HAYWARD CITY COUNCIL

RESOLUTION NO. 93-037

Introduced by Councilmember HILSON

RESOLUTION CERTIFYING THAT THE NEGATIVE DECLARATION FOR THE DRAFT HILLSIDE DESIGN AND URBAN/WILDLAND INTERFACE GUIDELINES HAS BEEN COMPLETED IN COMPLIANCE WITH THE CALIFORNIA ENVIRONMENTAL QUALITY ACT AND IMPLEMENTING STATE AND CITY GUIDELINES AND ADOPTING HILLSIDE DESIGN AND URBAN/WILDLAND INTERFACE GUIDELINES FOR THE CITY OF HAYWARD

BE IT RESOLVED by the City Council of the City of Hayward that the negative declaration for the draft Hillside and Urban/Wildland Interface Guidelines was prepared in accordance with the California Environmental Quality Act and state and City EIR guidelines and this City Council has considered and hereby adopts that document.

BE IT FURTHER RESOLVED that the City Council hereby adopts the City of Hayward Hillside Design and Urban/Wildland Interface Guidelines dated February 16, 1993, a copy of which is attached hereto as Exhibit "A."

IN COUNCIL, HAYWARD, CALIFORNIA February 16, 1993

ADOPTED BY THE FOLLOWING VOTE:

AYES: COUNCILMEMBERS Cooper, Hilson, Jimenez, Randall, Rodriquez, Ward
MAYOR Sweeney

NOES: None

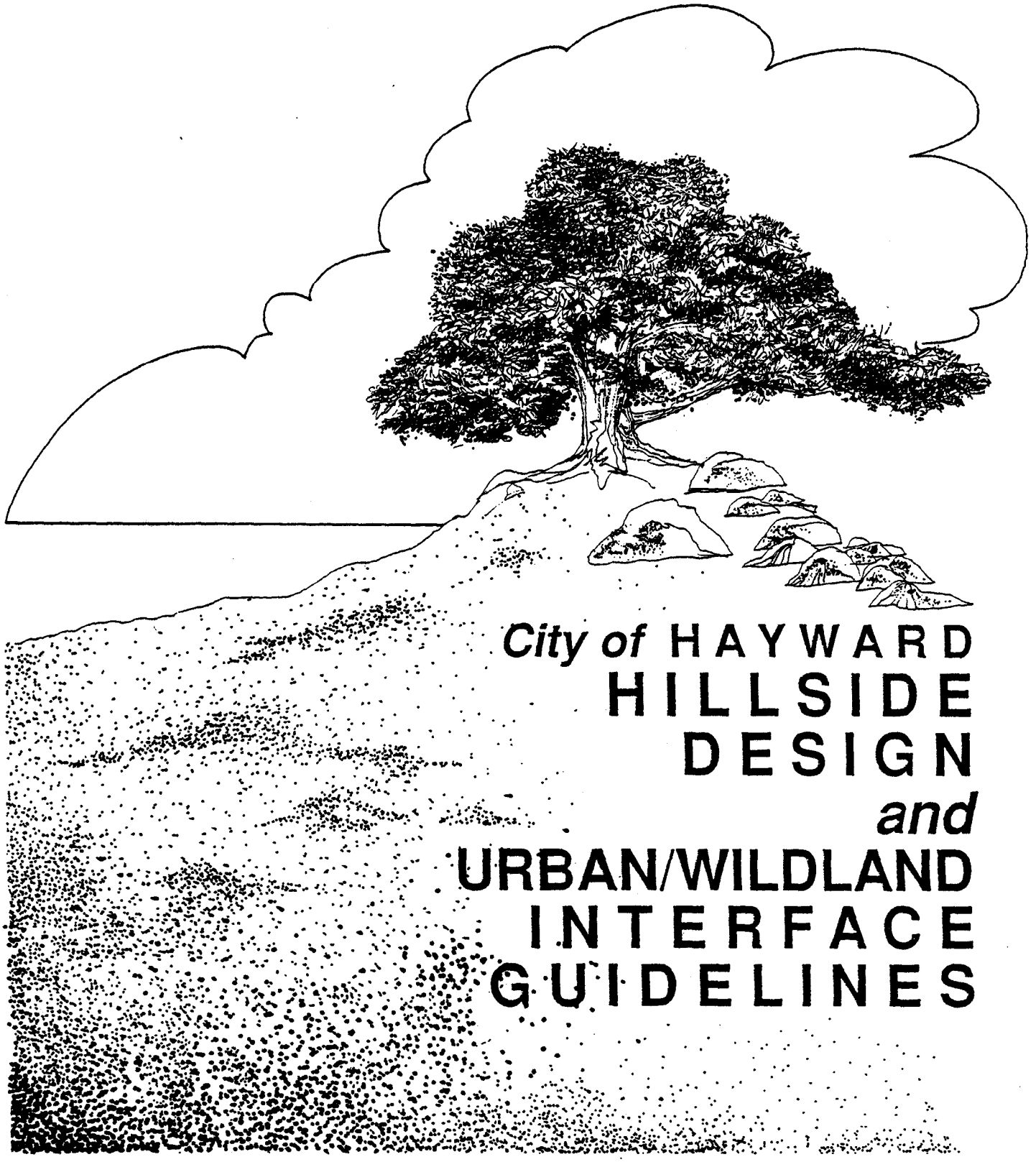
ABSTAIN: None

ABSENT: None

ATTEST: Judy Vonada
City Clerk of the City of Hayward

APPROVED AS TO FORM:

David Rizzardi
City Attorney of the City of Hayward



City of HAYWARD HILLSIDE DESIGN *and* URBAN/WILDLAND INTERFACE GUIDELINES

PLANNING DEPARTMENT
February 16, 1993
Adopted Resolution 93-037

EXHIBIT "A" TO RESOLUTION NO. 93-037

CONTENTS

		Page
INTRODUCTION		1
PART I - HILLSIDE DESIGN GUIDELINES		2
A.	Submittal Requirements	2
B.	Street Design	3
C.	Sidewalks and Planter Strips	4
D.	Driveways	5
E.	Ridgelines	5
F.	Cluster Home Development	6
G.	Architecture and Site Design	7
H.	Grading	10
I.	Landscaping	13
J.	Utilities	13
K.	Signing	14
PART II - URBAN/WILDLAND INTERFACE GUIDELINES		15
A.	Building Construction Standards for Fire Protection	15
B.	Fuel Management Program	16
C.	Homeowner Education	17
D.	Shaded Fuelbreak	17
E.	Mosaic Islands	18
F.	Fire-Resistant Planting	18
G.	Fuel Management Zones	19

		Page
Attachment A -	Slope Formula	22
Attachment B -	Fuel Management Terminology	23
Attachment C -	List of Fire-Resistant Plants and Highly Flammable Plants	24

HILLSIDE DESIGN
&
URBAN/WILDLAND INTERFACE GUIDELINES

INTRODUCTION

The development of a quality project requires attention to various design elements. The importance and magnitude of many design elements are enhanced when developing in a hillside area. Significant hillside issues include: street design, grading, parking, drainage, sewer availability, architecture, landscaping, visual impact, preservation of natural features, fire access and defensibility, and geologic hazards. These issues need to be studied carefully to assure attractive developments which are sensitive to the surrounding environment and safety needs.

The primary objectives of the Hillside Design & Urban/Wildland Interface Guidelines are as follows:

1. Implement policies and strategies in the General Policies Plan pertaining to hillside development.

2. Promote quality architectural, landscape, site and street design that will enhance the aesthetic character of the hillside setting;

3. Protect and preserve important environmental resources and significant natural features in the hills; and

4. Ensure that hillside development incorporates public safety measures relating to fire defensibility and access.

Part I of the Guidelines apply to **all** proposed developments located in the Hayward Hills, generally the area east of Mission Boulevard and south of "D" Street. These guidelines supplement the City of Hayward Design Review Guidelines as well as other City standards and regulations, including but not limited to the Zoning Ordinance, Subdivision Ordinance, Uniform Building Code, Uniform Fire Code, Grading Ordinance, Tree Preservation Ordinance, and Water-Efficient Landscape Ordinance.

Part II of the Guidelines apply to proposed developments located in certain areas of the Hayward Hills that are designated by the Hayward Fire Department as Urban/Wildland Interface Zones. An Urban/Wildland Interface Zone will typically include development sites that adjoin steep slopes, open grass/brush lands, woodland and riparian zones, or major drainage swales where existing vegetation may cause structures to be exposed to rapidly spreading fire which may be difficult for the Fire Department to control.

Where a Specific Plan will be prepared for a development area, the City Council may choose to include detailed plans, precise development standards, and/or design guidelines in the Specific Plan that will supersede all or a portion of these Guidelines.

A. SUBMITTAL REQUIREMENTS

Existing Subdivision and Zoning Ordinance regulations allow the Planning Director to require the submittals listed below for planned development or tentative tract map applications. When applicable, the Planning Director may also require these submittals for hillside developments that are processed with a site plan review or use permit application. Additional submittals may also be required following environmental review of the proposed project.

1. A **Topographic Survey** that shows contour lines at maximum 5-foot intervals with the location of all structures, improvements, trees, natural vegetation, rock outcroppings, drainage courses, and other significant site features accurately recorded. The survey shall be prepared by a California licensed surveyor or civil engineer.

2. A **Preliminary Grading Plan**, based on the topographic survey, that accurately indicates existing and proposed finish grades, proposed structures and retaining walls, and proposed drainage provisions. Cross-sections should also be submitted showing the relationship of proposed structures (including floor elevations) to existing and proposed finish grades.

3. A **Soils Engineering Report** that evaluates data regarding the nature, distribution and strengths of existing soils, conclusions and recommendations for grading procedures, design criteria for any identified corrective measures, and opinions and recommendations regarding existing conditions and proposed grading. This investigation and report shall be performed by a California licensed civil engineer.

4. A **Geology Report** that evaluates the surface and subsurface geology of the site, degree of seismic hazard, conclusions and recommendations regarding the effect of geologic conditions on the proposed development, opinions and recommended design criteria to mitigate any identified geologic hazards including locations of surface and subsurface fault lines in the area. This investigation and report shall be performed by a California registered geologist or engineering geologist.

5. A **Visual Analysis** that analyzes the visual impact of the proposed development from critical vantage points, such as open space areas and adjacent residential development. As determined by the Planning Director, the visual analysis should include a color rendering, computer simulation, photomontage, scale model, or another graphic representation that accurately shows the scale, bulk, and relationship of the proposed development to the topography and surrounding area.

B. STREET DESIGN

1. Street systems should be established to permit safe and efficient travel for motor vehicles, bicycles, and pedestrians, yet ensure ready access for fire and emergency vehicles.

2. Streets should be designed to reflect the type, density, scale, and character of hillside development. This will require sensitivity to grading, topography, existing vegetation, natural site features, and panoramic views.

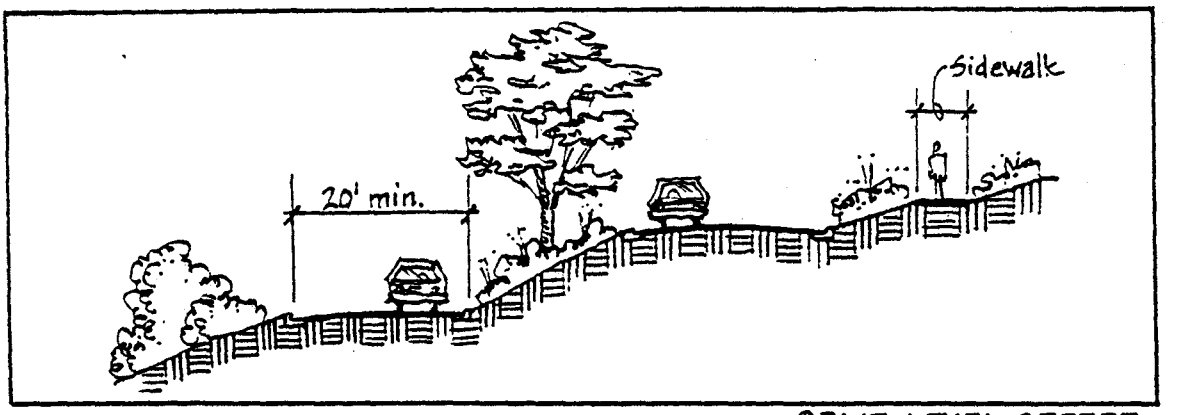
3. Streets should generally follow the natural contours of the lands and should not be placed perpendicular to contour lines, unless absolutely unavoidable. Curvilinear streets are preferred, but sharp curves should be avoided that will hamper emergency access.

4. In order to reduce grading and allow for narrower residential streets, parking bays for guests and residents should be considered as an alternative to continuous curbside parking lanes. Parking lanes should not be included if the street does not provide direct access to abutting residences. However, parking bays may be needed for emergency turnouts or desired to provide parking at strategic vista points.

5. Where traffic volume will be low, such as on loop or cul-de-sac streets, and where the street will not be a bus route, street width should be reduced in accordance with City standards to minimize grading and paving. Limiting the width will preserve and enhance the hillside setting and discourage speeding. Fire Department access shall always be maintained.

6. Street design criteria such as centerline radii should be reduced to promote slower traffic and to match existing contours while maintaining traffic safety. Whenever feasible, a consistent design speed should be utilized for the entire street.

7. A vertically offset or split-level road designed along a hillside slope is desirable where it would minimize grading, preserve an important site feature, or enhance the hillside setting. However, each roadway section should be a minimum of 20 feet in width (not including parking lanes) to provide access for fire vehicles.



SPLIT-LEVEL STREET

8. Arterial and collector streets should be designed to accommodate looped bus routes.

9. Where possible, major developments should include a minimum of two vehicular access points. Public and emergency access to natural and common open space should also be provided.

C. SIDEWALKS AND PLANTER STRIPS

1. Flexibility in sidewalk design and placement should be encouraged within hillside areas. Where desirable, sidewalk alignment should be varied to follow the hillside terrain. Sidewalks should also be darkened, colored, or textured to exhibit a natural appearance and to blend in with the surroundings, while maintaining pedestrian safety.

2. On streets with low traffic volumes that serve a small number of residents, sidewalks should be provided on one side of the street only; however, curbs should be provided on both sides.

3. On major and minor arterials and collector streets, planter strips (minimum 5-1/2 feet in width) should be placed between the curb and sidewalk to allow for landscaping and a greater separation between pedestrians and autos, unless excessive grading would be needed to accommodate the planter strips.

D. DRIVEWAYS

1. The location, width, design, grade, and type of material for driveways should be sensitive to potential visual impacts and the terrain of the hillside. Specific attention should be given to driveway widths and construction materials.

2. Common driveways on flag lots or adjacent lots should be encouraged, where feasible, to minimize pavement. Provisions for joint maintenance should be included in deed restrictions.

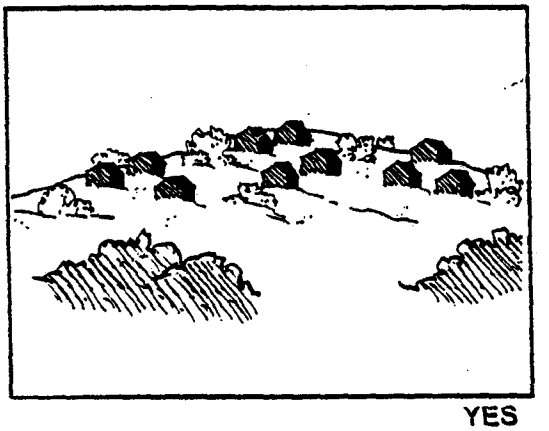
3. Driveways should be constructed using asphaltic concrete or an all-weather materials (e.g., darkened or colored concrete, textured or stamped concrete, or interlocking pavers) that will blend in with the surroundings. When driveways are located on steep slopes where concrete may be necessary, the surface should be darkened to reduce the visual impact.

4. Driveways or accessways serving structures located beyond 150 feet from a public street must comply with Fire Department design standards.

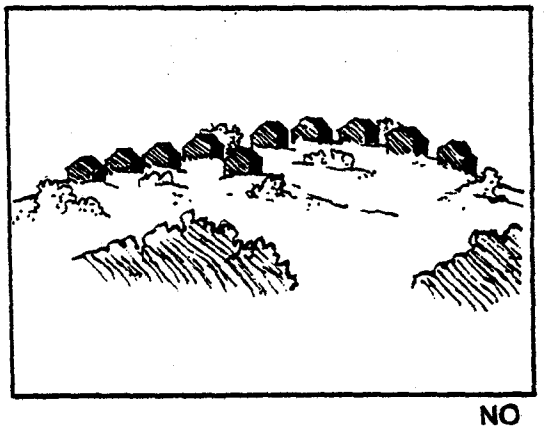
E. RIDGELINES

1. Development located near or on a ridgeline must be sensitive to the surrounding environment. Homes should blend into the topography, creating minimal visual disturbance to existing ridgelines and panoramic views.

2. Proper placement of homes is crucial for preserving the ridgeline and maintaining the natural scenic views. Rows of homes should be avoided on ridgelines.



YES



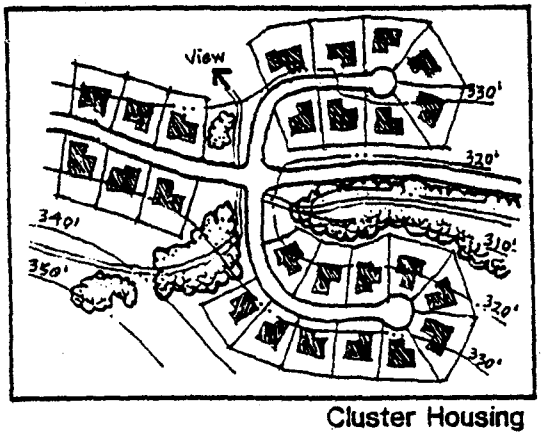
NO

3. Development along ridgelines should consist of larger lots with wider frontages and wider setbacks between structures to allow for "view corridors."

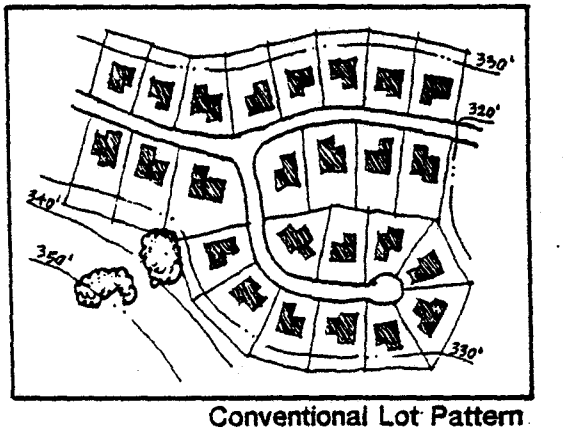
4. Dwellings should exhibit a low profile, and roof pitches should be angled to follow the slope.

F. CLUSTER HOME DEVELOPMENT

1. Preferred hillside development includes clusters of approximately 8 to 12 single-family dwellings or large clusters of multi-family structures separated by inter-connected natural open space corridors.



Cluster Housing



Conventional Lot Pattern

2. Development should be clustered to avoid geologic hazards and preserve significant natural site features, including but not limited to rock outcroppings, woodland and riparian vegetation, mature trees, natural drainage courses, important wildlife habitat areas and corridors, and scenic views.

3. Dwellings should be clustered on gentle slopes where less grading will be required and dwellings can be easily reached by emergency vehicles. Proposed developments on slopes over 25 percent should be specifically reviewed by the Board of Zoning Adjustments or the Planning Commission. For fire safety, avoid sitting dwellings at the head of a canyon or ravine. Dwellings should be set back from the crest of a hill or the top of a slope.

4. Where new single-family lots will be allowed on steep terrain over 25% slope, larger lot sizes (minimum 10,000 square feet) and wider setbacks between structures (minimum 20 feet) should be provided.

5. Greenbelts and/or fuelbreaks should be created to separate clustered structures from natural areas. (Greenbelts consist of fire-retardant planting; fuelbreaks consist of natural vegetation that is selectively thinned, then maintained to reduce fuel volume.) Responsibility for homeowners to maintain common open space should be included in covenants, conditions, and restrictions (CC&Rs); a fuel modification plan should be required where needed.

6. Cluster development should accommodate public transit requirements, such as bus shelters, direct pedestrian access to bus stops, convenient bus stops and turnouts, adequate roadway pavement and sections, and looped streets.

7. Pedestrian access should be facilitated by providing an attractive, safe, and convenient network of walkways throughout a development site. Connections to public facilities (e.g., school site, park site, and open space trails) should be provided where applicable.

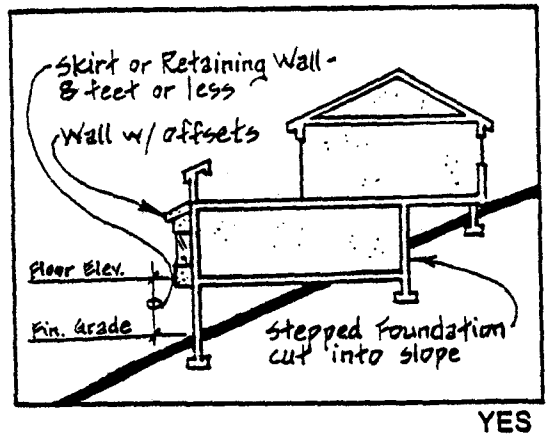
G. ARCHITECTURE AND SITE DESIGN

1. Structures should be sited outside of the dripline of mature trees to minimize impacting tree roots and to avoid creating a fire safety hazard.

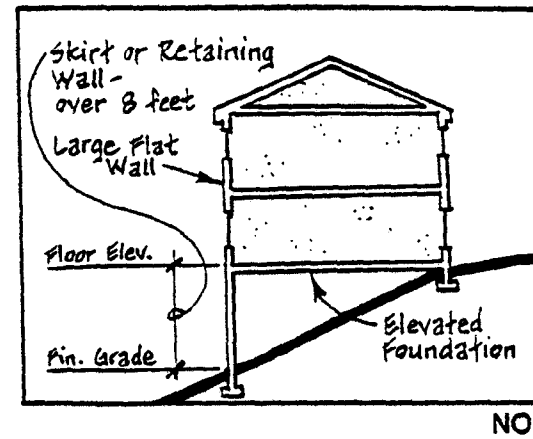
2. Dwellings and elevated decks should be located a minimum of 30 feet from any property line that abuts permanent open space; this setback area shall be maintained as a firebreak by the property owner per Fire Department requirements.

3. The architectural design of homes and choice of building materials and colors should provide a smooth visual transition between the homes and natural surroundings.

4. Where the existing slope is 15 percent or steeper, dwellings should exhibit a stepped design that follows the natural terrain and should not stand out vertically from the hillside. The height of skirt, foundation or retaining walls at the base of a structure should be minimized. The lower or ground floor elevation of a dwelling should not exceed eight feet above the adjacent exterior finish grade. (Note: The Zoning Ordinance also limits the height of single-family dwellings to 30 feet, measured from the mid-point of a sloping roof to the existing or finish grade, whichever is lower.)

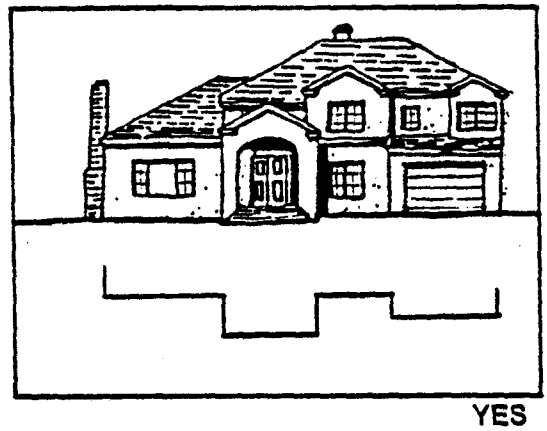


YES



NO

5. Buildings should exhibit varied elevations, floor plans, setbacks, and quality architecture to enhance the hillside setting. Front elevations should be articulated with well-proportioned windows, roof lines, entries, wall offsets, materials and/or other details. Side and rear elevations should also be attractively designed; design elements and materials should relate to the front elevation, with the level of articulation based on visibility from the surrounding area.



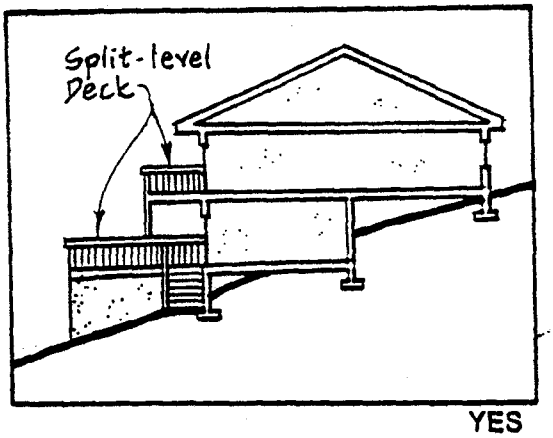
YES

NO

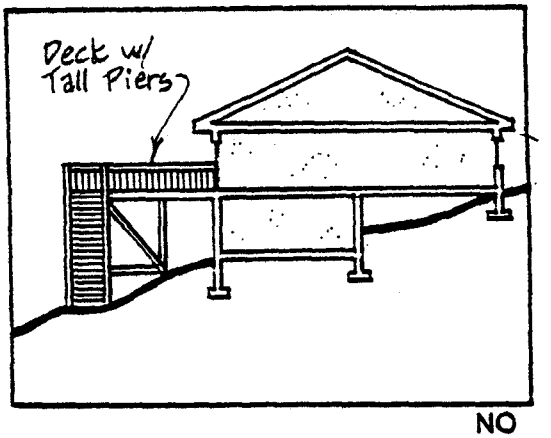
6. Large flat wall surfaces should be divided into smaller wall planes with horizontal offsets to reduce the bulky appearance of the structure. Roofs should also be broken into smaller components which accentuate the wall offsets.

7. New structures, additions, and remodels should be architecturally compatible with surrounding development with respect to bulk, articulation, design, colors and materials.

8. Elevated decks should be well-integrated into the design of the dwelling. Avoid massive decks that stand out in the hillside. Reduce the bulk of an elevated deck by lowering its height or terracing the deck to follow the slope. When possible, avoid tall piers and/or skirting by extending the floor joists of a dwelling to support the deck. (Also see Part II, Guideline A.9, if applicable.)



YES



NO

9. Rows of homes with similar setbacks/elevations should be avoided.

10. Where applicable, structures, should comply with the Urban/Wildland Interface Guidelines (Part II).

11. Massive multi-family developments should be avoided by dividing long or large buildings into smaller structures and providing variations and offsets in rooflines, building walls, windows, and balconies. Multi-family housing should be designed to provide for view corridors to adjacent open space and vistas. Where multi-family housing abuts a single-family zoning district, a transition should be provided by designing the multi-family units with lower heights and/or additional setbacks along the common boundary.

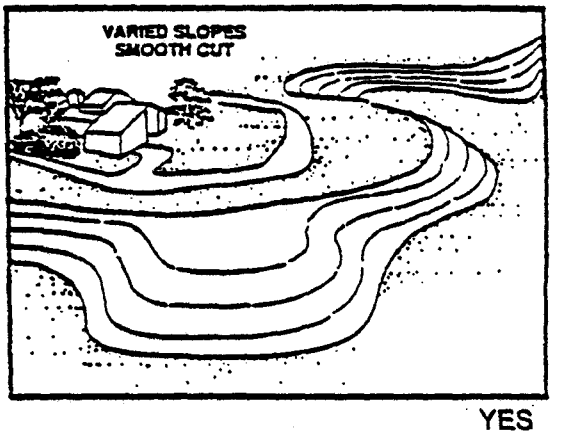
12. For large sloping lots exceeding 10,000 square feet, solid fencing should only be used to enclose the immediate private outdoor space around the house and should not be used to delineate property lines where it would visually interrupt natural open areas and views. (Also see Part II, Guideline A.4, if applicable.) Where fencing is needed to delineate private property from public or common areas, open or unobtrusive fencing should be installed.

13. Avoid long continuous walls along roads which block views. Walls should be textured and landscaped to discourage graffiti. Where possible, avoid placing fences on top of retaining walls.

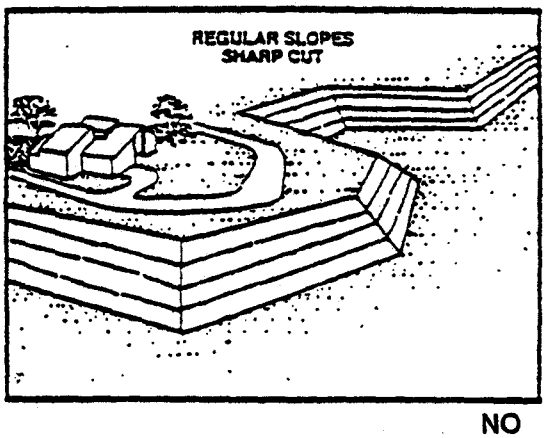
H. GRADING

1. Grading within hillside areas shall be done according to City guidelines and ordinance. Measures for protecting existing trees, native vegetation, rock outcroppings, and other natural features should be indicated on grading plans.

2. Cut or fill slopes should be designed to blend into the existing slope. The top and toe of slopes should be rounded to provide a smooth transition between grade changes. Large cut and fill slopes should be contoured to create a natural appearance and to provide swales for clustering vegetation.



YES



NO

3. Generally, a 3:1 (horizontal dimension:vertical dimension) slope or less should be utilized for cut or fill slopes if it will not result in excessive grading or will not disrupt natural site features. A steeper slope is acceptable where it will conform to the natural terrain, will not be highly visible, and will comply with engineering standards.

4. All developments should minimize grading and the use of retaining walls. If retaining walls are unavoidable, they should be designed with native rock or should exhibit a natural-looking texture or veneer. Walls should be buffered with landscaping. (Note: The Zoning Ordinance limits the height of retaining walls to six feet. A minimum separation of six feet is required between two parallel walls; a 15-foot separation is required for a third wall.)

5. Erosion control planting should be provided on disturbed slopes. Where hydroseeding is permitted, a low-growing seed mix should be used which includes native grasses and wildflowers. Other erosion control plants should conform to the guidelines in Section I for landscaping.

6. Jute netting or another acceptable erosion control measure should be placed on slopes steeper than 2:1 slope.

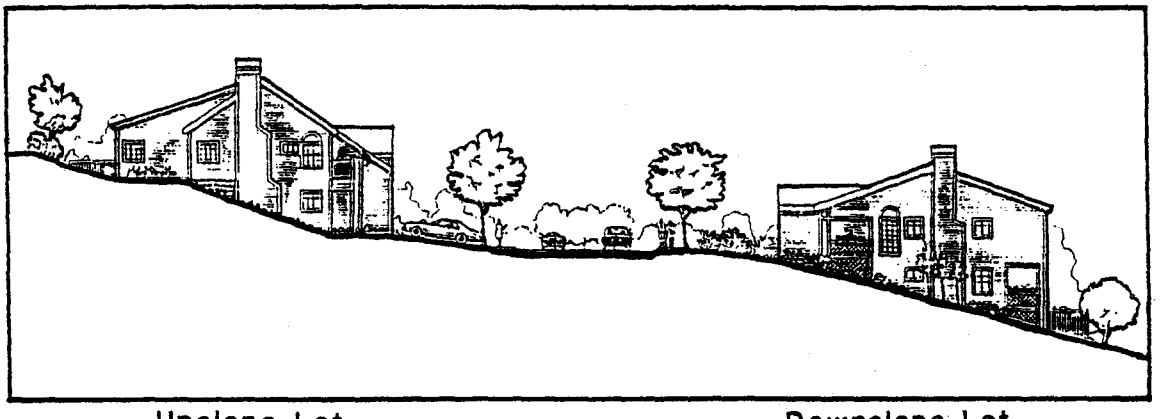
7. Drainage ditches and structures that will be highly visible from public view should be constructed with native rock or natural-looking material that will blend with the terrain. Where engineering standards require concrete drainage ditches, they should be screened with planting or earth berms.

The following grading guidelines (8, 9, and 10) shall apply to single-family dwellings located in hillside areas. (See Attachment A for method of calculating percent slope):

8. *On existing slopes under 15%*: Grading to create single-level padded lots is permitted provided that significant vegetation, rock outcroppings, or other important natural features will not be removed or disturbed.

9. *On existing 15 - 25% slopes*:

   a. Dwellings should be designed with stepped or pier and grade beam foundations to reduce grading, to avoid contiguous stair-stepped padded lots, and to retain a more natural appearance.



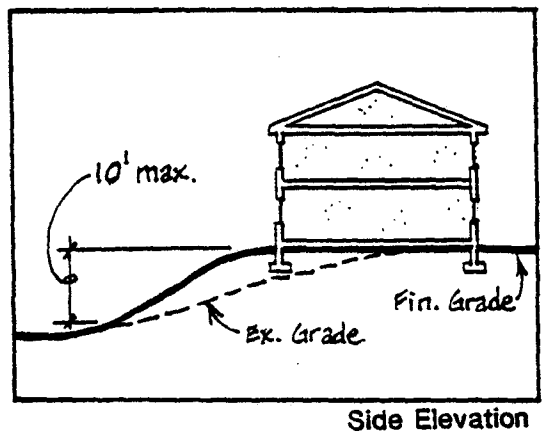
Upslope Lot Downslope Lot

   b. Padded lots may be permitted on existing 15 - 25% slopes provided;

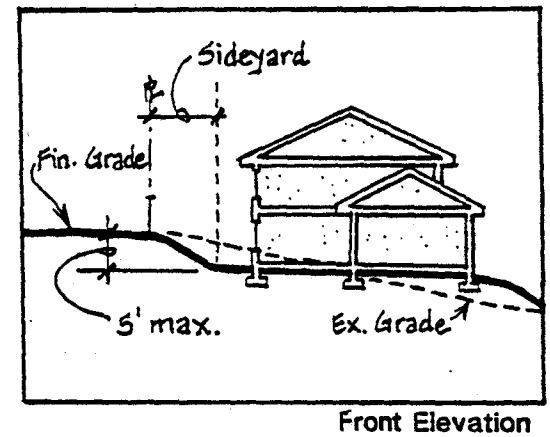
   - The vertical height of any resulting graded slope or combination retaining wall and slope will not exceed 10 feet, or 5 feet if the slope or retaining wall is located within a required side yard between lots;

- Significant vegetation, rock outcroppings, or other important natural features will not be removed or disturbed; and

- The proposed grading will blend with the natural terrain and will not be located at a visually sensitive area.



Side Elevation

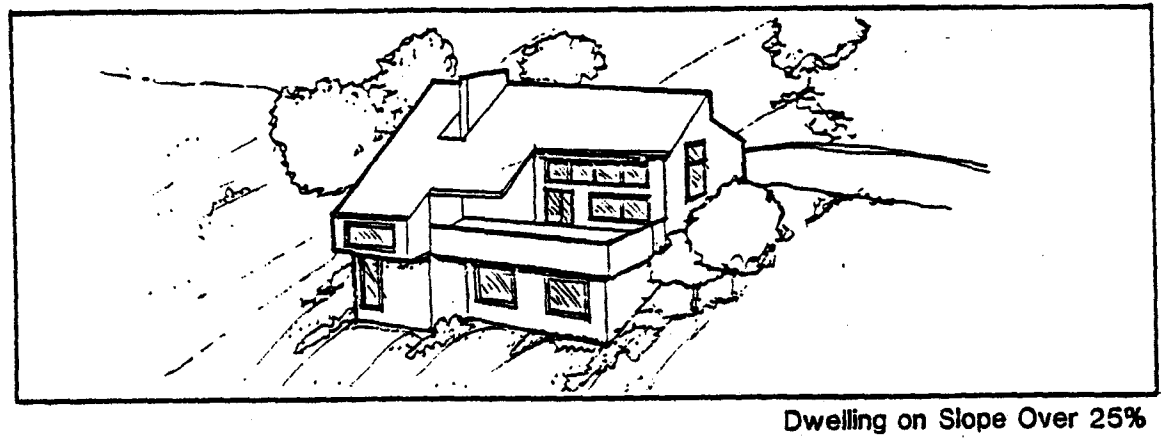


Front Elevation

10. *On existing slopes exceeding 25%*:

    a. Dwellings must be designed with a stepped, pier and grade beam, or a custom foundation to limit grading and alterations to the natural terrain.

    b. Grading to create flat usable open space should not be permitted. Outdoor living space should be provided by constructing elevated decks or patios that are integrated into the design of the dwellings.



Dwelling on Slope Over 25%

I. LANDSCAPING

1. Landscaping should be provided to minimize the visual impact of structures, walls, and graded slopes, especially where the development abuts open space areas or is located on ridgelines or on highly visible hill faces.

2. Domestic landscaping should emphasize the use of native, water-conserving, fire resistant, and deer tolerant plants that will blend with the natural vegetation. Avoid installing landscaping that can create a fuel management problem when the vegetation matures (e.g., tree canopy overhanging roof, fuel ladders, dense flammable vegetation, and plants that produce excessive debris). Plants on slopes should be deep-rooting for erosion control.

3. Avoid planting trees and shrubs in a straight line to define property lines, driveways, or edges. Plants should be clustered informally to blend with the natural vegetation.

4. On large lots, concentrate irrigated landscaping adjacent to the dwelling, and transition to more natural planting on the remainder of the lot.

5. Existing natural vegetation should be preserved as much as possible for wildlife habitat and slope protection, but may need to be modified for fuel reduction according to Fire Department requirements.

6. Irrigation systems should be water-efficient and emphasize the use of drip emitters, bubblers, and low precipitation spray heads. An automatic controller should be installed with all irrigation systems.

7. The boundary between multifamily and single-family developments should be well-buffered with planting.

8. Where applicable, landscaping should also comply with the Urban/Wildland Interface Guidelines (Part II).

J. UTILITIES

1. All utilities serving a new development should be undergrounded, except for equipment that must be installed above ground.

2. For infill areas with existing overhead power lines, individual service lines should be undergrounded to the power pole and connected to the overhead line via a conduit.

3. Light poles and fixtures should be designed to be compatible with the natural surroundings.

K. SIGNING

1. An attractive and clear signing program should be developed for large developments. Signs should reflect the natural setting; routed or sandblasted wood signs are preferred, especially for entry signs. Internally-illuminated signs should not be allowed.

2. Street number and address signs should be clearly visible from the roadway for emergency vehicles. Signs should be consolidated where possible.

3. Homeowner responsibility for maintenance of private signs should be included in deed restrictions.

The purpose of the Urban/Wildland Interface Guidelines is to mitigate through proper planning, design, and management the high fire danger associated with development located in an Urban/Wildland Interface Zone. Guidelines address building construction standards for fire protection, fuel modification and management at the urban/wildland interface, and fire-resistant landscaping. (Refer to Attachment B for definitions of terminology used in these guidelines.)

A. BUILDING CONSTRUCTION STANDARDS FOR FIRE PROTECTION

The following building construction standards pertain to two categories of structures. Category I structures shall be defined as those structures located on development sites where maximum built-in fire protection measures are necessary due to nearby steep slopes or wildland fuel loading. These buildings will exceed the minimum California Fire Safe Guidelines. Category II structures shall be defined as those structures located in the balance of the urban/wildland interface. These structures will meet the minimum California Fire Safe Guidelines.

The Fire Department will designate which sites or lots should comply with the Category I or Category II building construction standards. Developers may also be required to obtain, at their expense, a qualified urban/wildland fire management consultant to assist in this designation.

Construction standards followed by the notation "(I)" apply to Category I structures only. Construction standards followed by the notation "(I & II)" apply to both Category I and II structures.

1. Enclose all roof eaves. (I)

2. Provide double-paned windows for exterior windows. (I)

3. Specify a one-hour fire-resistive rating or greater for exterior building materials. (I)

4. Within ten feet of a structure, construct fences with an open wire mesh or non-combustible material to prevent fire from spreading to the structure. (I)

5. Design roofs that will comply with a "Class A" non-combustible roof rating as outlined in State Building Code Section 3204, 1991 edition. (Do not use wood shake or treated wood shake roofs.) (I & II)

6. Provide metal enclosures with 1/4" metal mesh screens on all attic vents (side vents) and basement vents. (I & II)

7. Provide spark arrestors with 1/4" metal mesh screens on all chimneys. Homeowners should inspect spark arrestors every year to ensure mesh screen integrity. (I & II)

8. Fully sprinkler all structures (including garages and support facilities) with residential fire sprinklers installed by a C-16 certified contractor to specifications listed in National Fire Protection Association Standards 13 and/or 13-D. For each structure or facility, provide a minimum of two replacement heads for emergency replacement along with an appropriate wrench for changing sprinkler heads. (I & II)

9. Construct exterior decks with heavy timber or non-combustible materials, and enclose all sides with a one-hour fire-resistive rated material. (I & II)

10. Clearly address all structures at the curb and on the structure or facility per Fire Department specifications. (I & II)

11. Restrict outdoor storage of firewood, kindling, or compost material within 30 feet of any structure, unless the material is stored in an approved bin or enclosure. (I & II)

12. Locate chimneys at least ten feet away from existing tree canopies. (I & II)

B. FUEL MANAGEMENT PROGRAM

A fuel management program shall be established for developments located within an Urban/Wildland Interface Zone to ensure the safety of residents, if required by the Fire Department. Where applicable, the fuel management program should include the following components:

1. Homeowner education;

2. Shaded fuelbreaks;

3. Mosaic islands;

4. Fire-resistant and drought-tolerant landscaping; and

5. Fuel management zones.

If feasible, a homeowner association should be authorized to implement and enforce the fuel management program by incorporating appropriate provisions in the covenants, conditions, and restrictions (CC&Rs) for the development. The homeowner association should be responsible for inspecting and maintaining common open space. Individual homeowners should be responsible for maintaining the private open space within each lot, with enforcement authority provided to the homeowner association and the City.

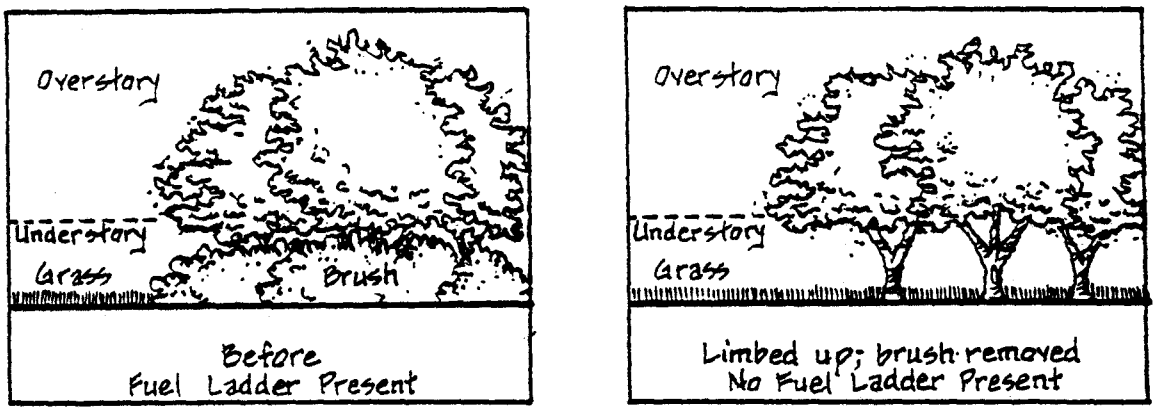
C. Homeowner Education

One of the most important aspects of a fuel management program is educating homeowners about living safely at the urban/wildland interface. Developers should provide each homeowner with an informational pamphlet, approved by the Fire Department, that outlines the key issues concerning fire safety and the annual wildland fire threat. The pamphlet should list key terminology. When homeowners are required to perform any fuel management work, they should understand what is required and associated with environmental or firefighting issues.

The pamphlet should contain several paragraphs describing the natural fire cycle and the ecological factors associated with fire. Information should be provided on the actions that family members should take if a fire occurs. Fire-resistive construction features associated with the development should also be listed. Finally, the pamphlet should include concerns and fire safety recommendations from the Hayward Fire Department.

D. Shaded Fuelbreak

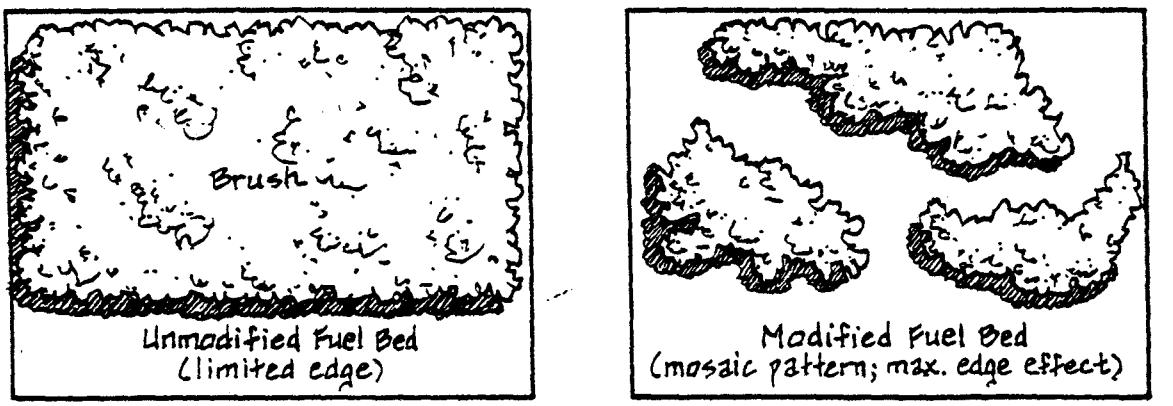
Woodland, riparian, and densely vegetated areas that will abut a development at the urban/wildland interface should be modified as necessary to create a shaded fuelbreak. A program for modifying each vegetation zone should consist of: 1) eliminating down-dead limbs; 2) limbing up trees and large shrubs; and 3) selectively removing understory shrubs and ground covers. The purpose of a shaded fuelbreak is to interrupt the fire ladder or the transfer of fire from ground fuels (shrubs and ground covers) to tree canopies. Attention should be given to preserving wildlife habitats, maintaining a natural appearance, and minimizing soil erosion.



SHADED FUELBREAK

E. Mosaic Islands

Where brushland will abut a development at the Urban/Wildland interface, the vegetation should be modified by creating mosaic islands. Dense stands of Bacharis shrubs should be selectively thinned (60 to 75 percent removed) to reduce fuel loading, to break up the continuity of the fuel bed, and to help reestablish annual grasses. Creating mosaic islands will reduce the thermal output and radiant heat that will impact upslope structures and vegetation if a wildland occurs. Mosaic islands will also: preserve the natural appearance of the hillside; enhance wildlife feeding, nesting, and protection areas by increasing vegetation edges; and minimize soil erosion.



MOSAIC ISLANDS

F. Fire-Resistant Planting

Developments located in high fire hazard areas should emphasize the use of drought-tolerant, fire-resistant plants for domestic and replacement planting. Recommended fire-resistant plants are listed in Attachment C. Also listed are highly flammable plants that should be avoided.

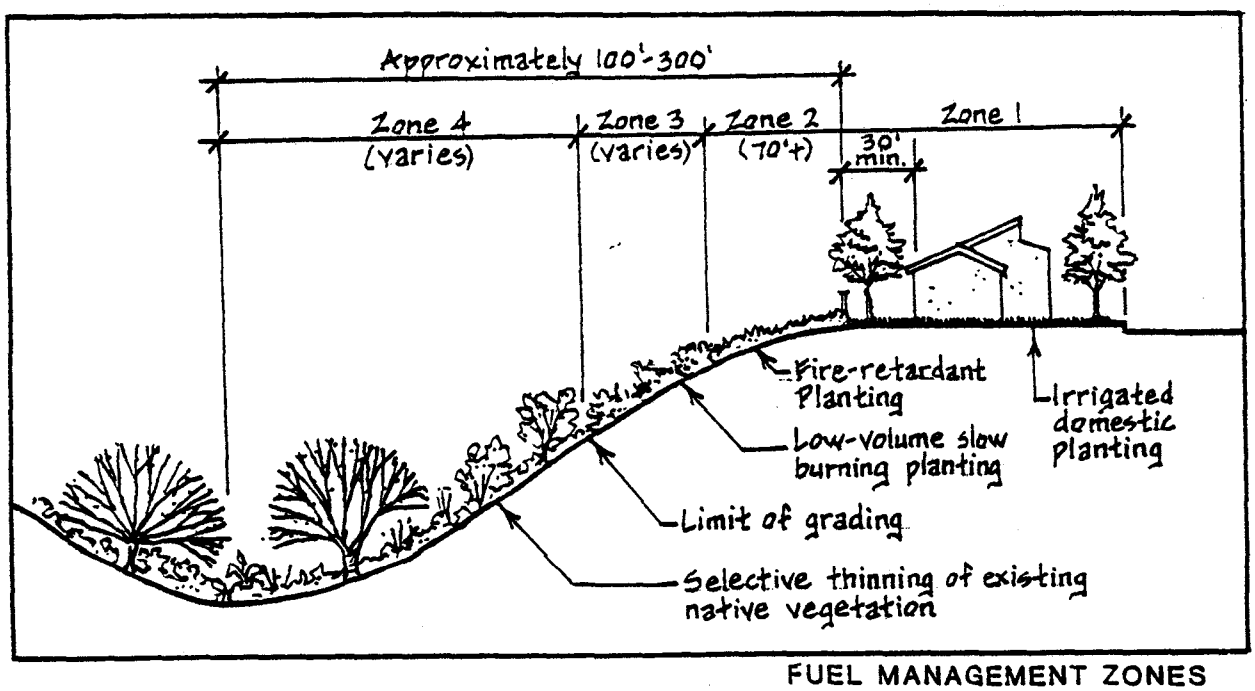
G. Fuel Management Zones

Where a development will be located adjacent to natural open space, the fuel management program should delineate fuel management zones within the abutting open space and establish management requirements for each zone.

Establishing a firebreak around the perimeter of the development is essential, and an additional fuelbreak or greenbelt is usually necessary. A firebreak and fuelbreak provide the first line of defense against a wildland fire by limiting the exposure of a structure to radiant heat and debris from an advancing fire.

All fuel management zones should be inspected at least every four years, with the vegetation modified as necessary. When strong winds or storms occur, the management zones should be immediately inspected by the homeowner or association, and any downed limbs or suspended broken limbs should be removed as soon as possible. Tree limbs and other debris should be chipped or disposed of in a manner approved by Fire Department.

The following design and management guidelines apply to four suggested management zones at the urban/wildlife interface. The width of these zones will be determined by the Fire Department based on topography, existing vegetation, density and type of development, access, and exposure. The Fire Department may require that a developer obtain a qualified urban/wildland fire management consultant to develop a fuel modification program for the management zones. The Fire Department may also require a fire road or trail and gated access points around the perimeter of a development.



FUEL MANAGEMENT ZONES

1. Zone 1: Minimum Firebreak

   a. Maintain a minimum 30 feet "defensible" space around structures by avoiding flammable species or species that tend to build-up dead branches and foliage.

   b. Emphasize the use of high canopy trees and low growing shrubs and ground covers. Limit the planting of large trees adjacent to structures. Use plants that can be easily pruned and maintained.

   c. Thin vegetation and remove dead leaves and wood annually. Remove tree branches located within 6 feet of the ground.

   d. Remove portions of trees that extend within 10 feet of the outlet of a chimney, and remove any dead branches that overhang a building.

   e. Annually remove dead leaves, needles, and other dead vegetative growth from rooftops and rain gutters.

   f. Install an automatic irrigation system for domestic landscaping and adequately water plants during hot dry periods.

2. Zone 2: Additional Firebreak or Greenbelt (if required)

   a. An additional firebreak of 70 feet or more may be required by the Fire Department where a 30-foot firebreak is determined to be insufficient for providing reasonable fire safety because of extra hazardous conditions (e.g., difficult topography, access problems, dense vegetation). Comply with Zone 1 guidelines.

   b. Where a greenbelt is desired, low ground cover not exceeding 18" high and fire-retardant plants (high moisture and low oil, sap or resin content) should be emphasized. An automatic irrigation system is recommended, and regular weed control is necessary.

   c. Dry annual grasses should be mowed to a maximum height of 4 inches.

3. Zone 3: Fuelbreak (Transition Zone)

   a. Domestic planting should be low growing, slow burning, and low volume species that will blend with the native vegetation and require no water once established. Provide erosion control planting on slopes.

   b. Higher growing plants are acceptable if they are fire-resistant and are spaced apart to maintain individual canopies or to create mosaic islands.

   c. A drip irrigation system is recommended for all new planting.

   d. Comply with Zone 4 guidelines for fuel modification of native vegetation.

4. Zone 4: Fuelbreak (Natural Open Space)

   a. A regular fuel modification program should be developed for this zone. The guidelines for creating shaded fuelbreaks and mosaic islands should be followed to reduce fuel loading, fuel continuity, and fire ladders. (See Sections D and E.)

   b. Replacement planting or planting on disturbed slopes should be slow burning, low volume native species.

   c. Where a roadway abuts open space, the vegetation located within a minimum distance of 10 feet from the roadway should be modified for fuel reduction.

Attachment A
Slope Formula

For the purpose of the Hillside Design Guidelines, the area to be included in determining the "existing slope" shall be defined as the total area within a site or lot that is proposed to be graded or covered with structures. Areas proposed to be undisturbed shall not be included in calculating the existing slope. The formula for calculating existing slope shall be as follows:

$$S = \frac{I \times L \times 100}{A},$$

where

S = Average existing slope in percent for the portion of the site or lot to be developed.

I = Contour interval in feet.

L = The combined length in feet of all contour lines within the portion of the site or lot to be developed.

A = Total area in square feet of the portion of the site or lot to be developed.

Attachment B
Fuel Management Terminology

AGE CLASS: Age of chaparral vegetation in relationship to fire responsiveness. Age classes over 20 years contribute to adverse fire behavior.

CANOPIES: Trees and tall brush.

CHAPARRAL: A fire responsive plant community found primarily in the Western United States. Heavy oil or resin laden canopies burn aggressively during a summertime wildland fire.

CONTINUITY: A term used to describe a fuel bed layout. Uniform continuity contributes to wildland fire spread. Patchy continuity often helps firefighters to stop the fire.

DOWN-DEAD: Herbaceous, stems, and twigs found on the ground which contribute to fire spread of thermal output of a wildland fire.

FIRE LADDER: The description of a wildland fire spreading from ground to aerial fuel canopies. A key goal of fuel management is to reduce the potential of a wildland fire sweeping into aerial canopies (trees).

FUEL BED: A defined block of vegetation generally ranging from 300 to 10,000 acres in size. Fuel beds are evaluated in terms of potential to support a major wildland fire.

FUEL LOADING: Volume of the fuel bed expressed in tons per acre.

FUEL MANAGEMENT: Modification of natural vegetation found around the development area. This modification will include reducing fuel loading, continuity of fuel bed, and removal of down-dead materials. Native oak and bay woodland are required to be limbed up in some cases. Fuel management activities are designed to reduce the threat of a major wildland fire while protecting structures located in wildland fuel beds.

HERBACEOUS: Fine fuels (non-woody) such as annual grasses and weeds. These fuels are primary fuel for a wildland fire.

MOSAIC ISLAND: A fuel management technique designed to create more "edge" for fauna while breaking up fuel bed continuity.

RIPARIAN ZONE: A wet or moist well-defined drainage. Generally shaded. An environmentally sensitive area. These ares can partially "dry out" in summer months.

SHADED FUELBREAK: In heavy oak woodland where closed aerial canopies are found, a process of limbing up the trees and removing down-dead materials from under canopies. This prevents the fire ladder from occurring.

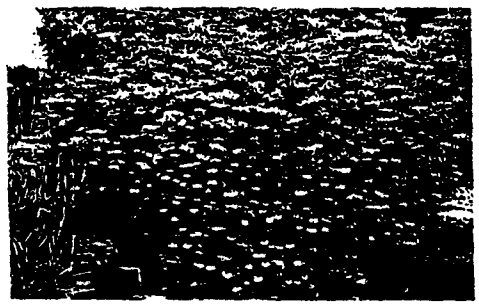
ATTACHMENT C

List of Fire-Resistant and Highly Flammable Plants

Cercis occidentalis (Redbud)

Quercus agrifolia (Coast Live Oak)

Cistus spp. (Rockrose)



Escallonia spp.

Plants With Some Fire-Resistance:

The following is a short list of drought-tolerant plant material. This list is only a starting point, and not the final word. Growing conditions in your yard and maintenance techniques and timing affect the relative fire-resistance and drought tolerance of plants. Those which generally have some fire-resistance are noted, as well as those which may suffer freeze damage inland. Spp. indicates more than one species is commonly grown.

R = Plants with some fire-resistance
F = Plants which may freeze inland

	Genus Species	Common Name
	Trees	
R	Arbutus unedo	Strawberry Tree
R	Ceratonia siliqua	Carob Tree
R	Cercis occidentalis	Western Redbud
	Cercocarpus betuloides	Mt. Mahogany
R	Quercus agrifolia	Coast Live Oak
	Pistacia chinensis	Chinese Pistache
R	Rhus lancea	African Sumac
	Shrubs	
	Arctostaphylos spp.	Manzanita
R	Atriplex spp.	Saltbush
	Berberis spp.	Barberry
	Ceanothus spp.	California Lilac
R	Cistus spp.	Rockrose
R	Cotoneaster spp.	Cotoneaster
R	Cotyledon spp.	No common name
R	Escallonia spp.	Escallonia
R	Feijoa sellowiana	Pineapple Guava
R	Galvesia speciosa	Island Bush Snapdragon
	Garrya elliptica 'Evie'	Garrya
	Gaura lindheimerii	Gaura
R	Heteromeles arbutifolia	Toyon
R	Nerium oleander	Oleander
R	Pittosporum spp.	Mock Orange
R	Prunus ilicifolia	Holly-Leaved Cherry
R	Prunus lyonii	Catalina Cherry
R	Punica granatum 'Nana'	Dwarf Pomegranate
R	Pyracantha 'Santa Cruz'	Pyracantha
	Raphiolepis spp.	India Hawthorne
R	Rhamnus spp.	Coffee Berry
R	Rhus integrifolia	Lemonade Berry
R	Ribes viburnifolium	Evergreen Currant

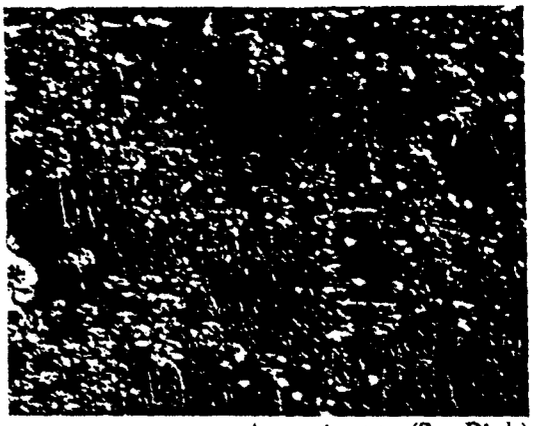
Source: East Bay Municipal Utility District, "Firescape Landscaping to Reduce Fire Hazard," 1992.

Groundcovers

R	F	Aloe spp.	Aloe
R		Arctotheca calendula	Capeweed
R		Armeria spp.	Sea Pink
R		Coprosma kirkii	Prostrate Mirror Plant
R	F	Drosanthemum floribundum	Ice Plant
R		Duchesnea indica	Mock Strawberry
R	F	Dymondia margaretae	No common name
R		Festuca rubra 'Creeping'	Creeping Red Fescue
R		Fragaria chiloensis	Wild Strawberry
R		Gazania spp.	Gazania
		Hypericum calycinum	St. John's Wort
R		Liriope gigantea	Giant Turf Lily
		Mahonia repens	Creeping Oregon Grape
R		Malephora crocea	Ice Plant
R	F	Myoporum parvifolium 'Prostratum'	Myoporum
R		Phyla nodiflora	Lippia
R		Rosmarinus officinalis 'Prostratus'	Creeping Rosemary
R	F	Scaevola 'Mauve Clusters'	Fan Flower
R	F	Sedum spp.	Stonecrop

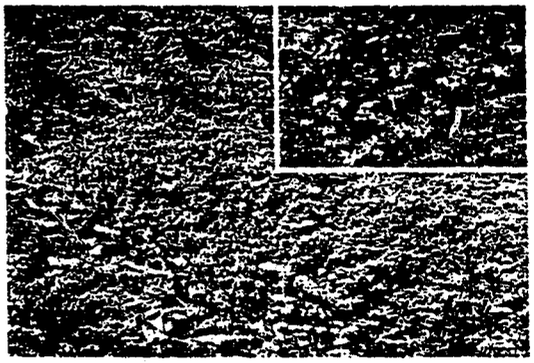
Perennials

R		Achillea spp.	Yarrow
R	F	Aeonium spp.	Succulents
R		Agapanthus spp.	Lily of the Nile
R	F	Agave spp.	Agave
R	F	Aloe spp.	Aloe
		Bergenia spp.	Bergenia
		Centaurea gymnocarpa	Dusty Miller
R		Centranthus ruber	Red Valerian
R		Convolvulus cneorum	Bush Morning Glory
R		Coreopsis spp.	Coreopsis
R	F	Crassula spp.	Jade Plant
R		Dietes spp.	Butterfly Iris
R		Diplacus spp.	Monkey Flower
R	F	Echeveria spp.	Hen and Chicks
		Erigeron spp.	Fleabane
		Erysimum linifolium	Wallflower
R		Eschscholzia californica	California Poppy
		Geranium spp.	Geranium
		Helichrysum petiolatum 'nana'	Curry Plant
R		Hemerocallis (assorted)	Daylily
R		Heuchera maxima	Coral Bells
R		Iris spp.	Iris
R		Kniphofia uvaria	Red Hot Poker
		Koeleria galuca	Blue Hair Grass
		Lantana montevidensis (sellowiana)	Lantana
R		Lavandula spp.	Lavender
R	F	Limonium perezii	Statice
		Linaria maroccana	Toad-Flax
R		Nerine masonorum	Nerine
R		Oenothera berlandieri	Mexican Evening Primrose



Armeria spp. (Sea Pink)

Mahonia repens (Creeping Oregon Grape)



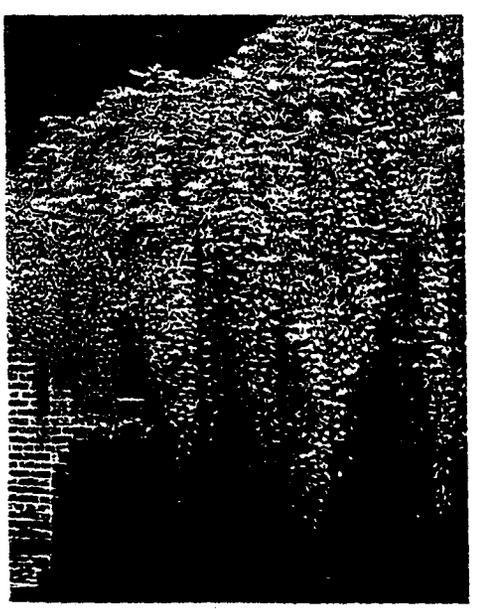
Rosmarinus officinalis 'Prostratus'

Agapanthus spp.

Plants With Some Fire-Resistance (continued)

Hemerocallis (Daylily)

Iris spp.



Wisteria spp.

	Pelargonium peltatum	Ivy Geranium
R	Penstemon spp.	Penstemon
	Perovskia atriplicifolia	Russian Sage
	Romneya coulteri	Matilija Poppy
	Salvia spp.	Sage
R	Santolina spp.	Lavender Cotton
	Senecio spp.	Dusty Miller
	Silene maritima	No common name
	Sisyrinchium spp.	Eyed Grass
	Stachys byzantina	Lamb's Ears
R	Trichostema lanatum	Woolly Blue Curls
R	Tulbaghia violacea	Society Garlic
	Yucca spp.	Yucca
	Zantedeschia aethiopica	Calla Lily

Vines

R	Jasminum spp.	Jasmine
	Rosa banksiae	Lady Bank's Rose
R	Solanum jasminoides	Potato Vine
R	Tecomaria capensis	Cape Honeysuckle
R	Trachelospermum jasminoides	Star Jasmine
	Wisteria spp.	Wisteria

Highly Flammable Plants:

Use these plants with extreme caution. They can be a hazard near buildings or wooden structures, and will need a higher level of maintenance. Keep any existing plants on this list clear of each other, free of any dry debris, and trimmed clear of any structures. Those denoted with **P** are considered **pyrophytes** - they almost attract fire.

	Genus Species	Common Name
	Trees	
	Abies spp.	Fir
	Acacia spp.	Acacia
	Cedrus spp.	Cedar
	Chamaecyparis spp. except dwarf	Cypress, Cedar
	Cryptomaria japonica except dwarf	Cryptomeria
	Cupressus spp.	Cypress
	Cupressocyparis	Cypress
P	Eucalyptus cladocalyx	Sugar Gum
P	Eucalyptus globulus	Blue Gum
P	Eucalyptus viminalis	Manna Gum
	Juglans hindsii	Black Walnut
	Larix spp.	Larch
	Palms (if fronds left untrimmed)	Palm

Highly Flammable Plants (continued)

	Picea spp.	Spruce
P	Pinus spp. (including dwarf mugo)	Pine
	Schinus spp.	Pepper Tree
	Tamarix spp.	Tamarisk
	Taxodium spp.	Bald Cypress
	Taxus spp. except dwarf	Yew
	Thuja spp.	Arbor-Vitae
	Tsuga spp.	Hemlock

Shrubs

P	Adenostoma fasciculatum	Chamis, Greasewood
P	Adenostoma sparsifolium	Red Shanks
	Artemesia californica	California Sagebrush
P	Baccharis pilularis consanguinea	Coyote Brush
	Cytisus, Genista, Spartium	Brooms
	Dodonaea viscosa	Hopseed Bush
	Erigonum spp.	Buckwheat
P	Juniperus spp.	Juniper

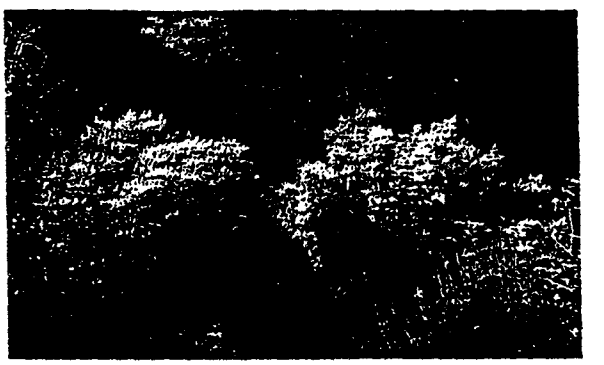
Groundcovers

P	Baccharis spp. (when overgrown)	Coyote Bush
	Hedera canariensis	Algerian Ivy

Perennials

Bamboo spp.	Bamboo
Cortaderia selloana	Pampas grass
Miscanthus spp.	Grasses
Muehlenbergia spp.	Deer Grasses
Pennisetum setaceum	Fountain Grasses
Salvia melilifera	Black Sage

Cytisus, Genista, Spartium (Broom)



Baccharis pilularis consanguinea (Coyote Brush)