER



2.

ABS strapped every  
4 feet

Pipe labeled, "Caution:-Non potable water,  
do not drink"(with duct tape and a black sharpie)

2" ABS pipe, sloped  
2% downwards

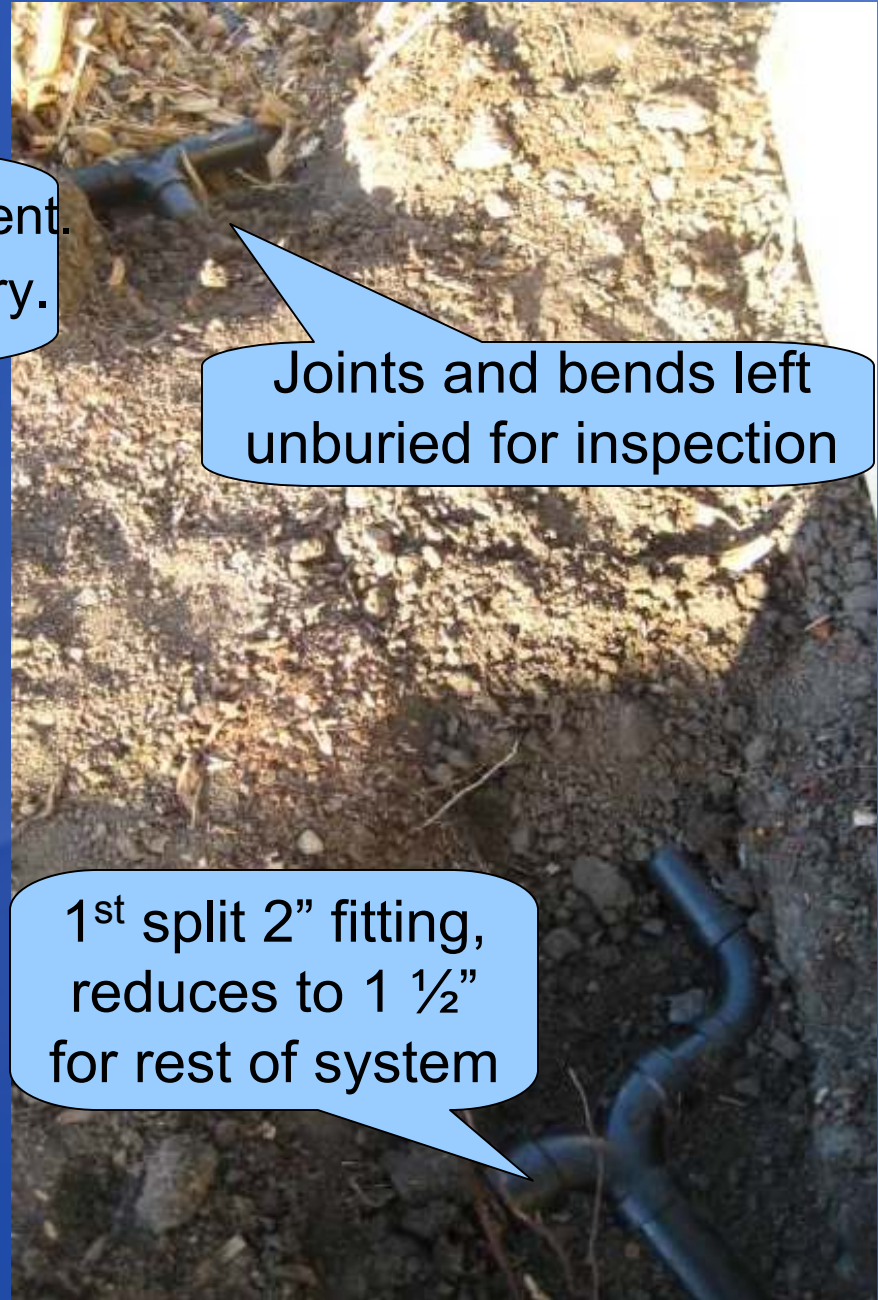


3.

Greywater pipe exits through existing vent.  
Screen resealed to prevent animal entry.



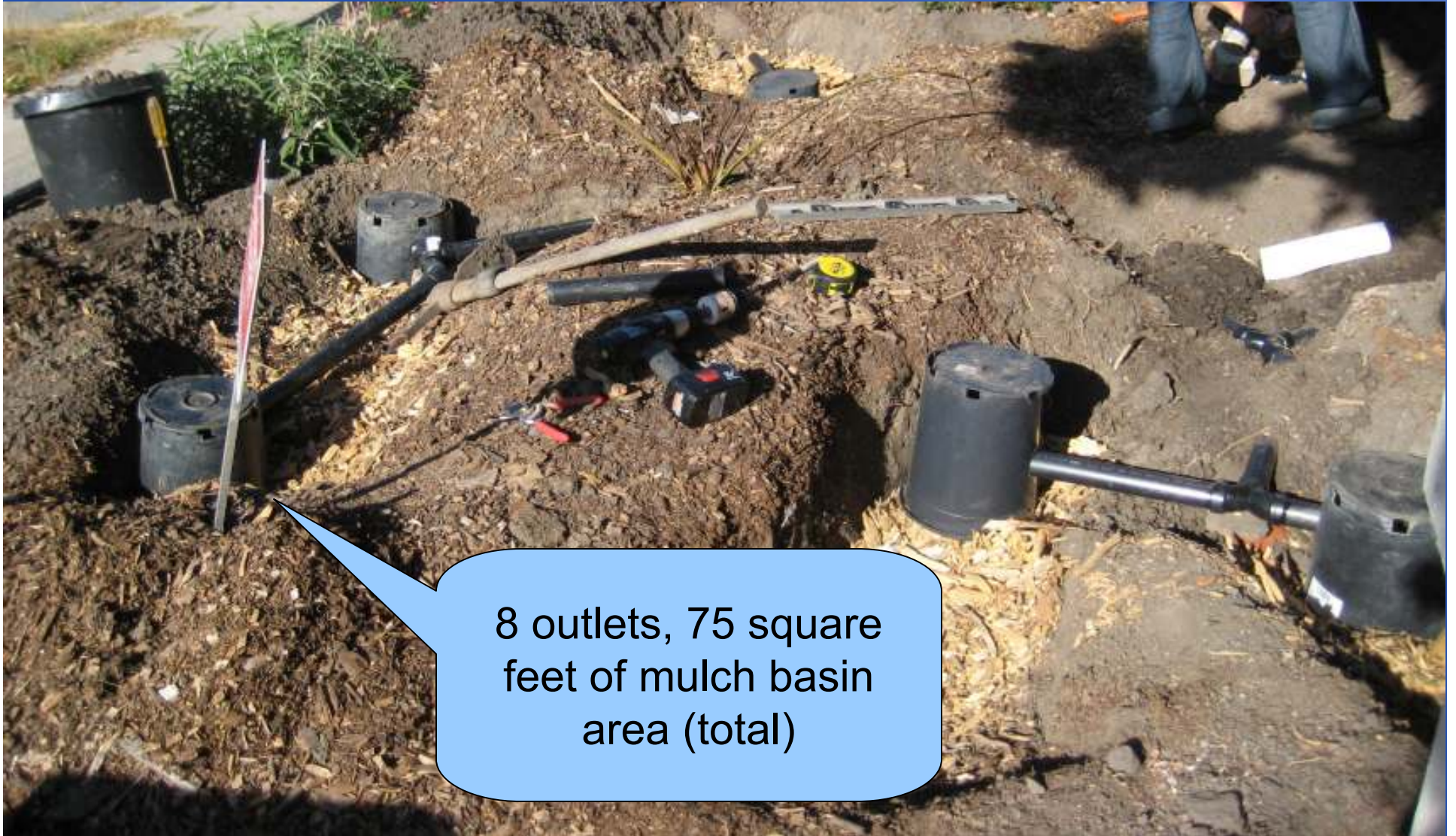
Clean-out. Exposed pipe will  
be painted to protect from sun



Joints and bends left  
unburied for inspection

1<sup>st</sup> split 2" fitting,  
reduces to 1 1/2"  
for rest of system

# Greywater Irrigation Field



8 outlets, 75 square  
feet of mulch basin  
area (total)

4.



Greywater discharged at least 2" under mulch. Outlet in "mulch shield" to prevent clogging.



Mulch shield buried to surface level, greywater flows into mulch basin.



Almost done!

Trees or shrubs will be planted near outlets

Basins will be filled to top with mulch

APPLICATION FOR GRAY WATER IRRIGATION SYSTEM PERMIT SIMPLE RESIDENTIAL GRAPITY SYSTEMS, NO STORAGE  
 Please read the California Plumbing Code Chapter 16A-1 Design Requirements before completing this form.

Assessor's Parcel No. [REDACTED]

Project address: [REDACTED] Oakland  
 Owners name and contact info: Jon Paul [REDACTED]

Description of project (include type and number of fixtures to be diverted):  
One shower only (no sink) diverted to front yard only

Daily graywater flow calculation:  
 Number of bedrooms: 2 Number of occupants (1 = # of bedrooms) 3  
 Shower/bath = 25 gallons per day per occupant  
 Laundry = Top loading machine = 15 gallons per day per occupant  
 Daily graywater flow = 75 gallons per day

Determine soil type:  
 Choice A: Use 1 square foot per gallon infiltration rate (1 ft<sup>3</sup>/gal)  
 Choice B: Send soil to laboratory for testing, use Table 16A-2

Choice A: Minimum irrigation field size needed = # of gallons of graywater produced daily  
75 sf

Choice B: Soil type: (if sent to lab) \_\_\_\_\_  
 Minimum irrigation field:  
 Divide total GPD by the number in the column of Table 16A-2 of your soil type.

Soil Type	Maximum absorption capacity in gallons per square foot of irrigation area per day
Course sand or gravel	50
Fine sand	40
Sandy loam	25
Sandy clay	17
Clay with considerable sand or gravel	11
Clay with small amount of sand or gravel	0.8

Example: 100 gallon/day of graywater in fine sand soil would need 100/4.0 = 25 square feet of irrigation area  
 Minimum irrigation field size needed: 75 sf

I certify that I have the home owners manual for this system, that I have read it, and that I will maintain the system as outlined in the manual. I understand that if there is a complaint investigation that verifies a violation of the applicable standards, improper use of the system, or non performing the necessary maintenance, that I will be held responsible for any fines or costs resulting from the investigation.

Signature of property owner: [Signature] Date: 7-23-10

Daily greywater flow: 2 bedrooms = 3 occupants  
 Shower: 25 gpd/person  
 3 x 25 = 75 gpd

Alternative calculation: Use local statistics (provided by water district if they have the data) This method is more accurate.

Soil type: Choice A: use clay (1 sq ft / gal)  
 = **75 square feet** irrigation field (mulch basin)

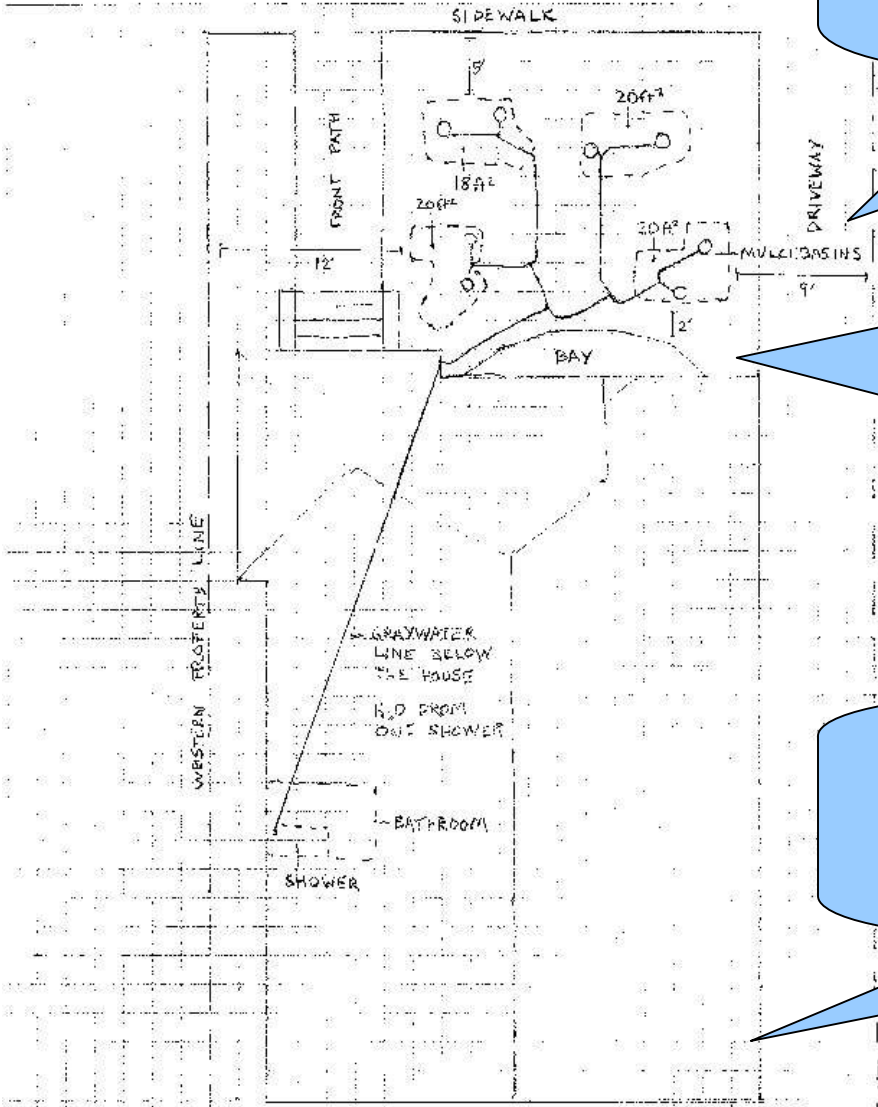
Soil type: Choice B: Send soil to lab for testing, then use Table 16A-2 to find irrigation field size.

75 gallons:  
 fine sand = 18 sq. ft  
 sandy loam = 30 sq. ft.  
 sandy clay = 44 sq. ft.

Irrigation Field Plan

Address: [REDACTED]

Using the graph below, indicate where on the property the graywater will be used plan on the next page). Indicate setbacks to property lines, house and other structures, 30% slopes, and drinking water lines. Show street frontage and your driveway



Show set backs: from property line (1.5 ft) and house (2 ft.) (When applicable include setbacks from wells, septic, creeks, etc.)

Show dimensions and area of irrigation field (mulch basins) must total minimum size based on soil type and gallons per day of greywater generated.

Irrigation plot plan not to scale, but shows building footprint, property lines, greywater line, and irrigation area.

Floor Plan

Address: [REDACTED]

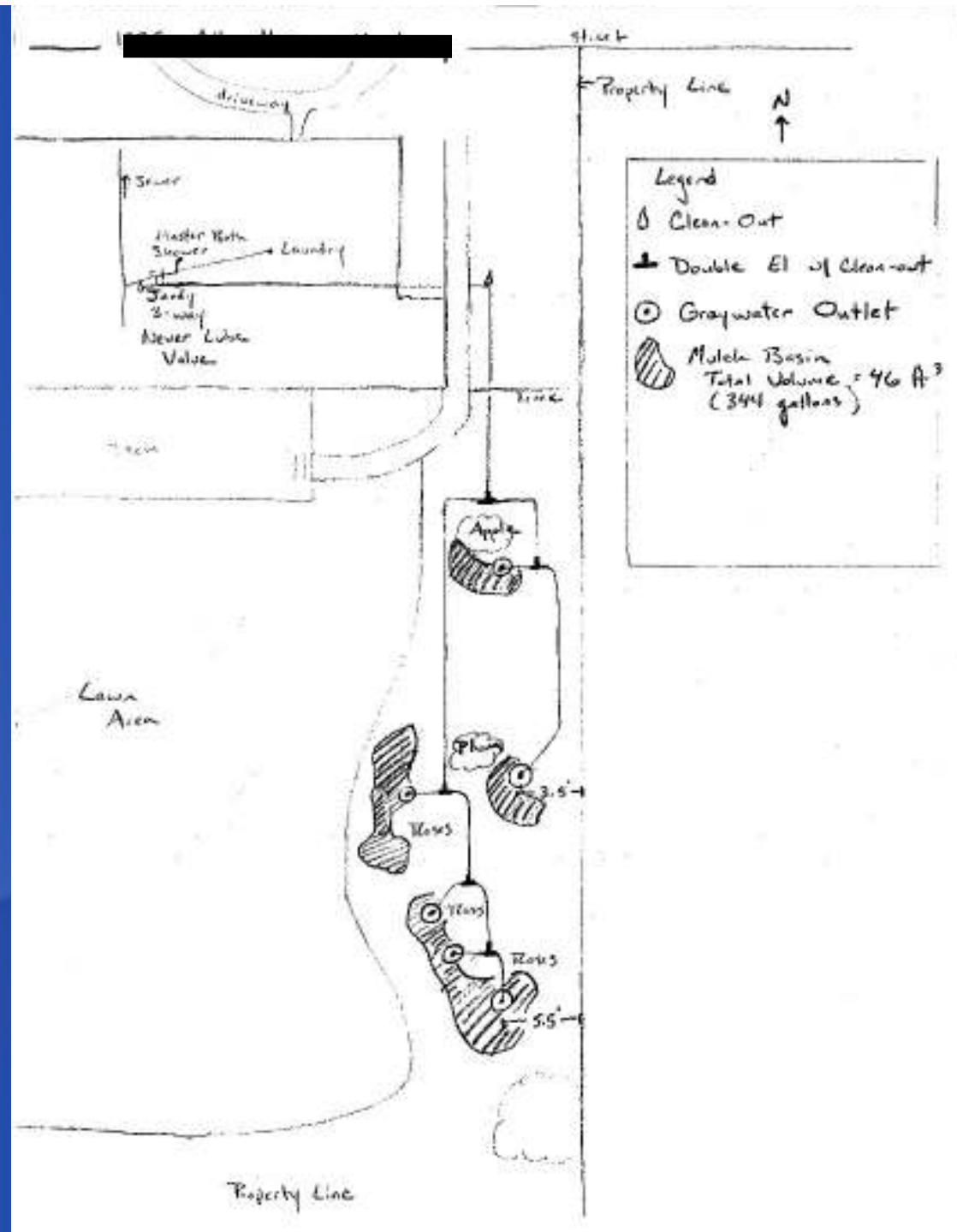
NOT TO SCALE  
DIAGRAM MARK

### Permit Checklist for simple gravity, no storage, graywater system

Check if complete	Item	Changes needed/Comments
<b>Connection to plumbing fixture and piping</b>		
	3-way diverter valve installed after trap and vent	
	Valve is clearly labeled	
	Backwater valve is installed on sewer side of 3-way valve in the horizontal position	
	Upgrades are made to plumbing if needed (Exception: When upgrades are too difficult to make ie. If plumbing goes into a foundation)	
	2" ABS pipe is run to outside of building, following drainage plumbing guidelines for fittings, strapping, clean-outs, etc.	
	Pipe is labeled "Non-potable water: do not drink" every 5 feet	
	Installation doesn't violate other codes or damage building. Any perforations in building envelope are properly sealed.	
<b>Landscape irrigation</b>		
	Irrigation field size meets minimum requirements	
	Graywater discharged minimum of 2" below surface	
	Graywater is not irrigating edible portion of plants (ie. Root crops)	
	Groundwater depth below 3 ft. (checked with test hole)	
<b>Operations and Maintenance</b>		
	Owners Manual has been read and is at the site.	

System turned off in rainy season





# Monterrey County plot plan (inspection passed in June)

Similar cover sheet to Oakland except:  
 -no backwater valve  
 -landscape contractor did soil test

# Example: Santa Cruz County

Estimated cost: \$330

**Sheet Index:**

- Page 1 – Cover Page & Site Plan Details
- Page 2 – Cover Page & Site Plan Details
- Page 3 – Floor Plan (*collection plumbing*)
- Page 4 – Site Plan (**Irrigation Field**) (*distribution plumbing and receiving landscape*)
- Page 5 – Detailed Vicinity Map
- Page 6 – Calculation of Estimated Graywater Discharge
- Page 7 – Owner’s Maintenance & Operations Manual

<input type="checkbox"/> <b>Single Family Residential</b> <i>(one-two dwellings)</i>	# of bedrooms:	# of occupants using graywater fixture(s):	<i>Estimated Graywater Discharge Calculation Method (choose one)</i> <input type="checkbox"/> <b>Chapter 16A (1606A)</b> Daily Graywater Produced _____ gpd
<input type="checkbox"/> <b>Multi Family Residential</b> <i>(more than two dwellings)</i>	# of bedrooms:	# of occupants using graywater fixture(s):	<input type="checkbox"/> <i>Estimate of graywater use from water use records and/or daily per person interior water use</i> Daily Graywater Produced _____ gpd

This property is served by municipal water/sewer  
 Name of Water Company: \_\_\_\_\_

This property contains a well       This property contains a septic system

<b>Irrigation method:</b>	<input type="checkbox"/> <b>Gravity</b> Total mulch basin surge capacity: _____ gal Constructed wetland surge capacity: _____ gal	<input type="checkbox"/> <b>Drip (pressurized)</b> Backflow prevention device (make & model): _____	<input type="checkbox"/> <b>Drum with Effluent Pump</b> Drum surge capacity: _____ gal Designed to empty in 24 hours? <input type="checkbox"/> Yes <input type="checkbox"/> No Drum overflow connected to sewer/septic? <input type="checkbox"/> Yes <input type="checkbox"/> No
---------------------------	---	--	--

# Unresolved Points

- Backwater valve? Many areas not requiring it.
- Burial depth of ABS. Most areas not requiring any specific depth (except on slopes).
  - Greywater code requires 2" minimum depth for irrigation, nothing for pipe. ABS sewer lines must be buried 12", hence the confusion for inspectors new to greywater.
- Soil testing:
  - Installer/landscaper perform test (soil ribbon test or shake test)
  - Lab (\$25-\$35)
  - Existing info from site
  - Use conservative/typical type, or send to lab
- Lack of local water use data (code gives high estimate for daily use, leads to over built systems)