



HOMEOWNER'S GUIDE

FOR

- FLOOD
- DEBRIS
- EROSION CONTROL

MISSION STATEMENT



Our mission is to provide information on protecting your property from potentially expensive flood damage through the installation of devices and measures, which would cost less to install and maintain than recovering from flood damage to your property.

ASSISTANCE FOR DISABLED PERSONS



Questions or concerns regarding information contained in this Guide, or access to any Public Works programs or facilities, should be directed to the Department A.D.A. (Americans with Disability Act) Coordinator at:

(626) 458-4081 during work hours

You may also obtain assistance by calling the toll free *CALIFORNIA RELAY SERVICE* numbers at:

Voice: 1-800-735-2922

TDD: 1-800-735-2929

Or, you may call the Public Works TDD Number at:

(626) 282-7829 during work hours.

ASSISTANCE FOR SPANISH-SPEAKING PERSONS (CONSEJOS EN ESPAÑOL)



Si necesita consejos en español con relación al control de inundaciones, escombros y erosión, favor de llamar al Condado de Los Angeles, Departamento de Obras Publicas al **(626) 458-4321**

ATTENTION



This Guide may not be applicable to drainage problems in areas outside the County of Los Angeles. If outside the County, you are advised to contact your local governmental office for additional assistance.

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Introduction

The Los Angeles Basin is periodically subject to devastating floods resulting in substantial property damage. Such damage is intensified by debris flows resulting from the destruction of the watershed by major brush fires.

Public Works has prepared this publication to provide information on devices and measures to protect your property, which will cost less to install and maintain than to recover from flood damage to your property.

The following discussion stresses measures to mitigate issues of particular significance to the growing number of residents in hillside areas. These temporary measures can be accomplished by individual homeowners or their hired professionals. Although the information is intended to develop measures to reduce the threat of flood damage, there is no guarantee that they will prevent all damage or injury.

When the storm season arrives (October to April), flooding and debris flows occur, making it more difficult to perform emergency work. Therefore, I recommend you initiate your preparation for the rainy season immediately.

MARK PESTRELLA
Director of Public Works



I. THE ISSUES

A. FLOOD WATERS

The most common drainage issue in a community is *flood waters*. This occurrence is the mere passage of stormwaters across areas that would normally not be affected in small storms. Remember that flood waters:

CONSIST	of large quantities of water, often fast moving, very turbulent and murky due to fine sediment and other soil.
OCCUR	in moderate to large storms and can reach depths that are greater than your height.
INUNDATE	large areas and impact any buildings, vehicles or equipment in their path.

NOTE

For the purposes of this publication, ponding or localized drainage around buildings during small to medium storms are not considered “flood waters.”

B. DEBRIS FLOWS

Another equally dangerous issue, usually in hillside or mountainous areas, is debris flows. Remember that *debris flows*:

CONSIST	of large quantities of soil, rocks, boulders, trees, or brush being moved by flood waters.
---------	--

OCCUR	when flood waters flow over hillside and natural streambed areas and are most severe in areas denuded by recent fire or grading.
ARE	highly destructive and leave large quantities of sediment and rocks in their paths during storms.
CONTAIN	sufficient strength to destroy objects in their path.
CAN	be deflected to reduce property damage (Fig. 2, page 9).

C. EROSION

An additional issue of storm or flood waters passing over land is often *erosion*. The result of erosion is often steep banks of scoured soil or other ground material. Remember that erosion:

OCCURS	most often when rain falls on and waters flow rapidly over loosely compacted soil or denuded slopes.
CONSISTS	primarily of soil worn away by rainfall and runoff at volumes that are less than debris flows, but can still cause damage.
CANNOT	be mitigated or controlled while it is happening, and is often not seen until the flood waters have subsided.
CAN	seriously undermine buildings, leading to major failures and danger to occupants and neighbors.

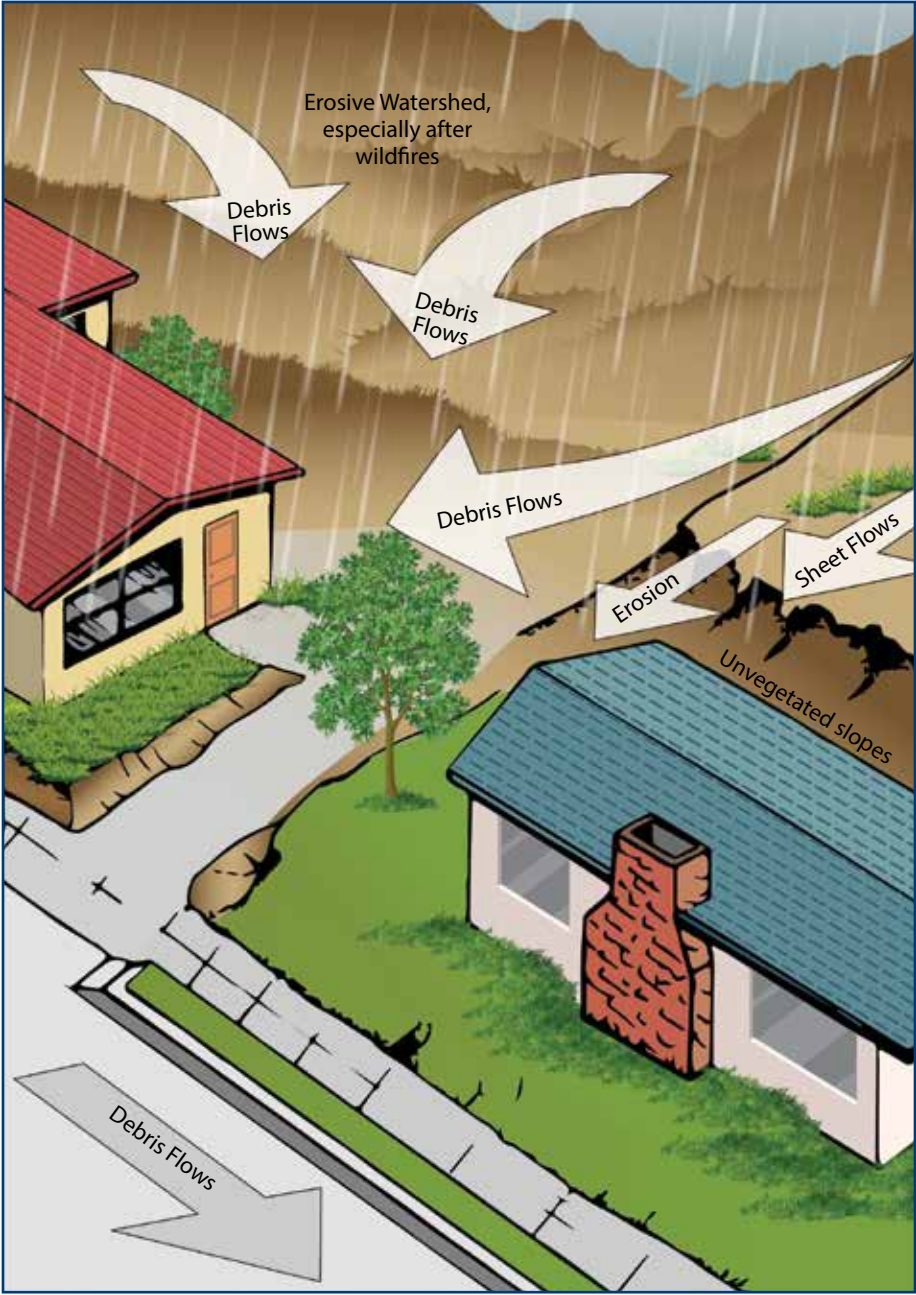


Fig. 1 - Unprotected Homes

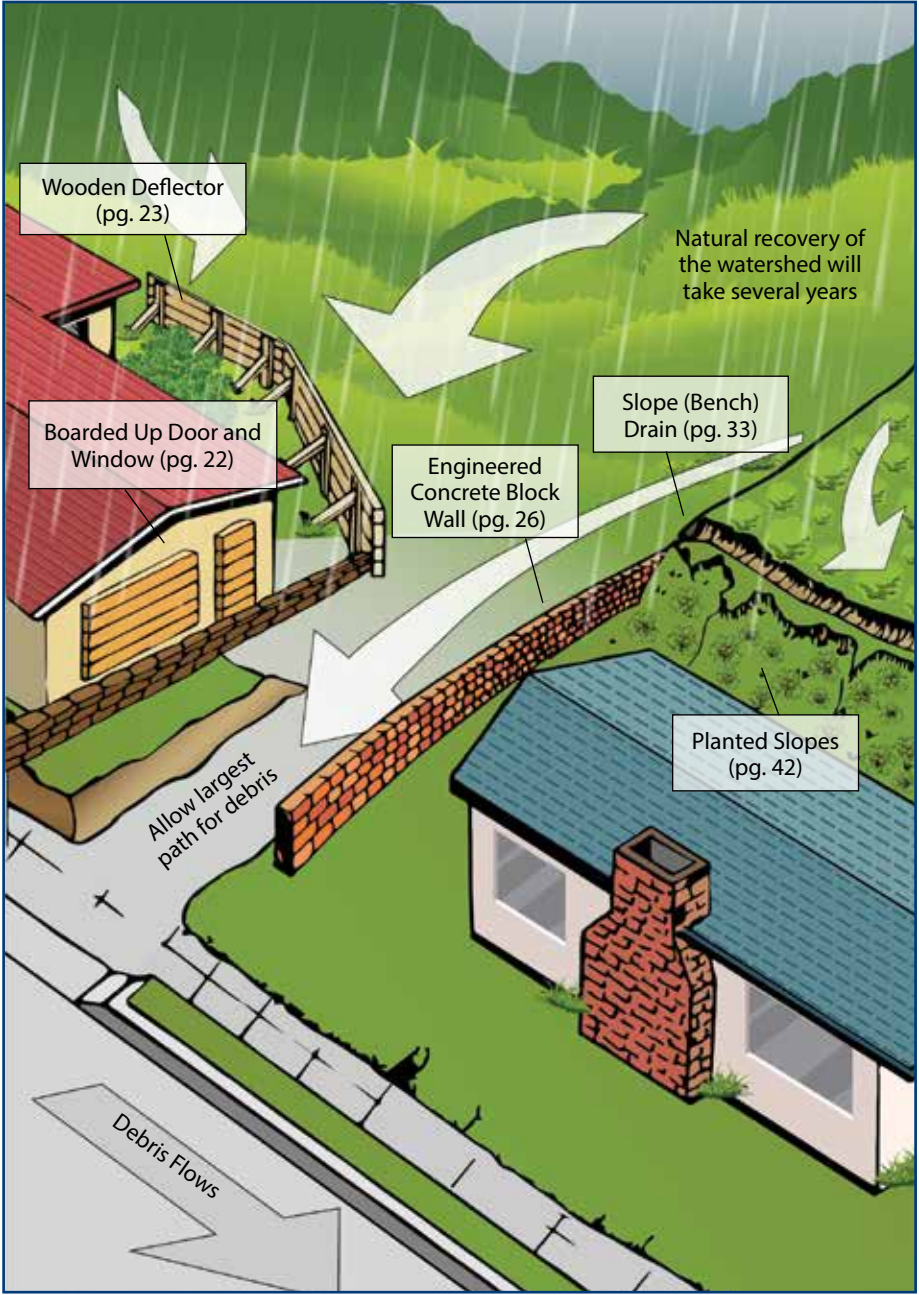


Fig. 2 - Homes Protected from Major Damage

II. EMERGENCY HOME PROTECTION

A. GENERAL RULES

The previous section described various issues you may encounter during the rainy season. Below are some general rules to follow in most cases involving flood waters, debris flows, and erosion.

-
- **NEVER** underestimate the power of debris flows.
 - **TRY** to direct debris flows away from structures.
 - **AVOID** trying to control or confine the flows more than is absolutely required.
 - **CLEAR** a path for the debris.
 - **USE** your house or building as a deflector, if necessary.
(Fig. 5, page 15).
 - **ALWAYS** place protection to deflect debris, not to dam or stop it.
 - **DEBRIS** will often enter a building through windows - board them up.
 - **REMEMBER** to protect your family and home first.
 - **THEN** consider what time and money are available to protect other less valuable objects such as swimming pools or landscaping.
 - **TRY** to install more permanent measures *(Figs. 19-20a, page 25-26)* to protect your home. In general, the problem of debris flows will exist for several years after a burn. Sandbags usually last for only a year.
 - **ALWAYS** work with adjacent affected property owners.
 - **BE** prepared to sacrifice the use of portions of your property to achieve the greatest amount of protection.
 - **AVOID** altering drainage patterns that could worsen conditions for your neighbor.
-

B. FLOOD INSURANCE

Flood insurance through the National Flood Insurance Program is available throughout the County of Los Angeles unincorporated areas and in participating cities within the County of Los Angeles. To determine if your property is in a federally designated flood hazard area you can visit our Flood Zone Determination web site at: www.dpw.lacounty.gov/floodzone , or call us at **(626) 458-4321**. If you reside in a city, please contact your city.

If you have concerns that flooding may cause damage to your home, we strongly recommend that you contact your insurance broker regarding flood insurance. If your broker is unfamiliar with flood insurance, he/she can obtain information by visiting the Federal Emergency Management Agency's (FEMA's) web site at: www.floodsmart.gov, or by contacting FEMA at the following toll free number: **1-800-621-FEMA**.

Remember, flood insurance is available in participating communities, even if your property is not in a flood-hazard area identified by the Federal Government, your County, the city, or the subdivider of your property.

Please be aware, there may be a **30-day waiting period** after the policy is issued before coverage becomes effective. Please consult your insurance agent or FEMA for information on exceptions to this waiting period.

C. DEBRIS CONTROL AIDS

ARE	not expensive when compared to the protection received, and the cost of recovering from damage to your home.
CAN	often be installed with tools owned by or readily accessible to professional contractors.
CONSIST	of materials readily obtained by homeowners or professional contractors.

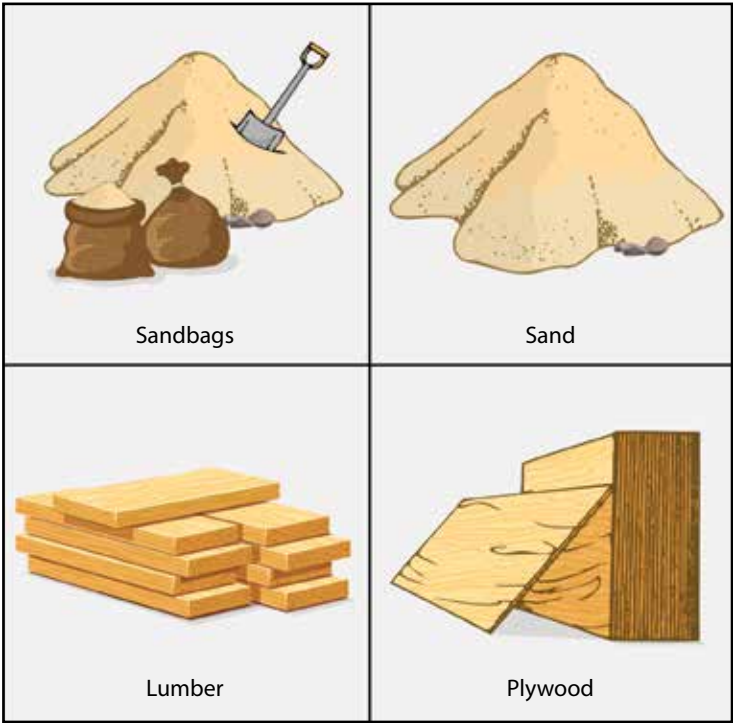


Fig. 3 - Typical Materials

D. SANDBAGS

Sandbags, when properly filled and placed, will redirect storm and debris flows away from buildings and other valuable objects on your property.

FILLING

1. Fill sandbags one-half full. Sand is preferred, if readily available; however, any local clean soil may be used.
2. For a more durable bag with increased effective life, mix 10 parts of sand or soil with 1 part of cement. The materials can be mixed and placed dry. After all bags are in place, a light sprinkling of water is recommended. This technique is only effective with burlap sandbags and will not work with plastic sandbags. Disposal of the used soil cement bags, especially if you have a large number of them, can be very expensive. Consult waste hauling companies for service availability in your area and their costs before employing this method.

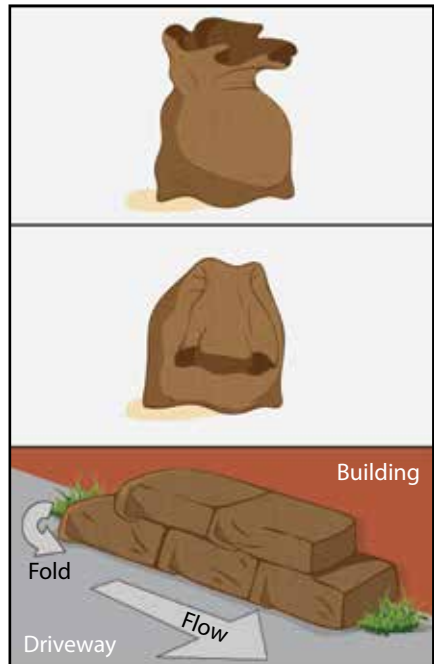


Fig. 4 - Sandbag Placement

PLACING

Fold top of sandbag down and rest bag on its folded top (*Fig 4, page 13*).

It is important to place bags with the folded top toward the **upstream or uphill direction** to prevent bags from opening when water runs by them.

Care should be taken to stack sandbags in accordance with the illustrations. Place each sandbag as shown, completing each layer prior to starting the next layer. Limit placement to two layers unless a building is used as a backing or sandbags are stacked in a pyramid formation (*Figs. 5-11, pages 15-18*).

Work with your neighbor(s) so that your combined efforts can more effectively address the drainage issue.

LIMITATIONS

1. Sandbags alone will not seal out water (*See section E - Water Intrusion Measures, pages 19-20*).
2. Sand and soil filled burlap sandbags deteriorate when exposed for several months to continued sunlight, wetting and drying. If bags are placed too early, they may not be effective when needed.
3. Sandbags are for low-flow protection (up to 2 feet). Protection from higher flows require a more permanent type of structure.
4. Sandbags are to be used to deflect flows, not to form dams.



CAUTION

Do not use straw or bales of hay in lieu of sandbags. They do not perform as well as sandbags and may be washed away.



Fig. 5 - Sandbag Stacking Against Buildings

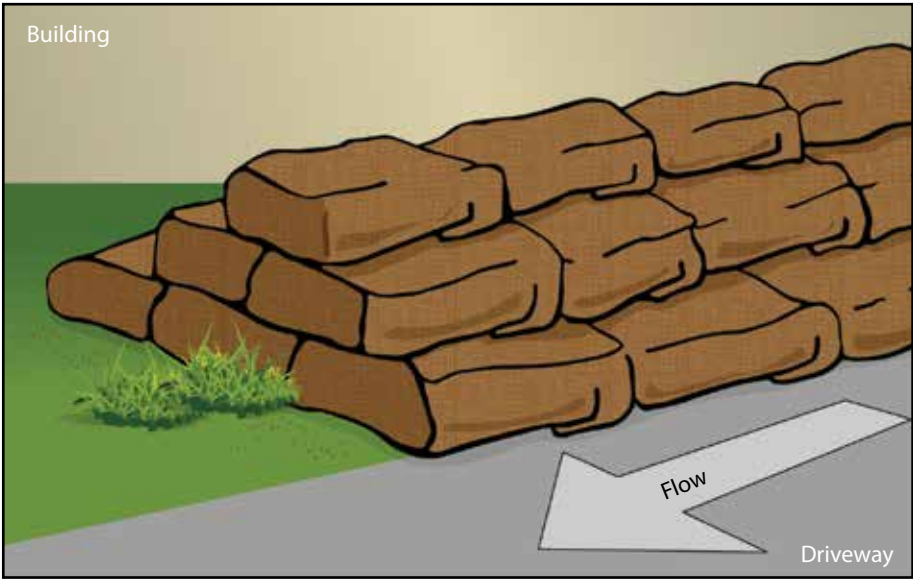


Fig. 6 - Pyramid Sandbag Stacking

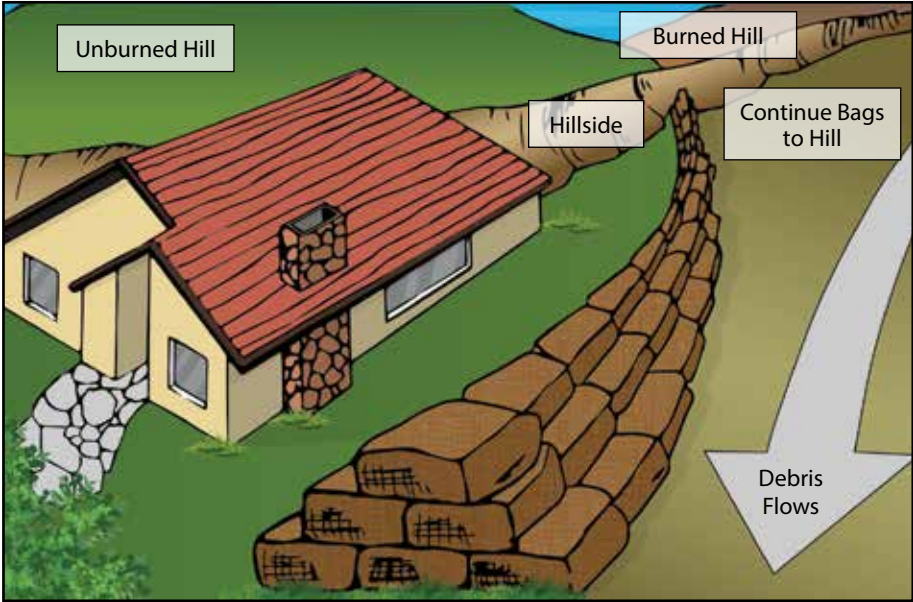


Fig. 7 - Deflecting Debris Away from Buildings

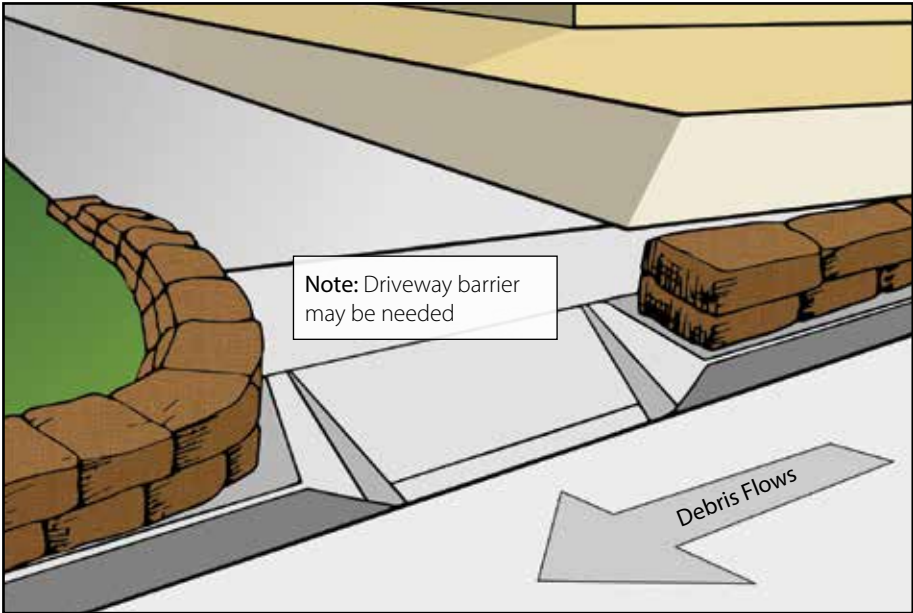


Fig. 8 - Containing Debris or Storm Flows in Streets

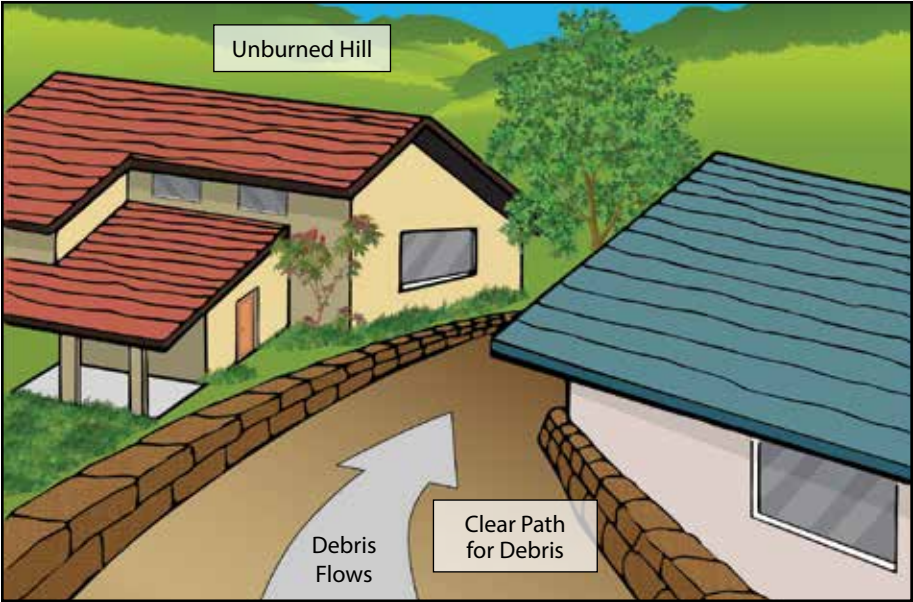


Fig. 9 - Directing Flows Between Buildings

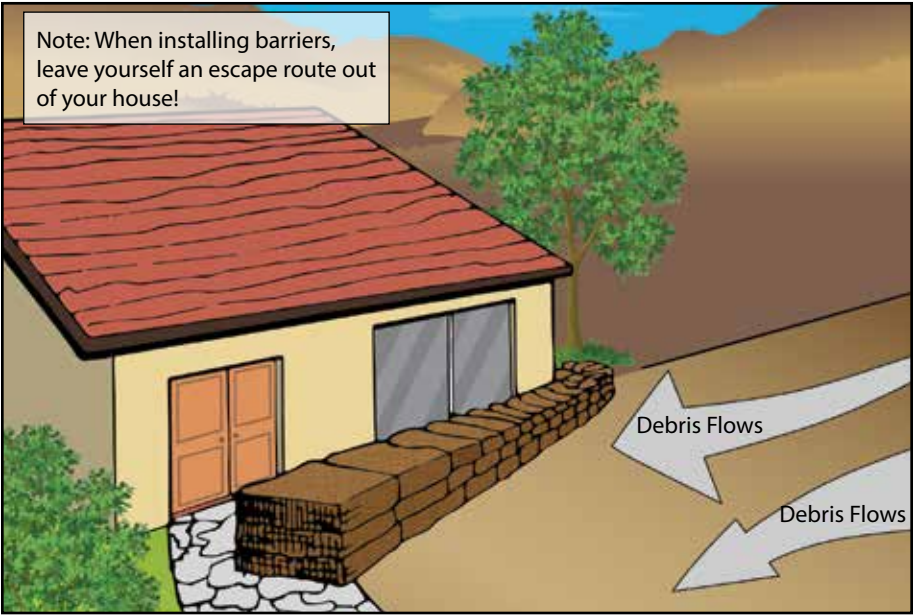
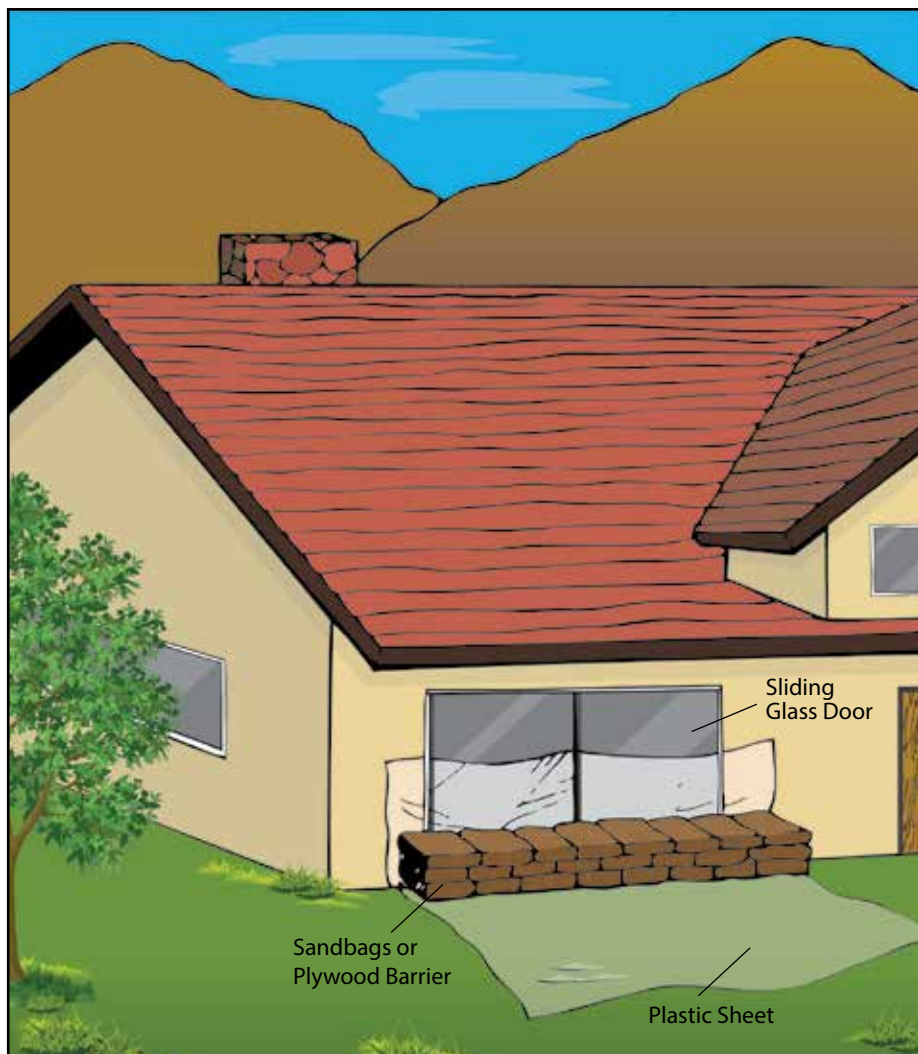


Fig. 10 - Building Protection



*Fig. 11 - Sliding Glass Door Sealing
(Control of flows to prevent seeping around sliding glass doors.)*

E. CONTROL OF WATER INTRUSION

DOOR/SLIDING GLASS DOOR SEALING

To prevent water from seeping around a door or sliding glass door, a plastic sheet (2 to 3 mils thick), should be placed between the door and the sandbags or between the door and the plywood barrier (*Figs. 11-12, pages 18-19*). Due to the forces of water pressure, this measure is not recommended for water levels above 2 feet.

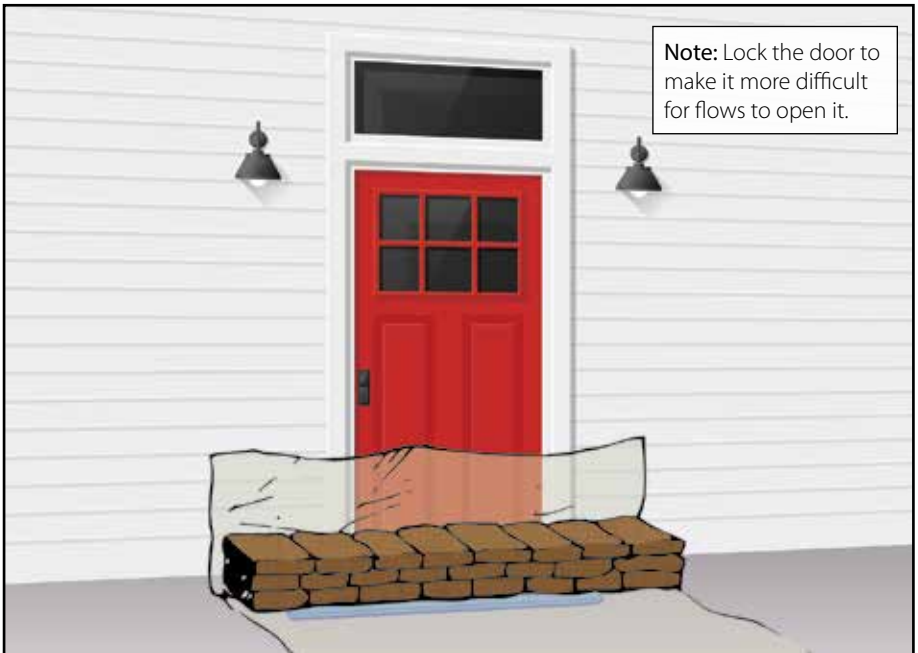


Fig. 12 - Door Seal

SUBMERSIBLE SUMP PUMPS

In cases where water has flooded a basement, garage, or any low-lying area, a submersible sump pump is recommended. If flooding is a recurring problem, a permanent pump should be installed in a sump with a floatation device for automatic on/off operation (*Fig. 13, below*).

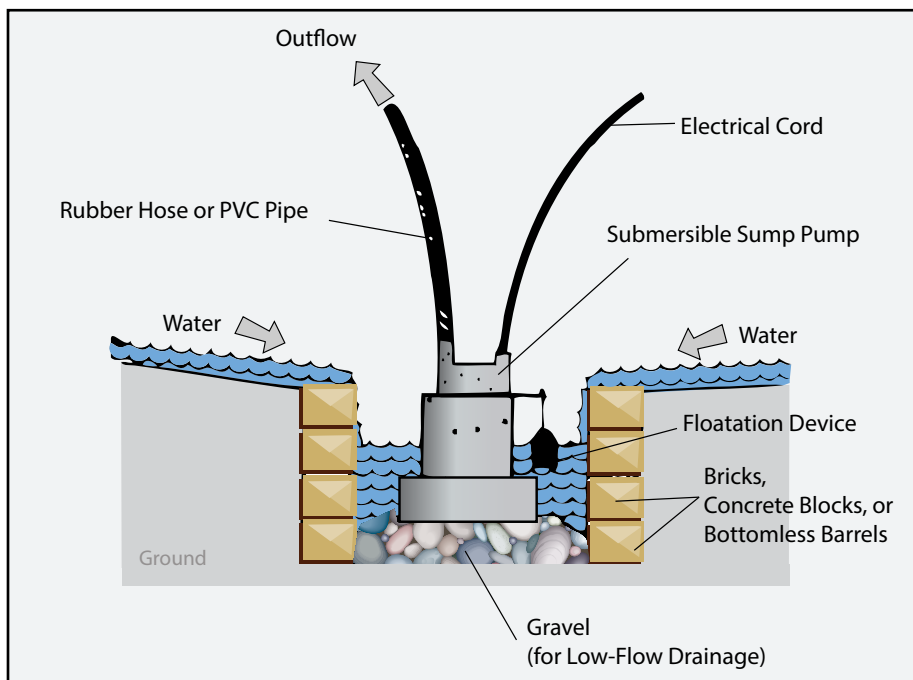


Fig. 13 - Submersible Sump Pump

NOTE

Installation of a sump pump may require permits. Check with your local building and safety official (local County Building and Safety Office for unincorporated areas).

F. DEFLECTION DEVICES AND BUILDING PROTECTION

DOOR AND WINDOW PROTECTION

PROVIDE	protection against debris entering around doorways and windows by use of boards or plywood (<i>Figs. 14-15, page 22</i>).
COVER	doors and windows completely with plywood, if affected by the hazard, and use an alternate entrance.
USE	low-grade plywood (minimum 5/8 inch thickness) to overlap windows, vents, and doors 3 to 4 inches on all sides.
SECURE	each sheet of plywood with nails, screws or bolts; stakes and boards may also be used to wedge barriers in place. As an alternative, standing pipes on both sides of a door may be used to secure a removable barrier (<i>Fig. 14, page 22</i>).
MATERIALS	can be dismantled after the storm season and stored year-to-year. Make sure to label your materials (wood, pipes, screws/bolts), so you can easily match the materials to be used for the particular window or door.

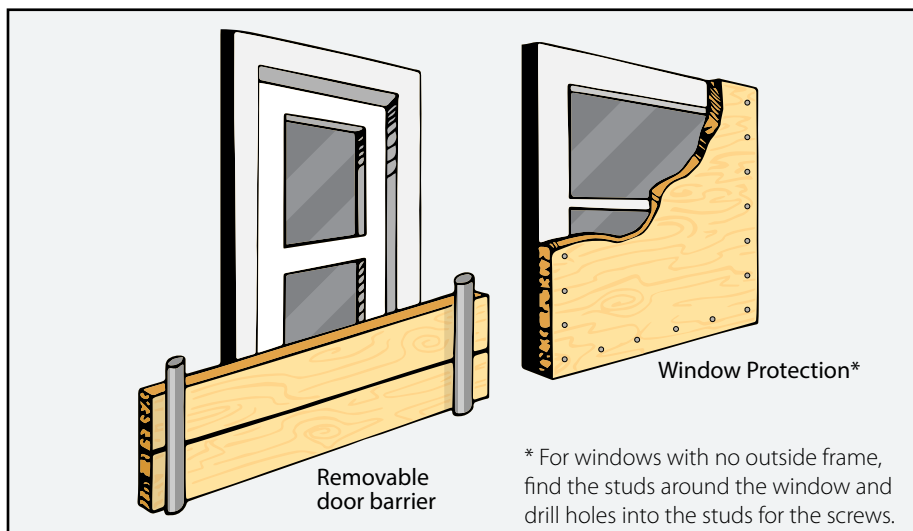


Fig. 14 - Door and Window Protection

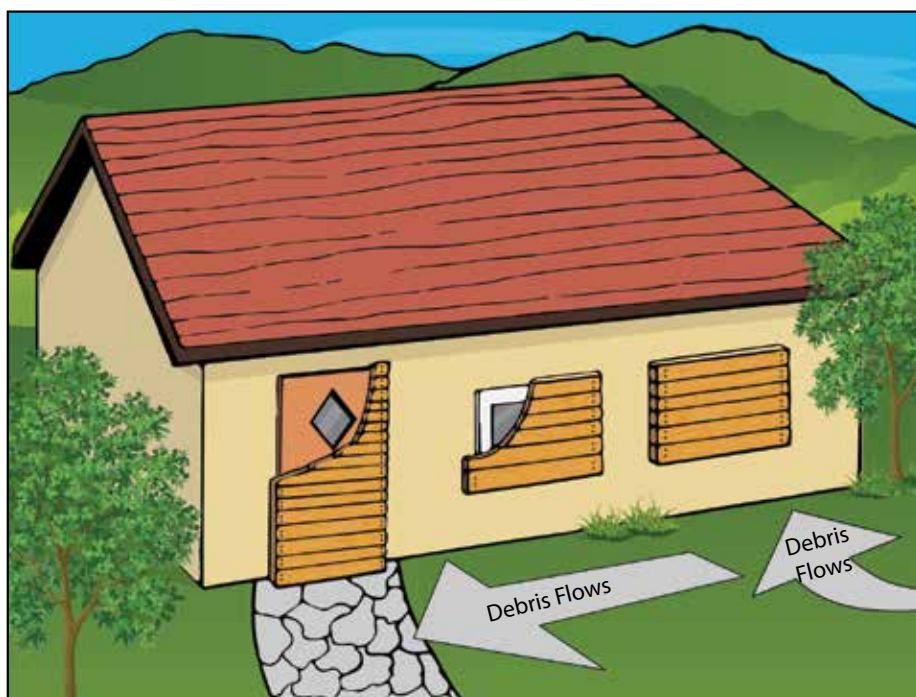


Fig. 15 - Use of Window and Door Protection

DEBRIS DEFLECTORS AND BARRIERS

USE	low-grade lumber and overlap section with protruding end facing downstream (Fig. 17-18, page 24-25).
DRIVE	stakes to at least one-half their length to ensure proper anchorage (Fig. 16, below).
PLACE	deflectors on solid, level soil if possible to reduce the hazard of undercutting.
DO NOT	attempt to use the lumber as a dam.
SOIL	firmly packed behind the deflector will provide needed additional strength (Fig. 18, page 25).
PLACE	sandbags against the house if debris deflector required is greater than 3 feet (Fig. 5, page 15).

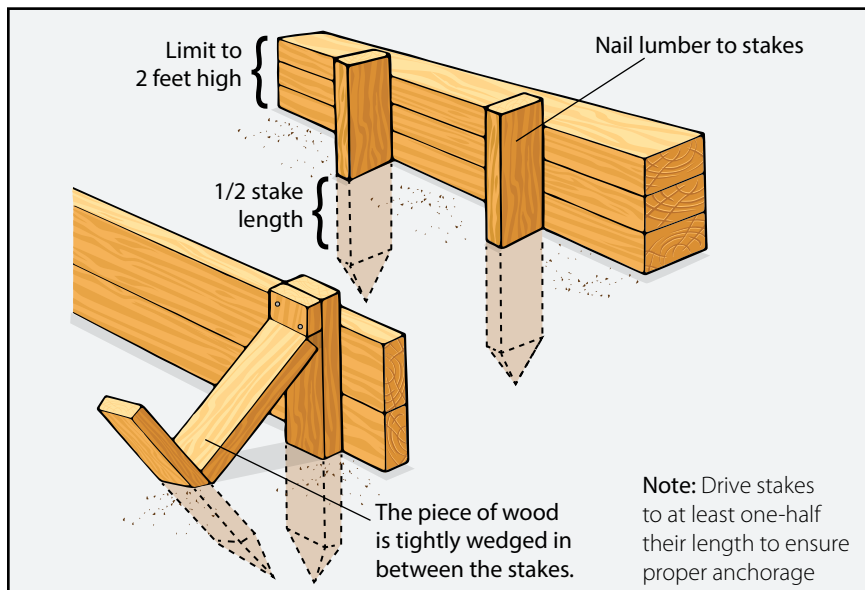


Fig. 16 - Typical Timber Installation

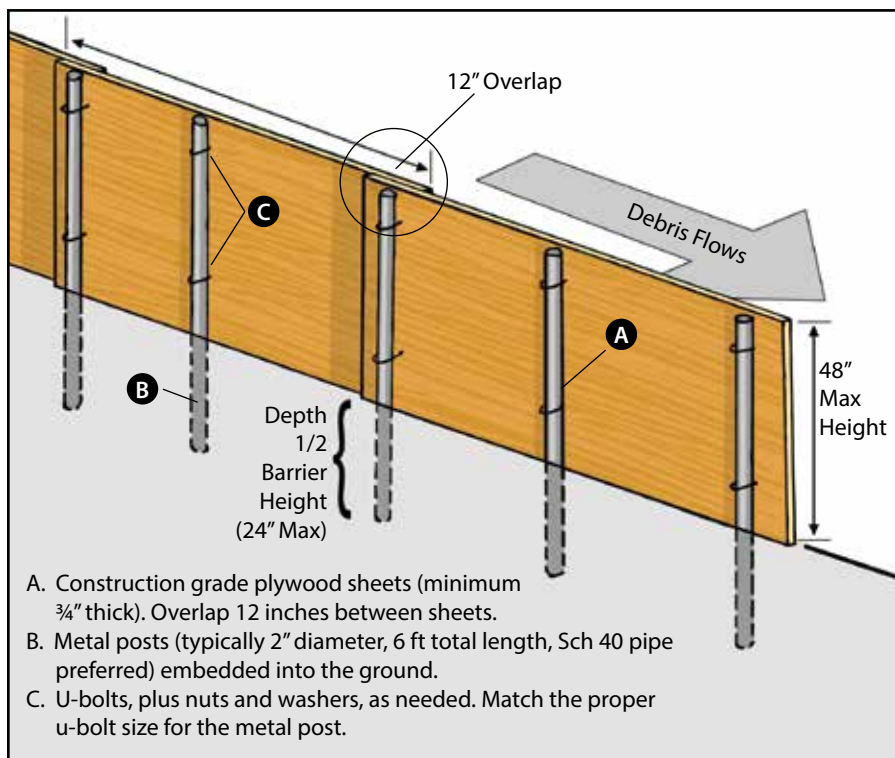


Fig. 17 - Plywood and Pipe Flow Deflection Barrier

CAUTION



Before undertaking any digging, drilling or post driving, locate your sewer laterals and irrigation lines, and call **Dig Alert (dial 811, or go to: www.digalert.org)** at least 2-3 working days in advance to locate underground utilities (gas, electric, water, etc.)

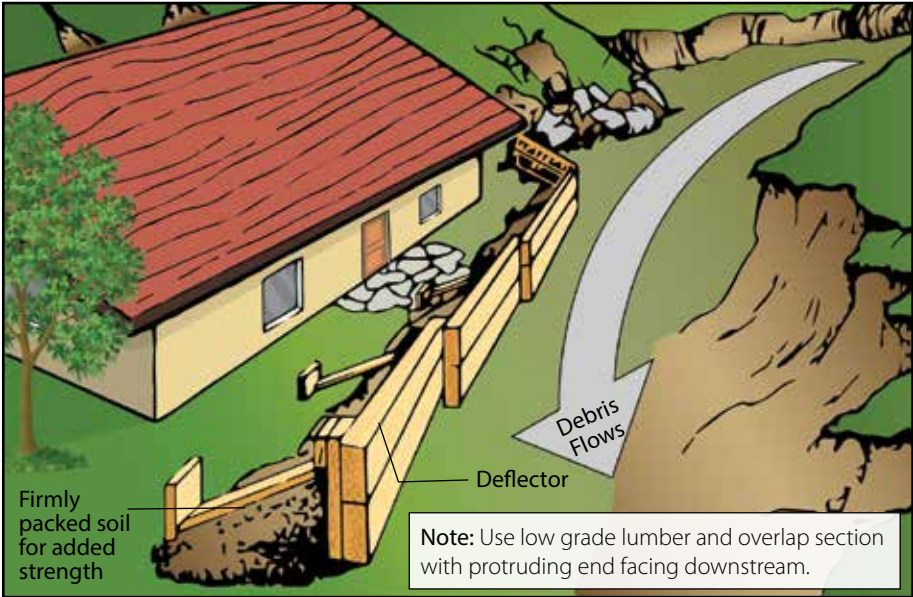


Fig. 18 - Timber Deflector

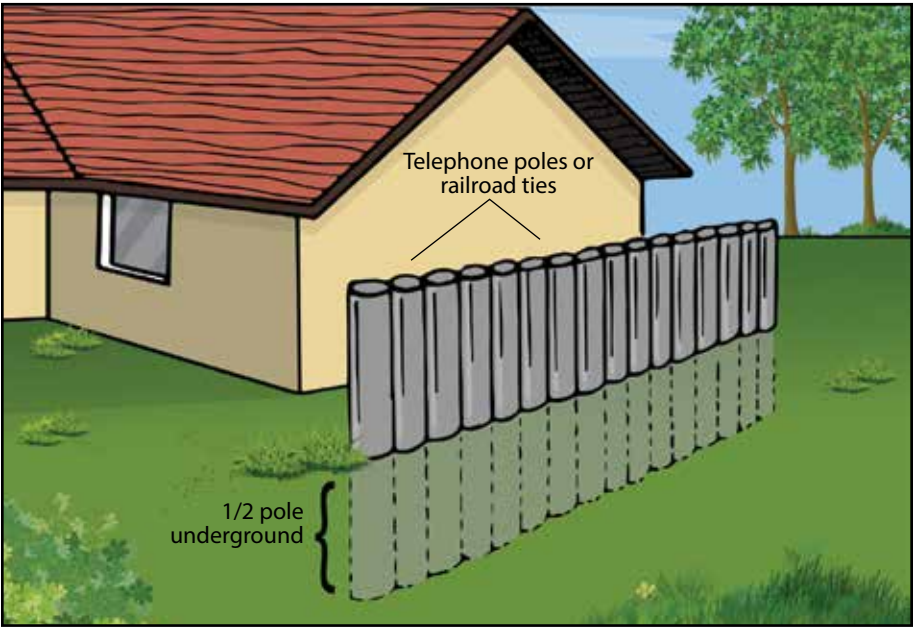


Fig. 19 - Telephone Pole or Railroad Tie Barrier

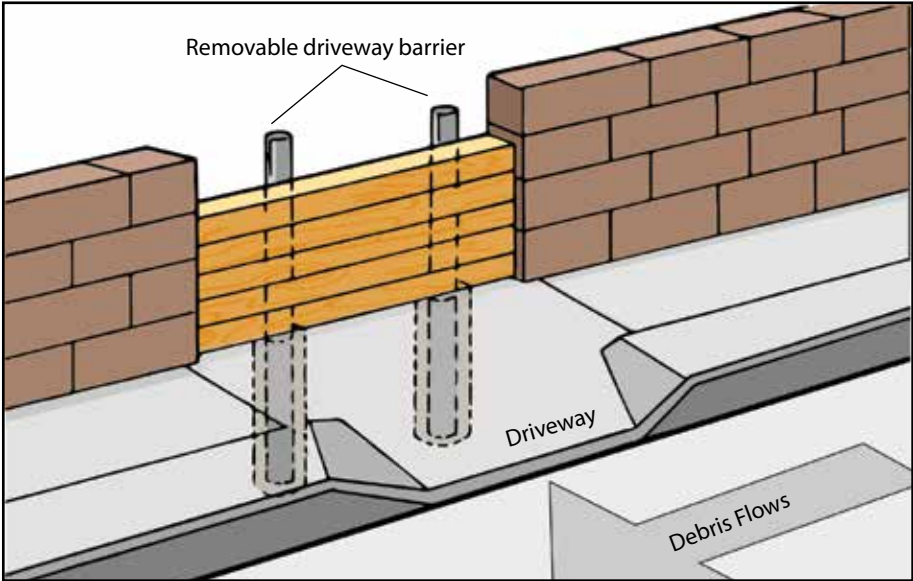


Fig. 20 - Removable Driveway Barrier (Single Pole)

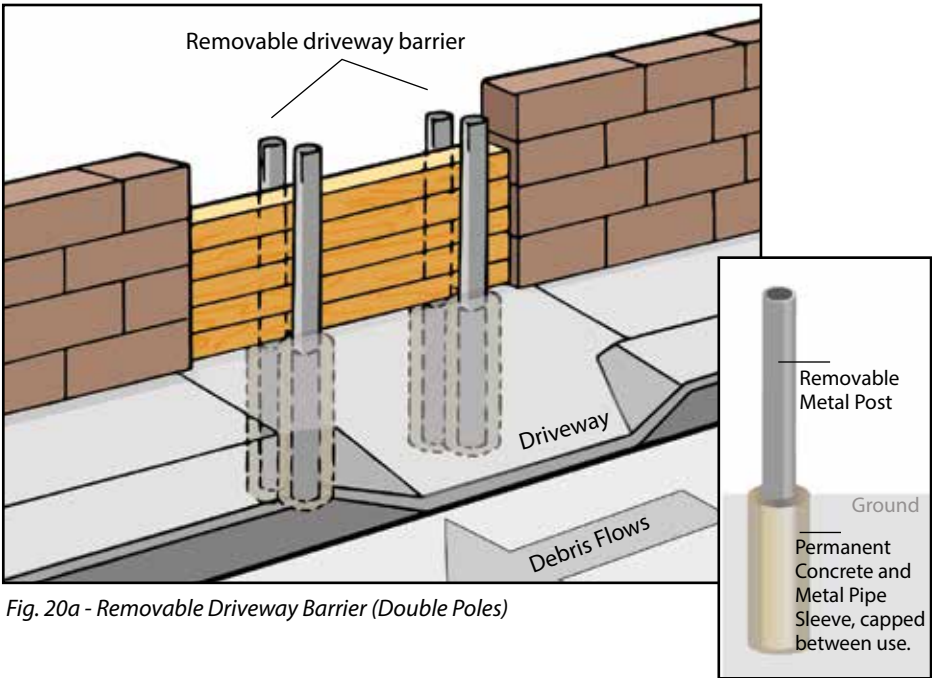


Fig. 20a - Removable Driveway Barrier (Double Poles)

G. ENGINEERED CONCRETE BLOCK WALLS

Concrete block walls that are designed and built to withstand loads caused by water and debris are excellent for protection and durability. In many cases, such walls can be adapted to become part of the landscaping. These walls generally are expensive and should be considered permanent installations. Engaging a licensed engineer to design such walls is recommended. However, not all block walls are engineered. Consult a licensed engineer to determine whether an existing block wall is engineered and suitable to rely on for debris protection.



CAUTION

Do not rely on nonengineered walls for protection.

Before undertaking any digging, drilling or post driving, locate your sewer laterals and irrigation lines, and call **Dig Alert (dial 811, or go to: www.digalert.org)** at least 2-3 working days in advance to locate underground utilities (gas, electric, water, etc.)

H. K-RAILS

If local agency places k-rails on street right of way (this can occur when the watershed experiences a wildfire), they will leave gaps to keep driveways accessible. It is the homeowner's responsibility to close those gaps. (Fig. 21, below)

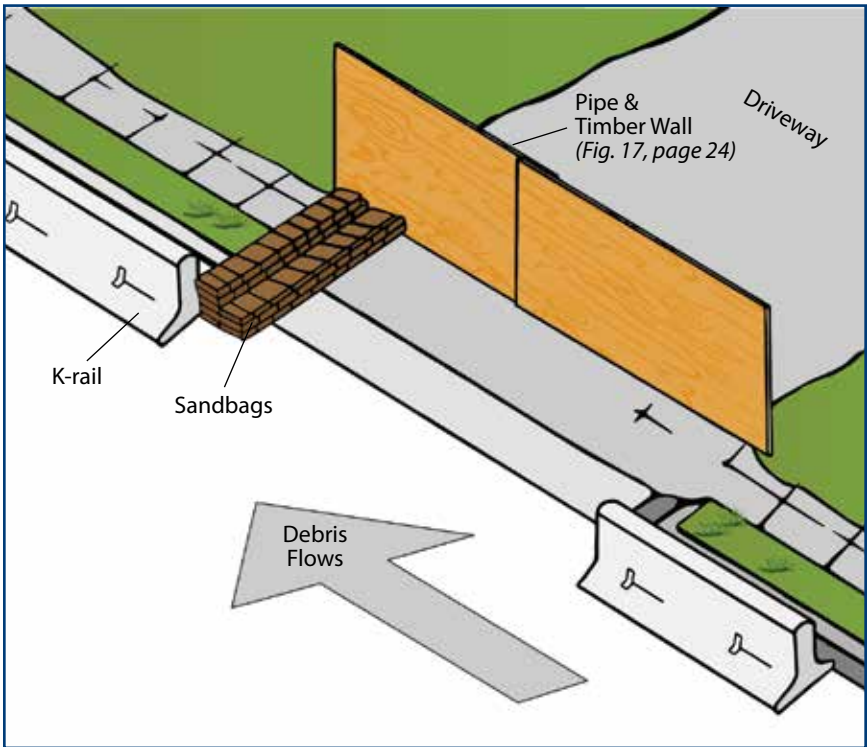


Fig. 21 - K-Rail Driveway Closure

III. OTHER PROPERTY PROTECTION MEASURES

The following measures are suggestions only, **and should be discussed with and installed by state-licensed professionals** to avoid creating additional problems on your property and those of your neighbors.

A. GENERAL PROPERTY GUIDELINES

1. CONTROLLING WATER FLOWING INTO PROPERTY

With a hoe or shovel, dig small temporary ditches (typically 6-8 inches deep and 12-16 inches wide) uphill from structures and other valuable features (tanks, solar collectors, etc.) to direct flows away from them. Build the ditches slightly less than level so that water moves along the ditches, but at a slow rate. Movement is needed to avoid ponding of stormwater. Sandbags, stacked no more than two levels high, may be placed along the ditches to aid their drainage. Make sure the ditches drain into a natural watercourse, onto the street pavement, or to a well vegetated area (*Fig. 22, page 32*). NOTE: Take care to make sure the ditches do not concentrate flows or worsen existing drainage conditions onto your neighbors' properties. **The purpose of the ditches is to direct flows away from your structures and features without impacting your neighbors.**

2. CONTROLLING RUNOFF ON AND STABILIZING SLOPES

Dig the same type of small ditch at the top of each steep slope, **provided the top of slope is no more than 30 feet high, and is within your property boundary.** Do not allow large amounts of water to concentrate along one route. Where ditches are used on unstable soil, the ditch should be sowed with perennial grasses that are non-invasive and allowed by local fire codes (*page 43*).

On soils especially prone to erosion, below are additional measures that can be installed (*Fig. 22, page 32*):

1. Plastic Sheeting:

Can result in 100% runoff and create additional runoff and erosion issues below sheeted area. **Plastic sheeting should be used only for short-term, temporary protection (enough to get through one imminent storm), and only on small areas.** These sheets (minimum thickness of 6 mil) should be keyed into the top of the slope, overlapped (12 to 24 inches) like shingles, securely tied or weighed down (with weights spaced no more than 10 feet apart), and edges embedded a minimum of 6 inches in the soil. This way, the majority of the water does not reach the soil and the sheeting stays in place. As soon as possible, replace the sheeting with mulch, fiber mesh or terraces.

2. Mulch:

A mulch of bark chips or wood chips is used to reduce raindrop splash erosion on barren soil and competition from invasive plants. It can be used in conjunction with revegetation efforts, or applied to allow natural re-growth of the seed bed in the soil. Mulch will decompose eventually, which adds valuable organic content to barren soil. **Mulch should be used only on slopes with steepness of less than 33% (1 foot vertical to every 3 feet horizontal).** Spread the chips over the barren soil, work them into the top few inches of the soil, and place a covering of chips (depth 1 inch or less) as slope and soil conditions indicate.

3. Burlap, Jute or Coconut Fiber Mesh:

These materials are designed to be used at the same time as permanent vegetation planting or around existing vegetation, **and on slopes with steepness of less than 50% (1 foot vertical to every 2 feet horizontal).** The mesh should be

porous enough to promote plant growth yet shield the underlying soil surface from erosion. These materials will decompose eventually. Burlap and jute last about one year. Coconut fiber typically lasts several years. These materials are supplied in rolled strips. Without stretching the material, roll it out smoothly in the direction of the flow of water, and secure to the soil with U-shaped staples or stakes according to the manufacturers' recommendations.

4. Hydroseed:

This includes the application of a mixture of water, seed, mulch and binder to sloped areas. **Hydroseed should be used only on slopes with steepness of less than 50% (1 foot vertical to every 2 feet horizontal), and on areas greater than ½ acre.** For areas of less than ½ acre (150 feet X 150 feet), **dry seeding** (applying seed by hand or with a belly grinder) can be used. Make sure the area to be seeded has a firm seedbed. Roughen the seedbed by scarifying it to depth of 2 to 4 inches. The seed mix should be made up of plants that have deep rooting characteristics and low water needs. The plants also need to be non-invasive and allowed by local fire codes (*page 43*).

5. Terraces:

Used for slopes with a steepness of over 50% (1 foot vertical to every 2 feet horizontal). Due to potential effects on existing drainage patterns and slope stability, **terracing may require approval by governmental agencies. Before starting any work, contact your local building official** (the local County Building and Safety Office for unincorporated areas).

3. STRENGTHENING THE SOIL TO RESIST EROSION

For slopes with steepness of less than 33% (1 foot vertical to every 3 feet horizontal), a mulch of bark chips or wood chips are effective in holding the soil in place. They have the added value of increasing the organic content of the soil. Either material should be worked into the top few inches of the soil. Place a covering of chips 1 inch (or less) as slope and soil conditions indicate (*Fig. 22, below*). Nitrogen fertilizer should be added.

Woven burlap can be laid on the slope and tied down with stakes to prevent lifting by wind or water (*Fig. 22, below*). Regular planting procedures can be followed before laying the burlap since it will not interfere with establishing growth on the slope. The burlap will decompose eventually, but will remain long enough for vegetation to become well established.

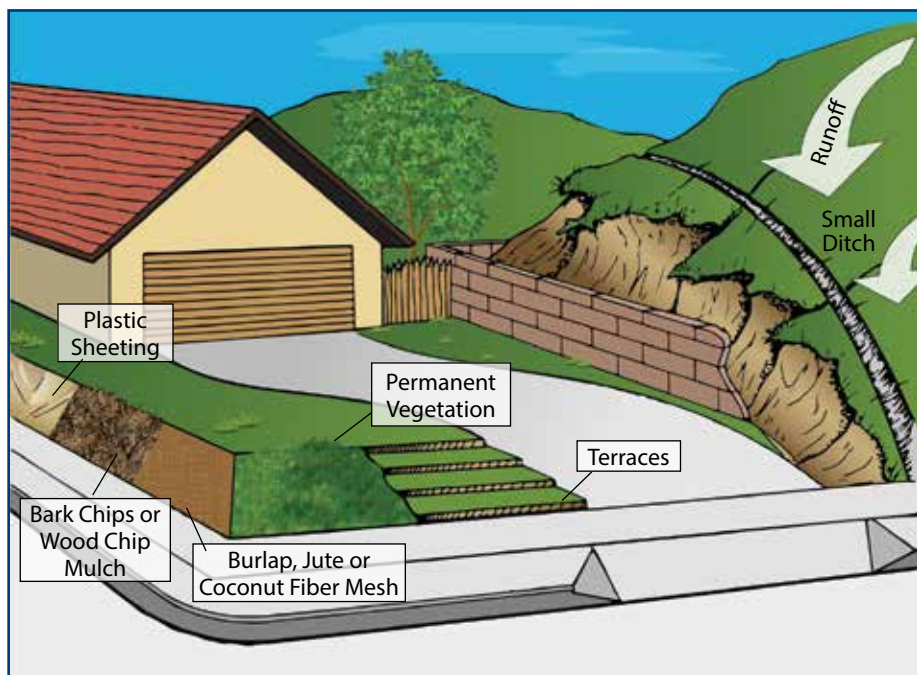


Fig. 22 - Erosion Control

B. PROPERTY DRAINAGE HINTS TO HOMEOWNERS

- Proper planting of slopes with proper species prevents erosion. Keep plants watered, but do not overwater. Replant barren areas.
- Make inspections during rains. This is when trouble occurs. Watch for gullying. Correct problems as soon as possible.
- Sandbags, tools, and sheets of plastic may come in handy during heavy rains. Keep a supply of them available.
- If unusual cracks, settling, or earth slippage starts, immediately consult a state-licensed civil engineer qualified in geotechnical issues or a state-licensed geologist.
- Do not alter your slopes or drainage without expert advice. Consult a state licensed civil engineer.

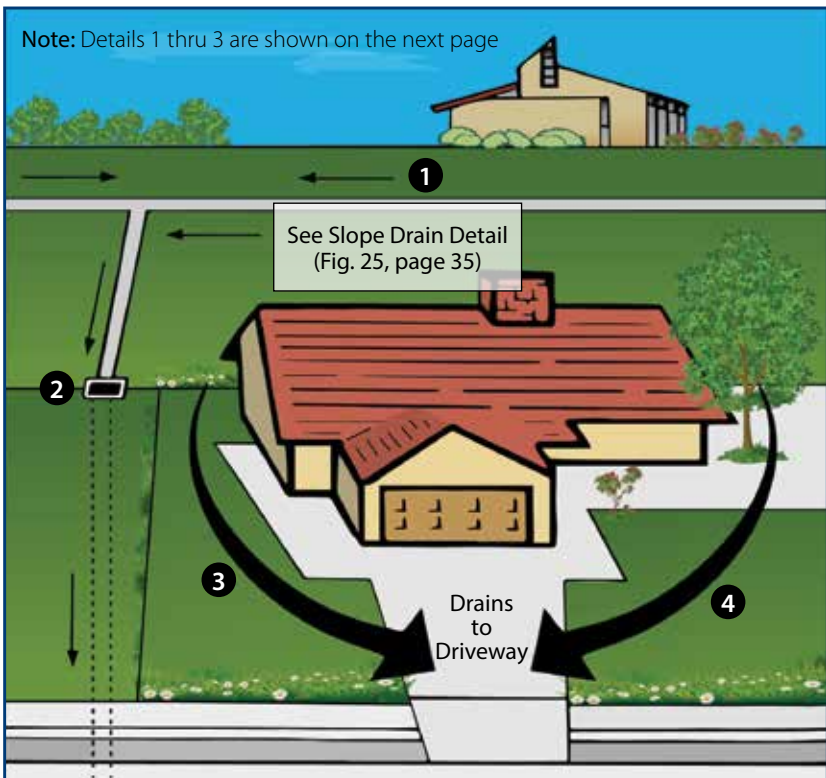
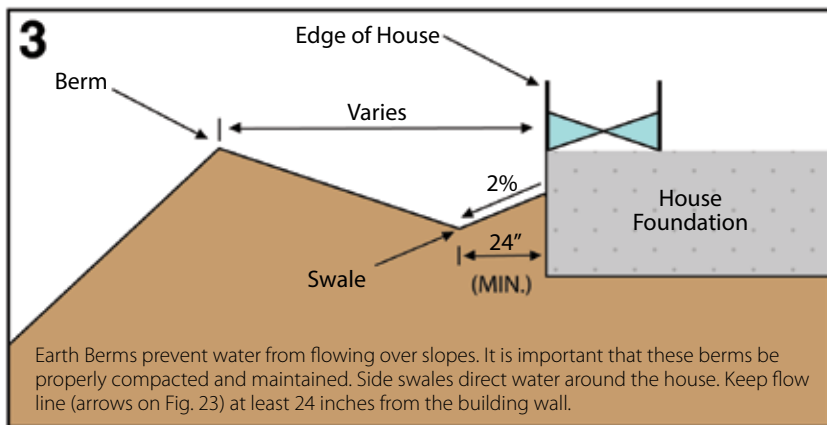
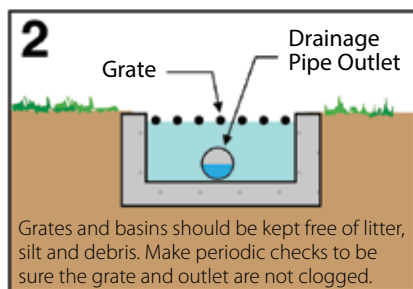
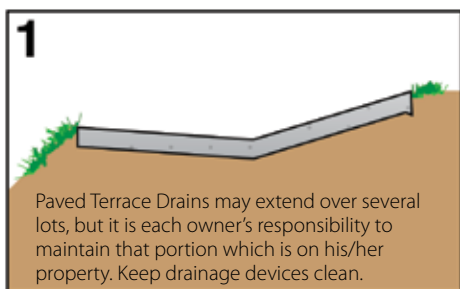


Fig. 23 - Property Drainage

- Do not let conditions on your property create a problem for your neighbors. Work with neighbors to minimize problems.
- It is unlawful to divert flows from their natural path to the detriment of your neighbors.
- Normal property drainage must flow to the street or an approved drainage device (Fig. 23, page 33). When landscaping, homeowners should avoid disrupting flow patterns created when the property was originally graded. Obstructions such as patios, sidewalks, and decks must not be placed in side swales unless an alternate method of drainage is provided. Deep ponding and saturation of the soil can result in severe property and foundation damage.



Details to Fig. 23

C. SLOPE (BENCH) DRAINS

Drainage devices (including slope or bench drains), located throughout hillside areas, are the source of many flooding problems when poorly maintained. With few exceptions, maintenance of these drains is the responsibility of the homeowner. **KEEP THESE DRAINS CLEAR** of debris and overgrowth (*Glossary, page 47*). Blockage may cause undermining and structural failure of the drains or erosion of the hillside (*Fig. 24, below*).



CAUTION

Slope/bench drains are designed to convey water flows, not debris flows, from burned hillsides.

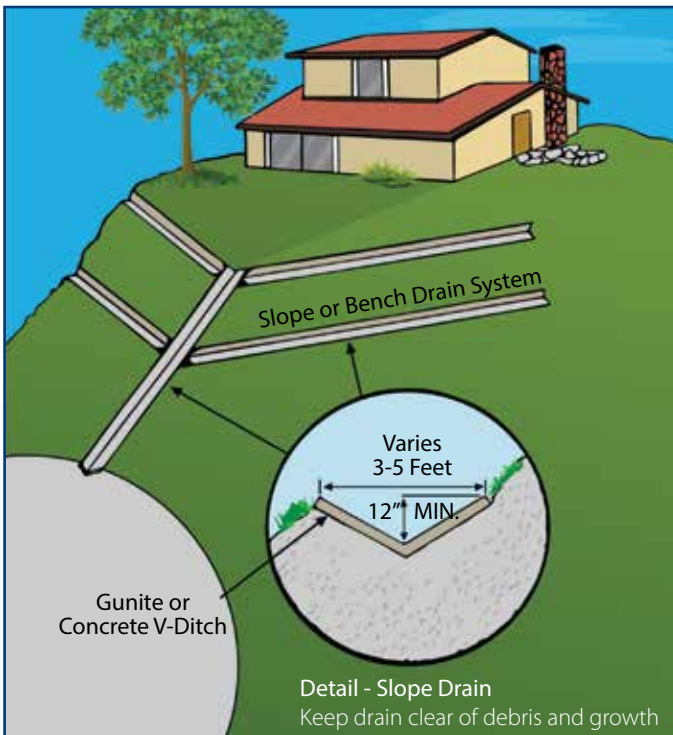


Fig. 24 - Slope (Bench) Drain

D. NATURAL WATERCOURSE EROSION

Many properties are adjacent to a natural watercourse or stream with minimal flows trickling periodically or continually throughout the year. During a major storm, these trickling flows may become a raging river, causing bank erosion and possibly undermining existing structures.

Structural solutions (concrete or riprap) to provide protection against bank erosion usually involve high costs and often require design services of a state-licensed civil engineer. Local, state and federal regulatory agencies may also have jurisdiction over your watercourse and special permit conditions if environmental concerns exist.

The following are a few helpful tips and economical measures that can be taken ahead of time to lessen this type of flood threat to yourself: (for erosion outside of a natural watercourse, please refer to page 29.)

CLEAR

the “low-flow” watercourse of debris, trash, and vegetative overgrowth before the storm season. Remove enough vegetation to keep the watercourse flowing. Contact your local building official (the local County Building and Safety Office for unincorporated areas) for natural watercourse maintenance guidelines as well as identification of federal and state agencies with regulatory authority.

VEGETATE

bare stream banks to control erosion. Select planting material suited to both the intended use and specific site characteristics.

NOTE: The amount of vegetation will affect the stream’s flow-carrying capacity. Too much vegetation can reduce capacity to a level that results in damage to your property and those of your neighbors. Consult state-licensed civil engineers and landscape architects to determine the amount of vegetation and species appropriate for erosion control and comply with local fire codes. Also, planting of stream banks may be subject to regulation by state and federal agencies.

D. NATURAL WATERCOURSE EROSION *(continued)*

EDUCATE	yourself about the history of stream erosion in your particular neighborhood. Long-term residents and previous owners may have important information about past floods and erosion problems. Stay away from areas experiencing erosion during storms.
PURCHASE	flood insurance to cover flood-related damages to structures (<i>page 11</i>). However, please note that damage to yards, earthwork, and outside equipment is generally not covered by flood insurance.
WATCH	for increased or sudden erosion caused by storm flows, which may indicate a need to evacuate your residence.
DETERMINE	a safe escape route from your home away from the stream in the event your home becomes undermined or flooded during a major storm.
GATHER	basic necessities for possible evacuation and temporary relocation upon notification of a pending major storm.

E. PLANTING GUIDELINES

The key to erosion control is adequate planting to hold soil in place. However, planting can also increase fire hazards during warm weather. To provide effective erosion control and still reduce future fire hazards:

REMEMBER

in general, installing smaller plants often produce the best growth. Diversity in plant selection is more desirable than planting only a few types. Ensure proper arrangement of plants with adequate horizontal and vertical spacing. “Spreading” shrubs and trees of the appropriate species are easier to establish and reduce long-term weed problems often associated with large areas of ground cover.

MINIMIZE

erosion with quick growing, “low fuel volume” ground cover planted with burlap mat or mulch throughout areas to be protected.

AVOID

large leafed Ice Plants (*Carpobrotus* sp) on slopes because it tends to “drag” surface soils down when saturated.

E. PLANTING GUIDELINES *(continued)*

SELECT

only “low fuel volume,” noninvasive plants. Contact your local building official (the local County Building and Safety Office and County Fire Department (Forestry Division) for unincorporated areas) for local requirements for plant arrangement and maintenance.

The Forestry Division of the County of Los Angeles Fire Department emphasizes the proper arrangements of plants to eliminate vertical and horizontal continuity. Consistent maintenance of properly selected plant species is a must. Plant species that are not properly selected, spaced and maintained have the potential to propagate fire (*Fig. 25, page 42*). Species not recommended include: Pampas Grass, Cypress, Italian Jasmine, Pine, Cape Plumbago, Cape Honeysuckle, Eucalyptus, Cedar, Acacia and Juniper. Go to the Forestry Division’s Fuel Modification website and the California Invasive Plant Council’s website to identify additional commonly planted species that are considered invasive.

E. PLANTING GUIDELINES *(continued)*

PLANT	low fuel volume,” non-invasive shrubs or trees where ground cover or grass ends. Large tree species should not be planted under or near utility lines. Low branching or wide-tree species should not be planted near roads and driveways where they can interfere with emergency vehicles’ access. Typically, trees should not be planted closer than one-half of their mature width to roads and driveways. The Fuel Modification Plan Review website of the Forestry Division of the County of Los Angeles Fire Department provides useful information. Contact your local building official (the local County Building and Safety Office and County Fire Department (Forestry Division) for unincorporated areas) for local planting requirements.
EMPHASIZE	rapid growth ground cover consisting of properly selected and spaced plant species.
BE AWARE	rains can normally be expected to start in October, so plan accordingly.
INCREASE	the vertical and horizontal spacing of plants and control their re-growth.
ENHANCE	effectiveness of fire-retardant plantings with deep irrigation practices, which encourage deep root growth. Drip irrigation will concentrate the water where it is needed. Conventional overhead irrigation often causes erosion on steep slopes.

E. PLANTING GUIDELINES *(continued)*

REDUCE

vegetation and minimize combustible growth around buildings. In unincorporated areas, the Los Angeles County Fire Code requires a minimum distance of 30 feet from buildings, and depending on the severity of the fire potential may require up to 200 feet of fire hazard reduction. The County's Fire Code allows brush height up to 18 inches within the zone between 30 and 100 feet of buildings for soil stabilization and erosion prevention (*Fig. 26, page 42*). The Fire Code also allows a limited number of specimen shrubs and within 30 feet of a building, provided they are spaced and maintained in a manner that does not transmit fire from surrounding vegetation or structures to the building. (For residents outside Los Angeles County unincorporated areas, refer to your local fire codes for local requirements.)

KEEP

your landscape clean. Remove litter under trees and shrubs, and prune out dead and excessive growth. Remove dead and dry portions of ground cover and succulents. Leave space (15 to 20 feet) between remaining allowed shrubs and trees to curtail the spread of fire.

NOTE: Clearing or eliminating vegetation in streambeds, ecologically sensitive areas, or the Coastal Zone may require permits or authorizations from federal, state, or local environmental regulatory entities prior to start of activities. Contact your local building official (the local County Building and Safety Office for unincorporated areas) for identification of federal, state, or local agencies with authority over your property.

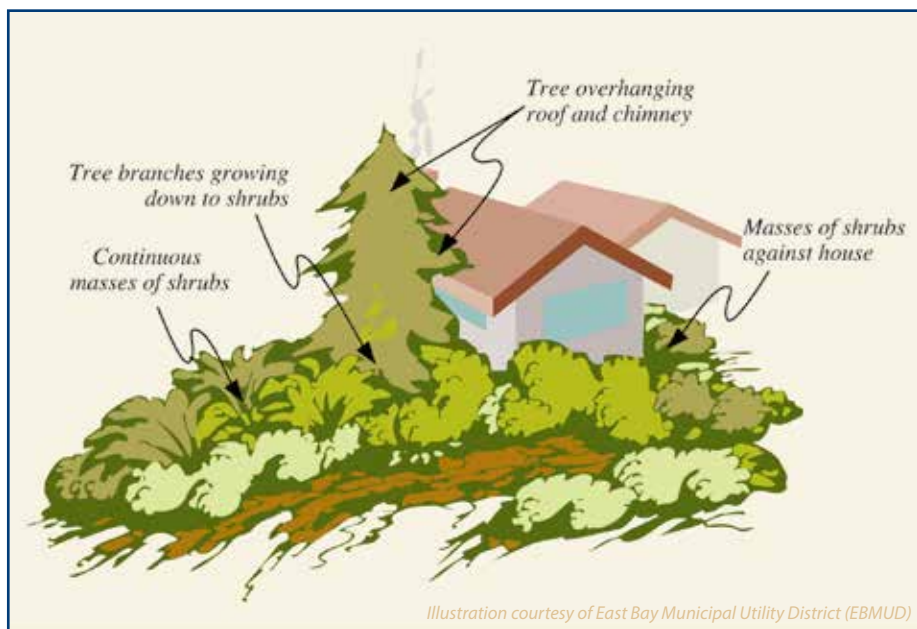


Fig. 25 - Uncontrolled Vegetation

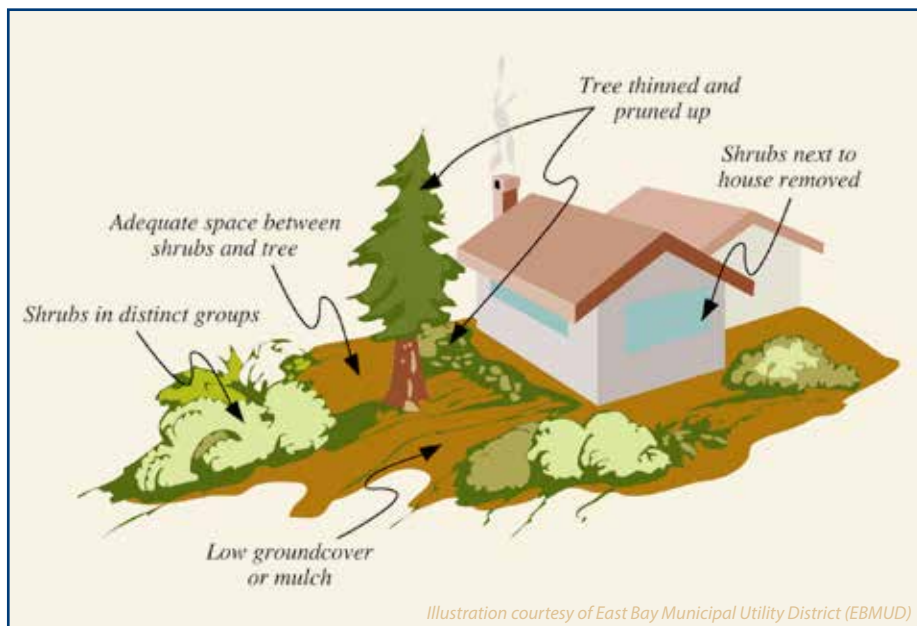


Fig. 26 - Homes Protected from Fire by Fire Hazard Reduction in Accordance with Local Fire Codes

F. PLANT SELECTION

The Forestry Division of the County of Los Angeles Fire Department recommends homeowners select plants for the desirable attributes of “low fuel volume,” low maintenance, availability, and erosion control effectiveness. The Fuel Modification website of the Los Angeles County Fire Department’s Forestry Division provides useful information on appropriate plant arrangement and spacing, depending on their distance from structures. **NOTE: If your property is in a Fire Hazard Severity Zone, check with your local building official and fire department** (the local County Building and Safety Office and County Fire Department (Forestry Division) for unincorporated areas) to see whether you need to submit landscaping plans for approval **prior to planting.**

TREES

Depending on the distance from structures, trees are particularly valuable on steep hillsides. The roots of many trees go much deeper than those of most ground cover plants. Native plants that resprout after burning are generally the best choice for wildland areas, so you do not have to replant and the roots continue to grow. Selections for new tree plantings may include California natives like Toyon, Alder, Black/Southern California Walnut, California Bay/Laurel, Coast Live Oak, and Valley Oak.

SHRUBS

Depending on the distance from structures, selections for new shrub plantings may include Coast Sunflower, Lavender-Cotton, Matilija Poppy, and Yucca.

GROUND COVERS

Depending on the distance from structures, selections for new ground cover plantings may include Woolly Yarrow, California Fuchsia, Creeping Sage, Manzanita, Aaron's Beard, Purple-Leaf Winter Creeper, and Rockrose.

GRASSES

Depending on the distance from structures, selections for grass plantings or seeding may include Canyon Prince Wild Rye, Penstemon, and Thrifts.

G. ADDITIONAL RESOURCES FOR PLANTING

The following may be contacted for additional information on noninvasive, low fuel volume and erosion-resistant trees, shrubs, ground covers, and grasses:

**County of Los Angeles
Fire Department Prevention Bureau
Forestry Division**

5823 Rickenbacker Road, Rm #123,
Commerce, CA 90040-3027
(323) 890-4330

<https://www.fire.lacounty.gov/forestry-division/forestry-fuel-modification/>

**United States Forest Service
Pacific Southwest Research Station**

4955 Canyon Crest Drive,
Riverside, CA 92507-6071
(951) 680-1500

www.fs.usda.gov/research/psw

**The Theodore Payne Foundation
For Wildflowers and Native Plants, Inc.**

10459 Tuxford Street,
Sun Valley, CA 91352-2126
(818) 768-1802

www.theodorepayne.org

**California Native Plant Society
Los Angeles/Santa Monica
Mountains Chapter**

6117 Reseda Boulevard #H,
Tarzana, CA 91335
(818) 782-9346

www.lasmmcnps.org

California Invasive Plant Council

1442-A Walnut St. #462,
Berkeley, CA 94709-1405
(510) 843-3902

www.cal-ipc.org

**The Arboretum
County of Los Angeles
Arboretum and Botanic Garden**

301 North Baldwin Avenue,
Arcadia, CA 91007-2697
(626) 821-3222

www.arboretum.org

**County of Los Angeles
South Coast Botanic Garden**

26300 Crenshaw Boulevard,
Palos Verdes Peninsula, CA 90274-2515
(310) 544-1948

www.southcoastbotanicgarden.org

**County of Los Angeles
Descanso Gardens**

1418 Descanso Drive,
La Canada Flintridge, CA 91011-3102
(818) 949-4200

www.descansogardens.org

California Botanic Garden

1500 North College Avenue,
Claremont, CA 91711-3157
(909) 625-8767

www.calbg.org

**City of Los Angeles Department of
Parks and Recreation
Charles F. Lummis Home (El Alisal)
and Garden**

200 E. Avenue 43,
Los Angeles, CA 90031-1304
(323) 226-1620

www.laparks.org/historic/lummis-home-and-gardens

IV. SUMMARY

Remember

- DO NOT underestimate the power of debris flows and flood waters.
 - DO NOT wait until the storm season to start your planning and installation of flood, debris, and erosion control facilities. Start as soon as possible. Once debris flows and flood waters begin, it is usually too late to install protection.
 - PROTECTION is not always pleasing to the eye, and appearance should not dictate location or type of installation.
 - BE prepared to personally observe and maintain your installations during storm periods, for in many cases a minor correction will prevent major failure. **However, do not take any unnecessary risks.**
 - ALWAYS employ state-licensed individuals when hiring experts and contractors.
-

V. GLOSSARY OF TERMS

DEFINITIONS OF FLOOD-RELATED TERMS

Bench Drain - Typically a gunite or concrete V-ditch located horizontally and vertically along residential hillside areas. This device assists in draining the slope to protect against hillside erosion. Typical width is 3 to 5 feet and typical depth is 12". (Same as a Slope Drain)

Debris - Any combination of soil, rock, mud, trees, or vegetation usually transported by debris flow.

Debris Flows - Consist of any soil, rocks, boulders, trees, or brush being moved by stormwaters and containing sufficient strength to destroy or move objects such as cars and buildings in their path.

Drainage Patterns - The drainage paths stormwater runoff usually or historically takes through a given area.

Engineered Concrete Block Walls - Walls engineered to withstand loads caused by water and debris. These walls are considered to be permanent, and do not require yearly replacement.

Flood - (1) A general and temporary condition of partial or complete inundation of normally dry-land areas from the overflow of inland or tidal waters; or (2) the unusual and rapid accumulation or runoff of surface waters from any source.

Flood Insurance - Insurance to cover damages to your home, or belongings in your home, caused by flooding, that can be purchased through your local insurance agent.

Ground Cover - Typically a low-lying plant that will spread outward, eventually covering all surrounding bare soil.

Gullying - Formation of ditches or hollows worn by running water.

Natural Watercourse - An unimproved natural stream of any size. Includes rivers, creeks, branches, canyons, arroyos, gullies, washes, etc.

Ornamentals - Plants or shrubs grown for their decorative effect.

Overgrowth - Foliage that has grown and spread out so as to obstruct or block any natural watercourse, improved drainage device, or structure.

Rainy /Storm Season - The period of the year from October 15 to April 15 when Los Angeles County usually receives its largest amount of rain.

Riprap - A layer of large stones or boulders placed together without order, usually used for erosion protection along streams or shore lines.

Sandbags - A burlap or plastic bag that can be filled with sand or native soil, which can be stacked or placed to redirect or deflect storm and debris flows away from homes or property improvements.

Seedbed - The local soil environment in which seeds are planted.

Slope Drain - Typically a gunite or concrete V-ditch located horizontally and vertically along residential hillside areas. This device assists in draining the slope to protect against hillside erosion. Typical width is 3 to 5 feet and typical depth is 12". (Same as a Bench Drain)

Sump - A low-lying area with no drainage outlet.

Sump Pump - A pump designed to pump water out of a sump or basement.

ACKNOWLEDGMENTS

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"Landscape to Prevent Fire," published by the University of California Extension Service

"When Water is Your Enemy," published by the Contra Costa County Disaster Office

"Prevent Soil Erosion on Your Property," published by the U.S. Department of Agriculture, Natural Resources Conservation Service

"Construction Site Best Management Practices Manual," published by Caltrans.

ADDITIONAL INFORMATION AND CONTACTS

For additional information on flood preparedness, please visit one of the following County of Los Angeles Public Libraries:

Malibu Library

23519 West Civic Center Way, Malibu, CA 90265
(310) 456-6438

Rosemead Library

8800 Valley Boulevard, Rosemead, CA 91770
(626) 573-5220

Castaic Library

27971 Sloan Canyon Road, Castaic, CA 91384
(661) 257-7410

For mudflow engineering advice call us at:

(626) 458-6164

For copies of this free booklet please write us at:

Los Angeles County Public Works
Stormwater Engineering Division
P.O. Box 1460,
Alhambra, CA 91802-1460

or visit us at

Stormwater Engineering Division, 2nd Floor
900 South Fremont Avenue,
Alhambra, CA 91803-1331

or call us at

(626) 458-6164

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