Design Templates for Wildfire Mitigation & Landscape Resilience

Vegetation Management Strategies for the Wildland Urban Interface in Coastal Central & Southern California

Native Oak Shaded Fuel Breaks

Created for the Regional Wildfire Mitigation Program
by SIG-NAL & Watershed Progressive

A Native Oak Shaded Fuel Break

How **shaded fuel breaks** mitigate **wildfire hazards** by **reducing fuel loads**

What is a Shaded Fuel Break?
A fuel break is defined by the Southern CA National Land Management Plan as "a wide strip or block of land on which native or pre-existing vegetation has been permanently modified so that fires burning into it can be more readily extinguished."

Native oak shaded fuel breaks differ from traditional clear cut fuel breaks by preserving and maintaining tree canopy and native chaparral habitat, while helping to slow and reduce the intensity of approaching wildfires.

Shaded fuel breaks are planted with fire-resistant plants which, once established, are drought tolerant. Many of these plant species can regrow after fire.

Shaded fuel breaks create cooler temperatures. Shade contributes to cooler soils and provides habitat for native plant and animal species. Shaded fuel breaks require less maintenance than traditional fuel breaks, although close care is required during the initial 5-10 years after planting new oaks.

Implementing Shaded Fuel Breaks
Shaded fuel breaks should be placed strategically along access roads, parcel boundaries, and ridge tops to help protect infrastructure and crop fields.

Proper spacing between trees, shrubs and groundcover eliminates ladder fuels and should be maintained.

Implementing and maintaining a shaded fuel break consists of removing or pruning trees, shrubs, brush, and other vegetative growth in the area according to specific spacing guidelines outlined in the following pages.

ADDITIONAL CONSIDERATIONS

Prescribed herbivory or targeted grazing is a wildfire management strategy that involves using livestock to graze on vegetation in targeted areas to reduce fuel loads (1). This strategy can be considered as a site preparation step for targeted fuel reduction.

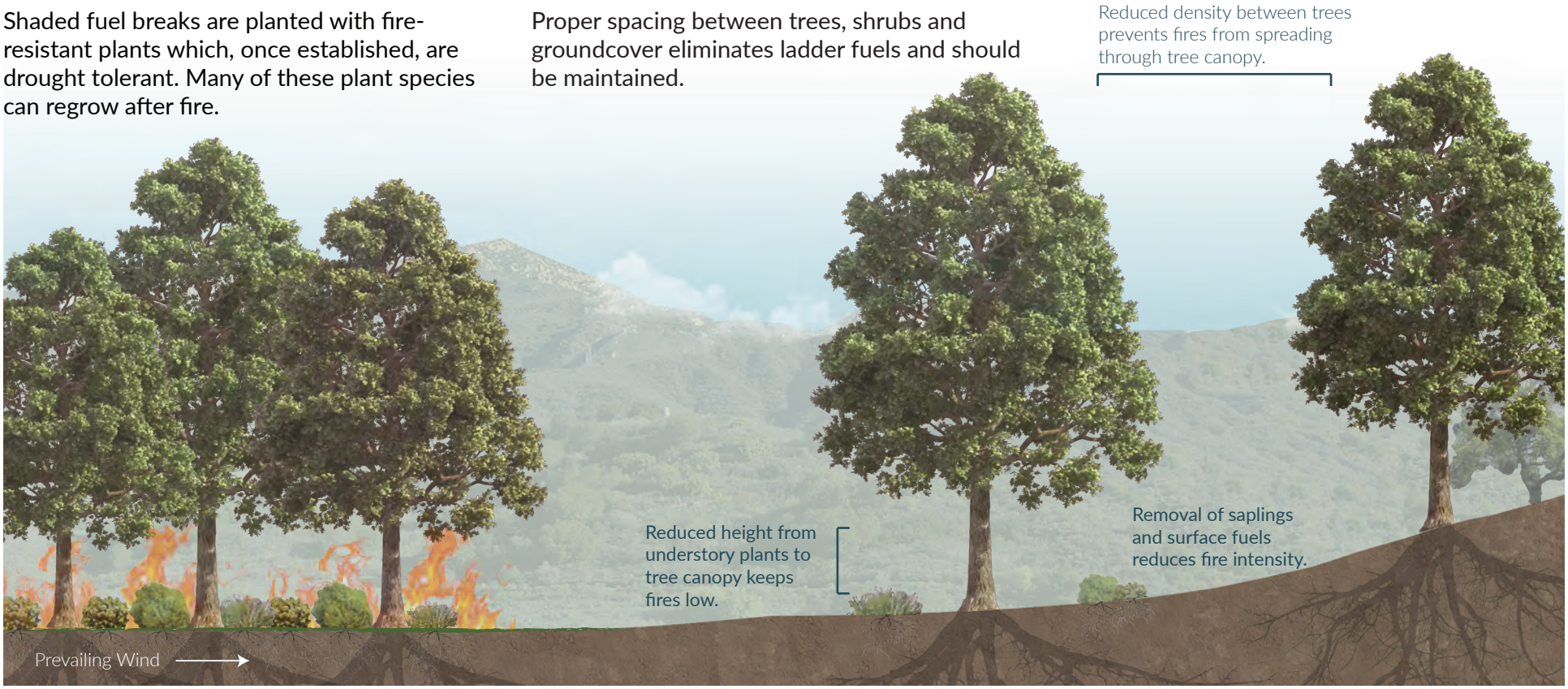


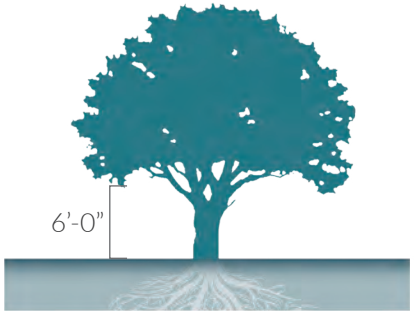
ILLUSTRATION: Native Oak Shaded Fuel Break (right) vs. Non-Managed Oak Woodland (left)
Shaded Fuel Breaks reduce density between trees and shrubs, helping to eliminate surface fuels while maintaining tree canopy that provides shade and cools the ground.

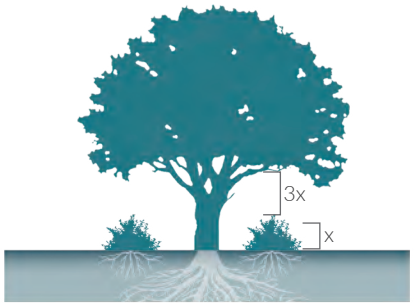
A2 Native Oak Shaded Fuel Break

How to **space trees** and **shrubs** to create **defensible space** throughout the landscape

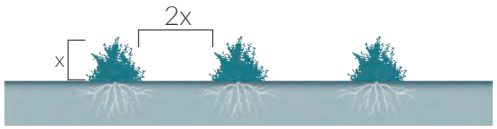
Maintenance of shaded fuel breaks is essential to their effectiveness in mitigating wildfire hazards, and for providing firefighters a safe space to suppress approaching wildfire. Maintenance includes invasive weed monitoring, and regular pruning of shrubs and branches to minimize combustible fuels.

- ✓ DO maintain a minimum width of 200 feet. In sites with steep slopes, consider increasing the fuel break to 600 feet or more.
- ✓ DO thin out thick shrubs and trees to create separation between them.
- ✓ DO remove or trim low shrubs and plants (understory fuels) that are over 1 foot in height.
- ✗ DO NOT remove or treat threatened and endangered plant and animal species, such as elderberry and other sensitive species.
- ✗ DO NOT compile brush or combustible materials in or around the fuel break.

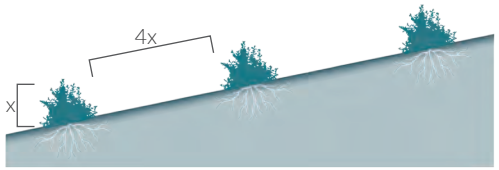




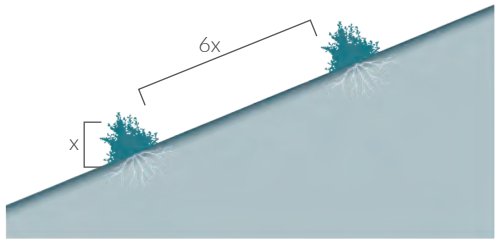
3x Height of Shrub = Minimum Vertical Clearance



Flat to Mid Slope (0%-20%)

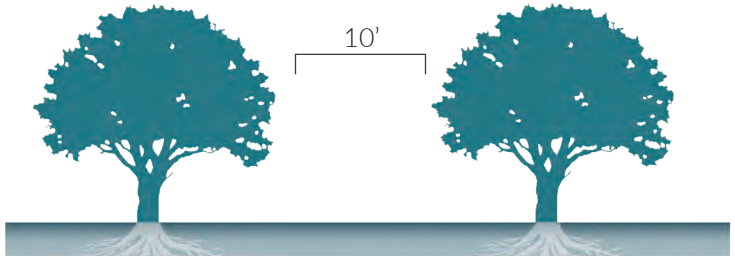


Mid to Moderate Slope (20%-40%)



Moderate to Steep Slope (40% or Greater)

DIAGRAMS: Vertical (left) and Horizontal (right) Spacing Guidelines for Trees and Shrubs in Native Oak Shaded Fuel Breaks on Flat, Moderate, and Steep Slopes



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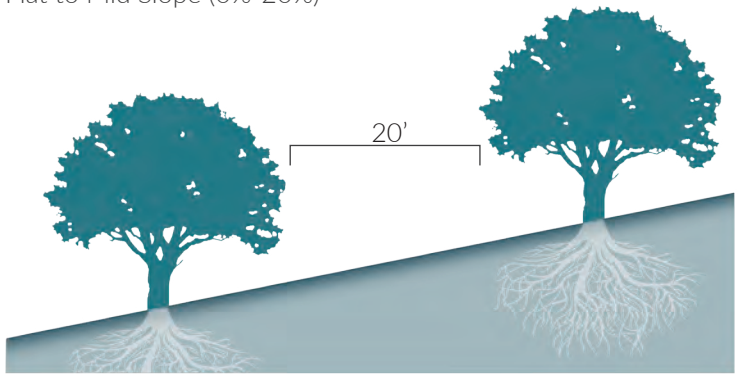
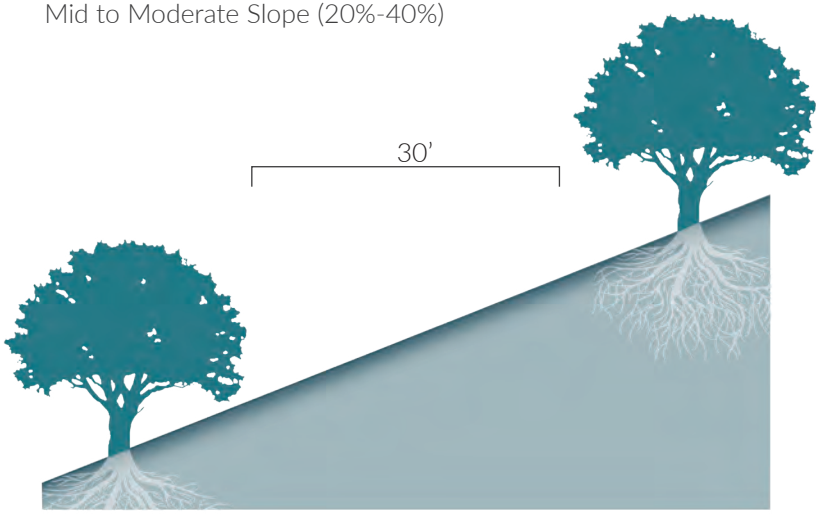


Mid to Moderate Slope (20%-40%)



Moderate to Steep Slope (40% to Greater)

ADDITIONAL CONSIDERATIONS

Refer to **CALFIRE** for more information about Defensible Space Zones and spacing guidelines, and other ways to protect your homes from fire (2).
www.fire.ca.gov

B

Native Oak Shaded Fuel Break

Prototypical plans, sections and details for implementation

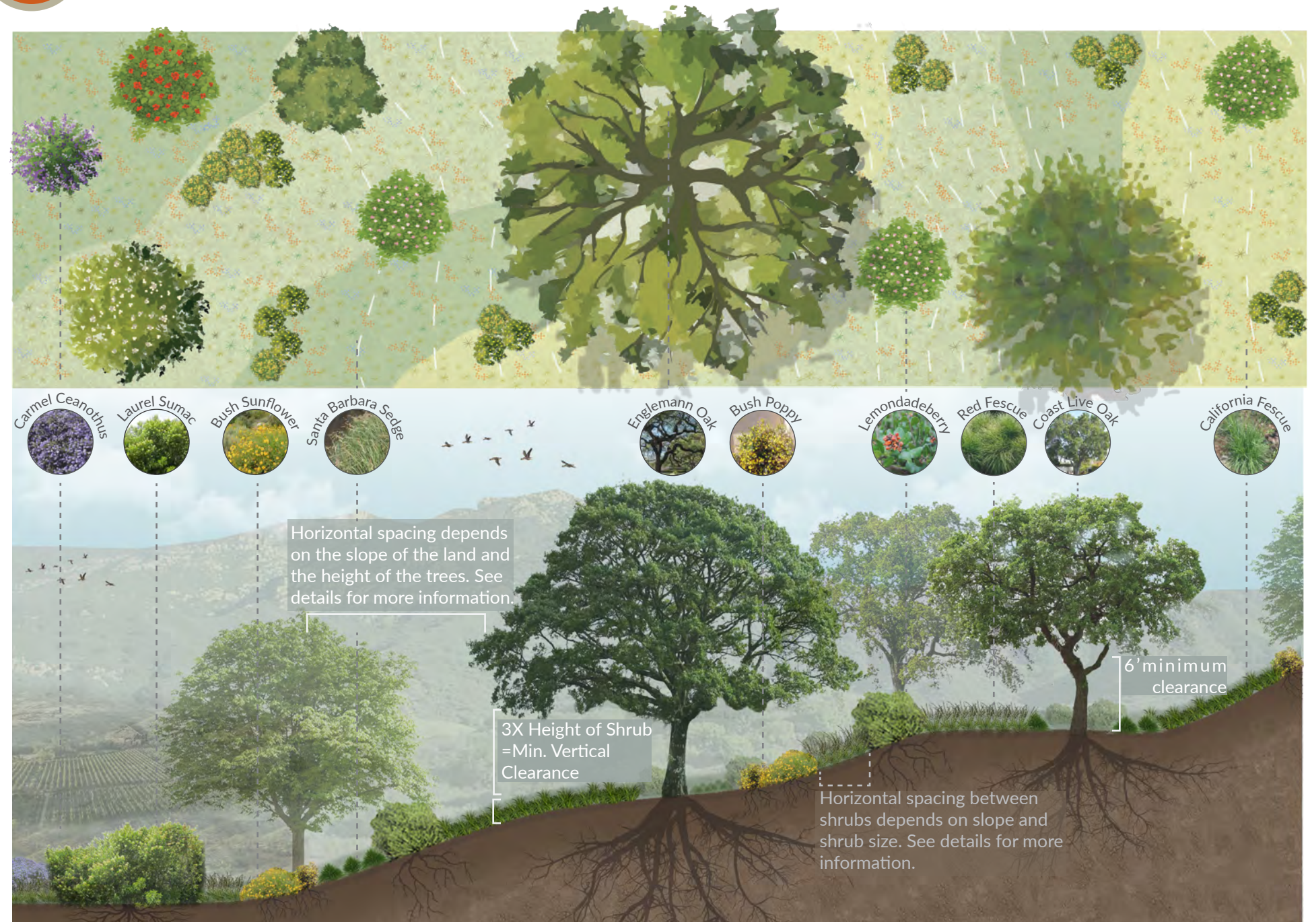


ILLUSTRATION with CORRESPONDING PLANTING PLAN: Native Oak Shaded Fuel Breaks, with Grasses
Vertical and horizontal spacing considerations for planting and maintaining oaks and appropriate shrubs help create shade while reducing fuel loads on steep slopes.

B2 Native Oak Shaded Fuel Break

Prototypical plans, sections and details for implementation

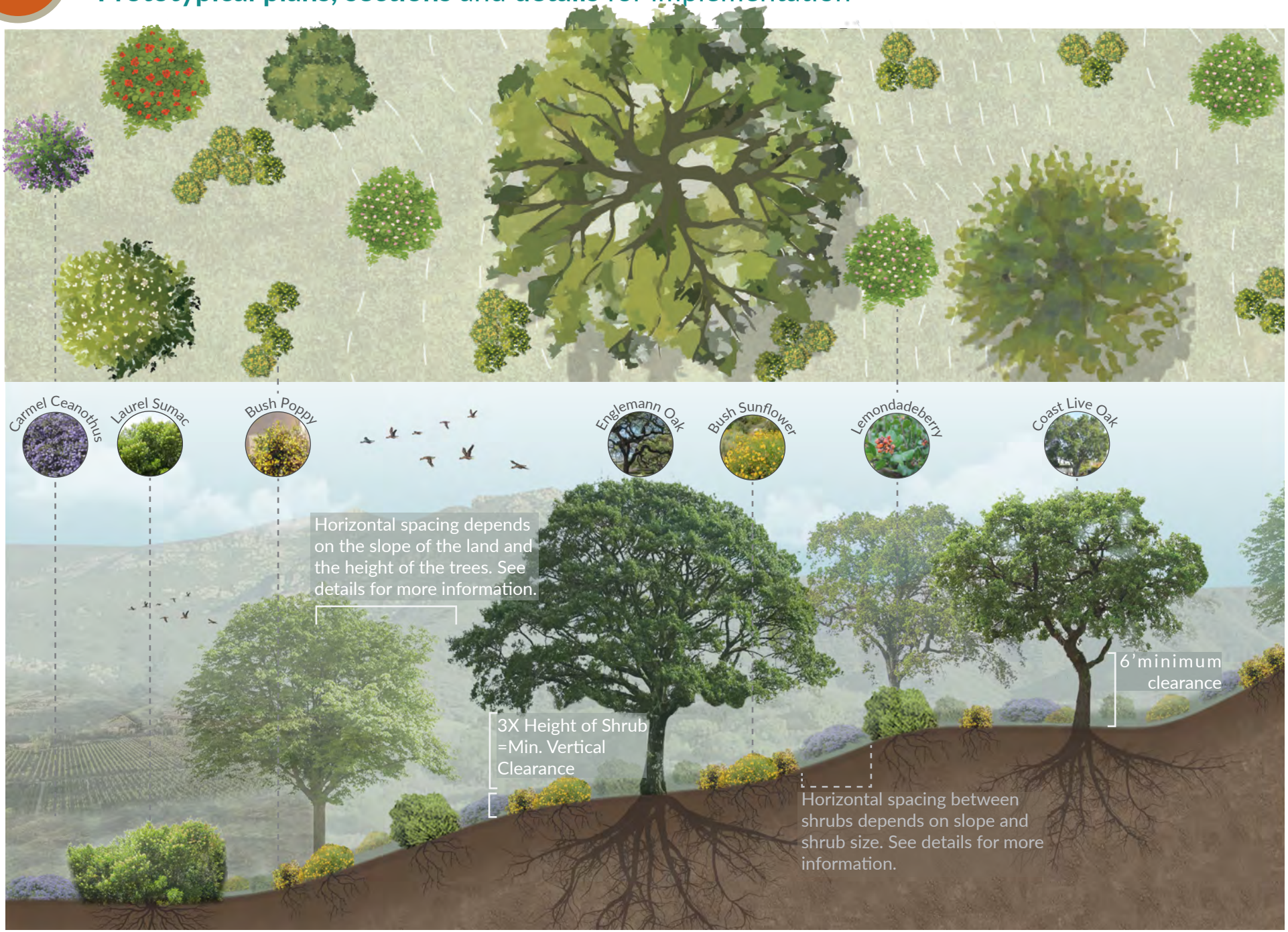


ILLUSTRATION with CORRESPONDING PLANTING PLAN: Native Oak Shaded Fuel Breaks, without Grasses
Vertical and horizontal spacing considerations for planting and maintaining oaks and appropriate shrubs help create shade while reducing fuel loads on steep slopes.

C

Native Oak Shaded Fuel Break

Plant Palette for South, East and West facing (sunny) slopes

TREES

Quercus agrifolia
Coast Live Oak

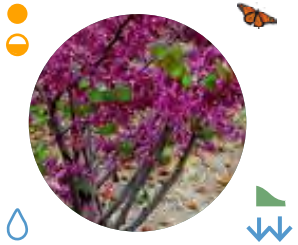
Quercus engelmanii
Engelmann Oak

Quercus tomentella
Island Oak

SHRUBS

Frangula california
California Coffeeberry

Arctostaphylos refugioensis
Refugio Manzanita



Cercis occidentalis
Western Redbud

SHRUBS

Heteromeles arbitufolia
Toyon

Rhus integrifolia
Lemonade Berry

Malosma laurina
Laurel Sumac

SHRUBS

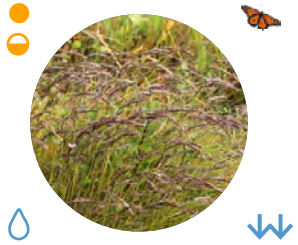
Sambucus mexicana
Blue Elderberry

Dendromecon rigida
Bush Poppy

Cercocarpus betoluides
Mountain Mahogany

GRASSES

Carex barbarae
Santa Barbara Sedge



Festuca rubra
Red Fescue

SOIL DRAINAGE

- slow
- adaptable
- fast

SUN/SHADE

- full sun
- partial sun / shade
- full shade

WATER USAGE

- low
- moderate
- high

OTHER CONSIDERATIONS

- erosion control
- pollinator
- fire resistant with maintenance

C2

Native Oak Shaded Fuel Break

Plant Palette for North facing (shaded) slopes

TREES

Quercus agrifolia
Coast Live Oak

Quercus douglassi
Blue Oak

SHRUBS

Paeonia californica
California Peony

Venegasia carpesioides
Canyon Sunflower

Cercocarpus betuloides
Mountain Mahogany

SHRUBS

Heteromeles arbitufolia
Toyon

Woodwardia fimbriata
Giant Chain Fern

Quercus berberidifolia
Scrub Oak

SHRUBS

Sambucus mexicana
Blue Elderberry

Polypodium californicum
California Polypody

Achillea millefolium
Common Yarrow

GRASSES

Melica imperfecta
Small Flowered Melica

Stipa cernua
Nodding Needle Grass

SOIL DRAINAGE

- slow
- adaptable
- fast

SUN/SHADE

- full sun
- partial sun / shade
- full shade

WATER USAGE

- low
- moderate
- high

OTHER CONSIDERATIONS

- erosion control
- pollinator
- fire resistant with maintenance

D Native Oak Shaded Fuel Break

Construction Details and Additional Resources

Mulching for Shaded Fuel Breaks
Mulching is the use of organic and inorganic material to cover soil surfaces throughout landscapes. Mulching conserves soil moisture, enhances soil quality, regulates soil temperatures for plant roots, and suppresses the growth of invasive weeds that may be flammable and threaten native habitat.

However, mulching can also increase combustible surface fuel cover. Where implemented, it needs to be done with careful consideration of hydrological benefits versus flammability tradeoffs (3). Assessing each site's needs will help you determine best practices for mulching in landscapes within the Wildland-Urban Interface.

In general, composted wood chips (around 3 inches in size*) have lower burn characteristics than other mulches, and can aid in smoldering fires. You should avoid fibrous mulches, which tend to spread fire.

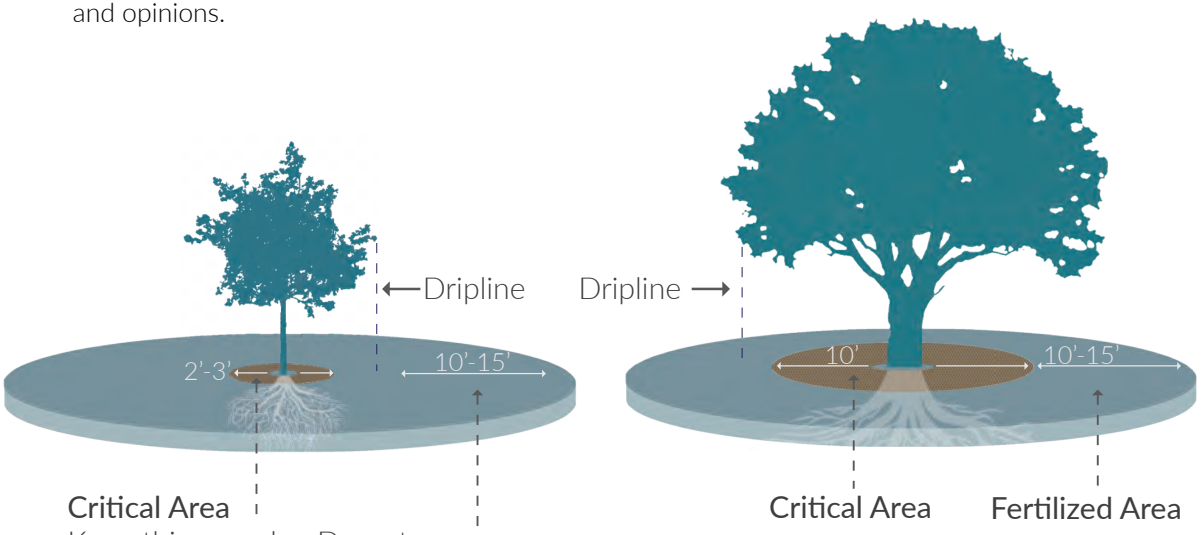
Mulching for Native Oaks
The best mulch for oaks is a thick layer of oak leaves. As oak trees are established, they amend the soil, improving the health of surrounding plants. If oak leaves are not available, wood chips can be used (4).

For newly planted seedlings, mulching around the base helps protect the plant from competing vegetation and weeds. Deep irrigation (2 gallons per seedling) several times during late spring and early summer can help protect seedlings from drought. Newly planted oaks in shaded fuel breaks should be closely monitored for the first 5-10 years after planting to make sure the plant is protected from invasive weeds.

- ✓ DO Mulch the soil beneath oak trees with 2"-4" of organic material.
- ✗ DO NOT Use gorilla hair, monotone fibrous mulches, shredded rubber, pine needles or shredded cedar bark. These are all highly combustible (4).

ADDITIONAL CONSIDERATIONS
*There are outstanding questions around mulching to reduce flammability risk. Consult your local fire district for guidance and opinions.

- ✗ DO NOT Place mulch directly against tree trunks.
- ✗ DO NOT Use synthetic materials such as rubber pellets, landscape fabric, or anything containing plastic
- ✗ DO NOT Put the oak mulch of one oak tree on another without verifying that the source oak is healthy and free of fungus.

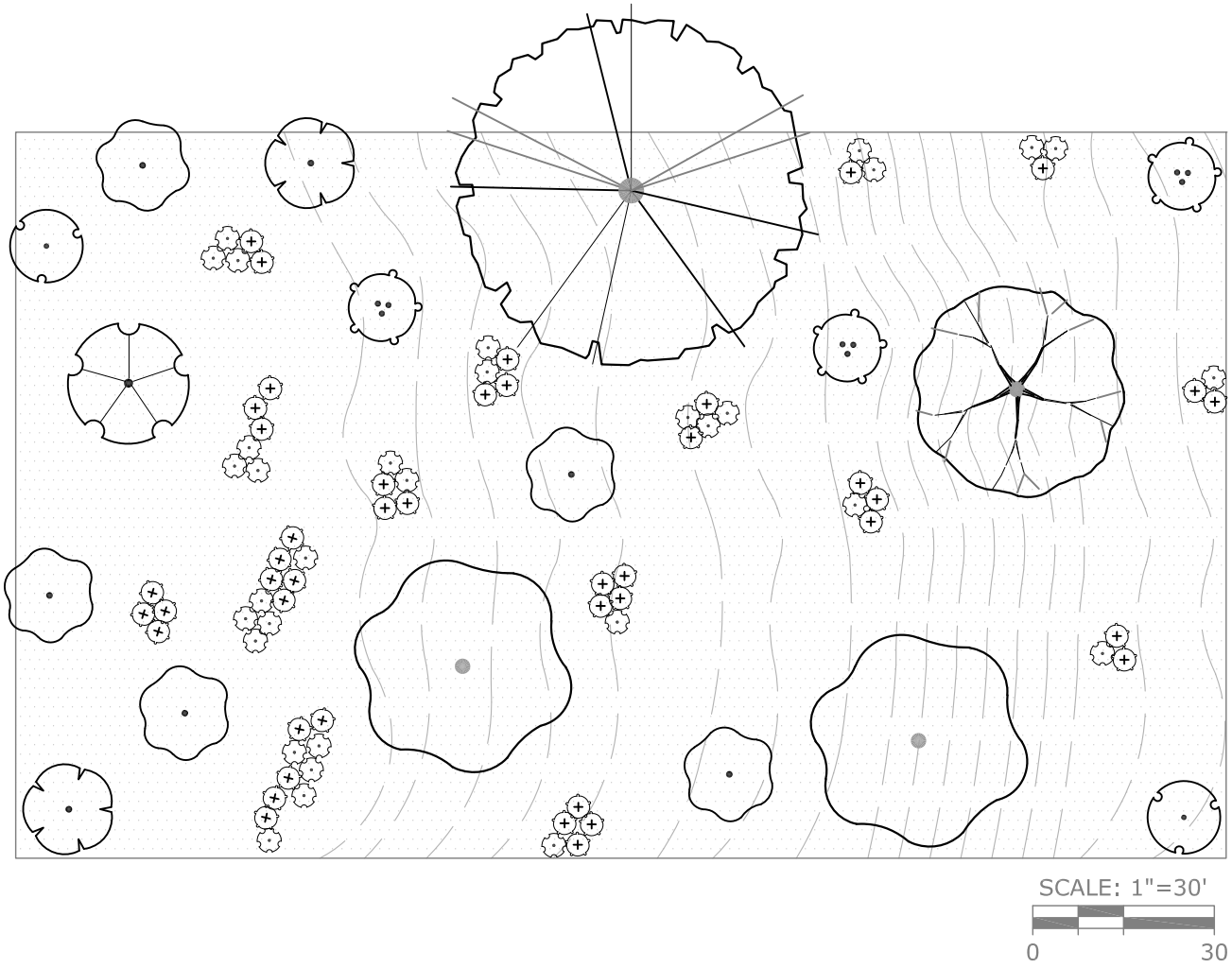


Generally, healthy oaks do not need fertilization, and it is not a good idea to fertilize over-stressed and weakened trees. Fertilization can help maintain oak health if done once a year. Fertilizers created specifically for use with oak trees can promote overall tree health by providing nutrients that encourage root development and disease resistance. (5).

DIAGRAM: Basic Mulching Guidelines for Newly Planted Seedlings and Existing Mature Oaks

D2 Native Oak Shaded Fuel Break

Construction Details and Additional Resources



PLANT SCHEDULE

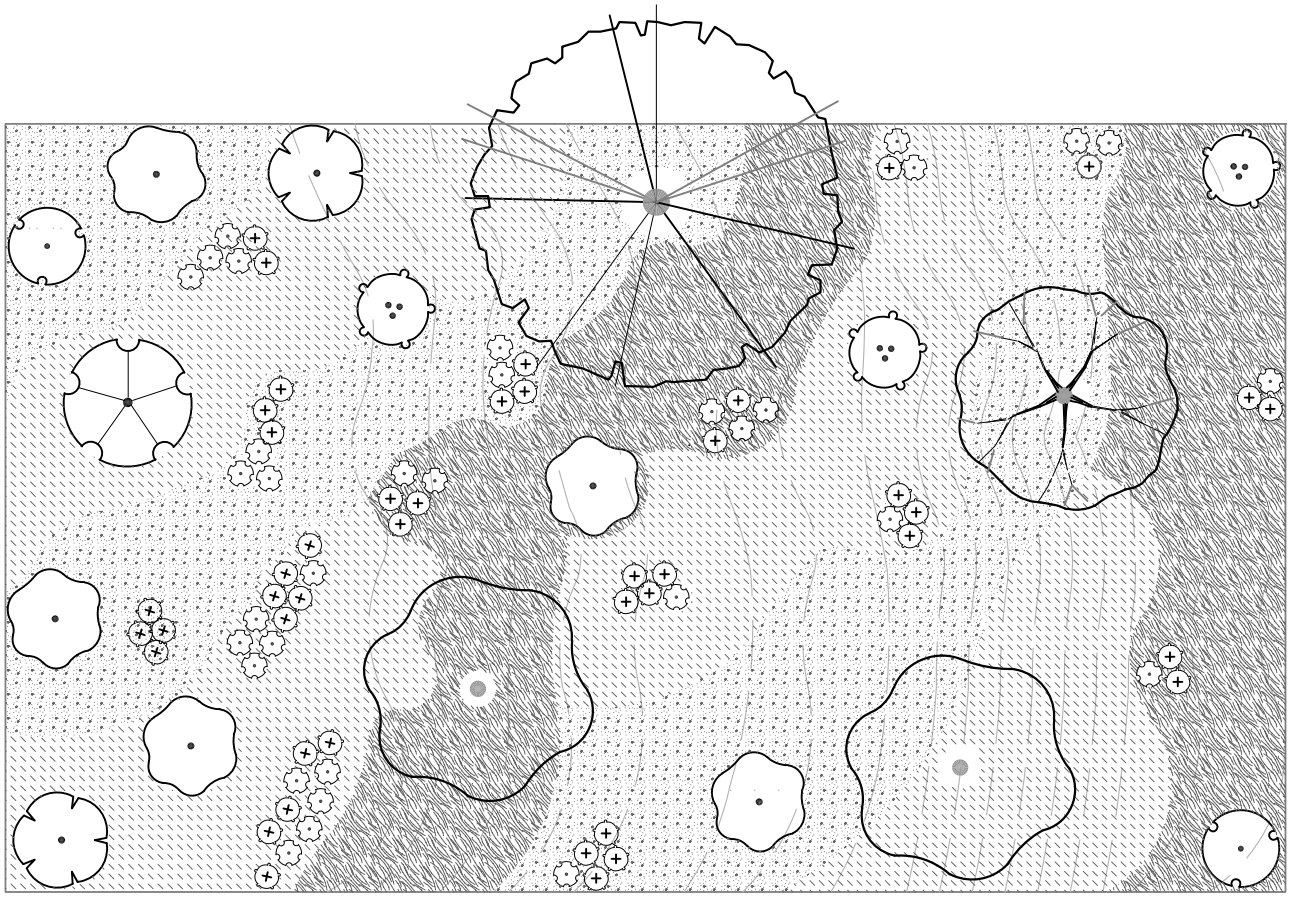
TREES	COMMON / BOTANICAL NAME
	Coast Live Oak Quercus agrifolia
	Engelmann Oak Quercus engelmannii
	Island Oak Quercus tomentella

SHRUBS	COMMON / BOTANICAL NAME
	Carmel Ceanothus Ceanothus griseus
	Bush Poppy Dendromecon rigida
	California Encelia Encelia californica
	Toyon Heteromeles arbutifolia
	Laurel Sumac Malosma laurina
	California Scrub Oak Quercus berberidifolia
	Lemonade Berry Rhus integrifolia

1 NATIVE OAK SHADED FUEL BREAK PLANTING PLAN WITHOUT GRASSES

D3 Native Oak Shaded Fuel Break

Construction Details and Additional Resources



PLANT SCHEDULE

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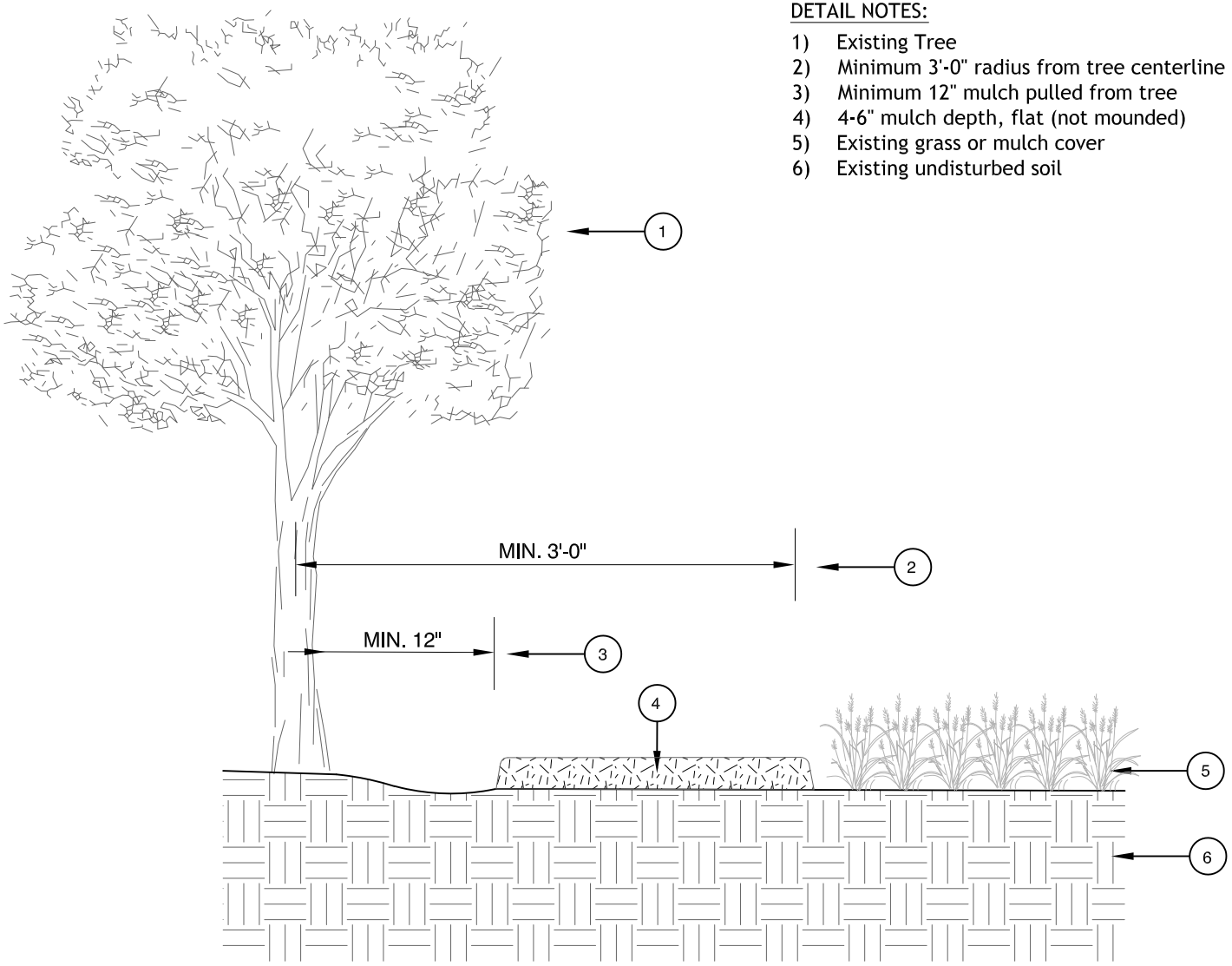
	Bush Poppy Dendromecon rigida
	California Encelia Encelia californica
	Toyon Heteromeles arbutifolia
	Laurel Sumac Malosma laurina
	California Scrub Oak Quercus berberidifolia
	Lemonade Berry Rhus integrifolia

GROUND COVERS	COMMON / BOTANICAL NAME
	Santa Barbara Sedge Carex barbarae
	California Fescue Festuca californica
	Red Fescue Festuca rubra

2 NATIVE OAK SHADED FUEL BREAK PLANTING PLAN WITH GRASSES

D4 Native Oak Shaded Fuel Break

Construction Details and Additional Resources



DETAIL NOTES:

1) Existing Tree
2) Minimum 3'-0" radius from tree centerline
3) Minimum 12" mulch pulled from tree
4) 4-6" mulch depth, flat (not mounded)
5) Existing grass or mulch cover
6) Existing undisturbed soil

3 TREE MULCHING

(N.T.S)

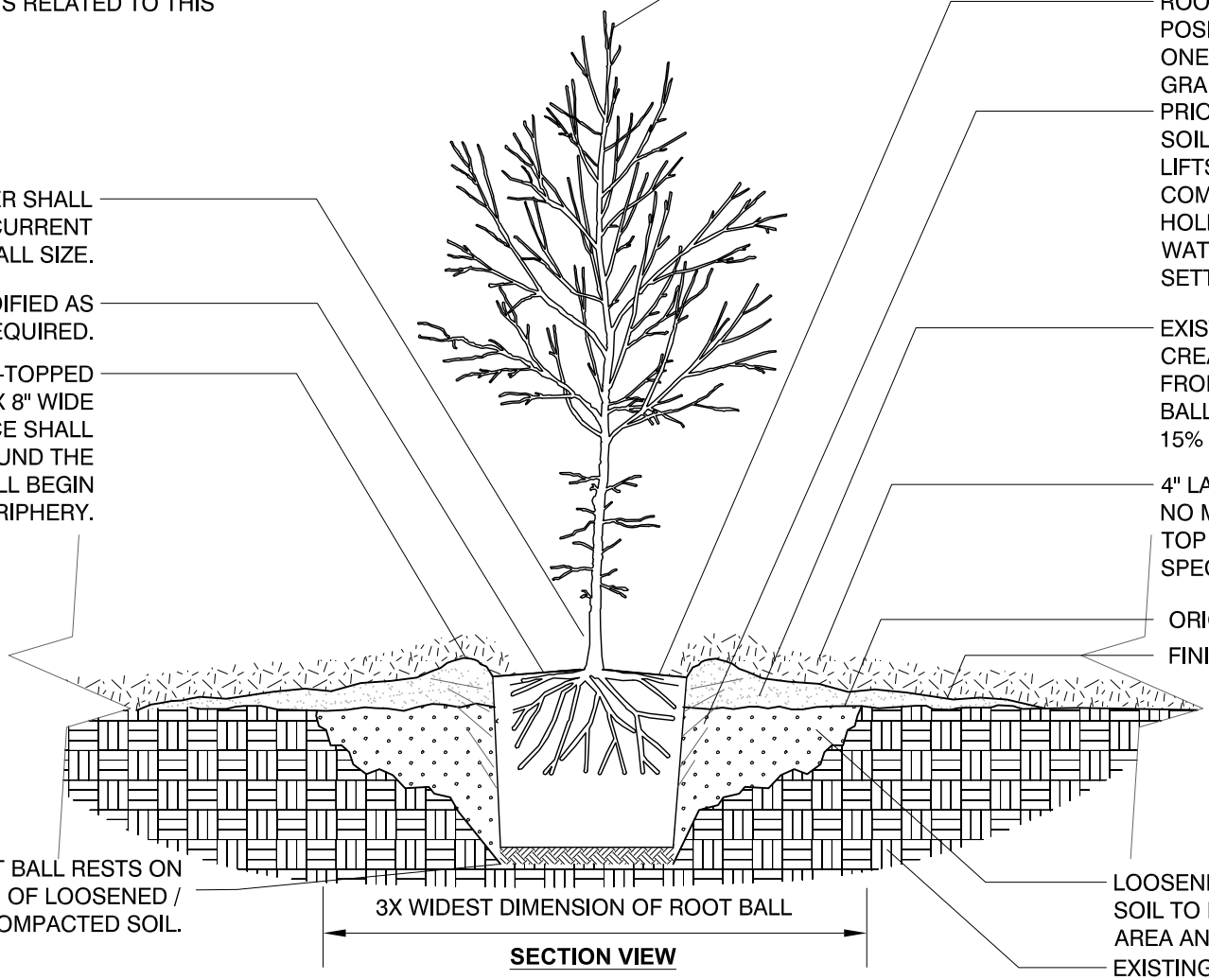
D5

Native Oak Shaded Fuel Break

Construction Details and Additional Resources

NOTES:
1- TREES SHALL BE OF QUALITY PRESCRIBED IN CROWN OBSERVATIONS AND ROOT OBSERVATIONS DETAILS AND SPECIFICATIONS.

2- SEE SPECIFICATIONS FOR FURTHER REQUIREMENTS RELATED TO THIS DETAIL.



SECTION VIEW

4

TREE PLANTING

1/2" = 1'-0"

D6

Native Oak Shaded Fuel Break

Construction Details and Additional Resources

NOTES:
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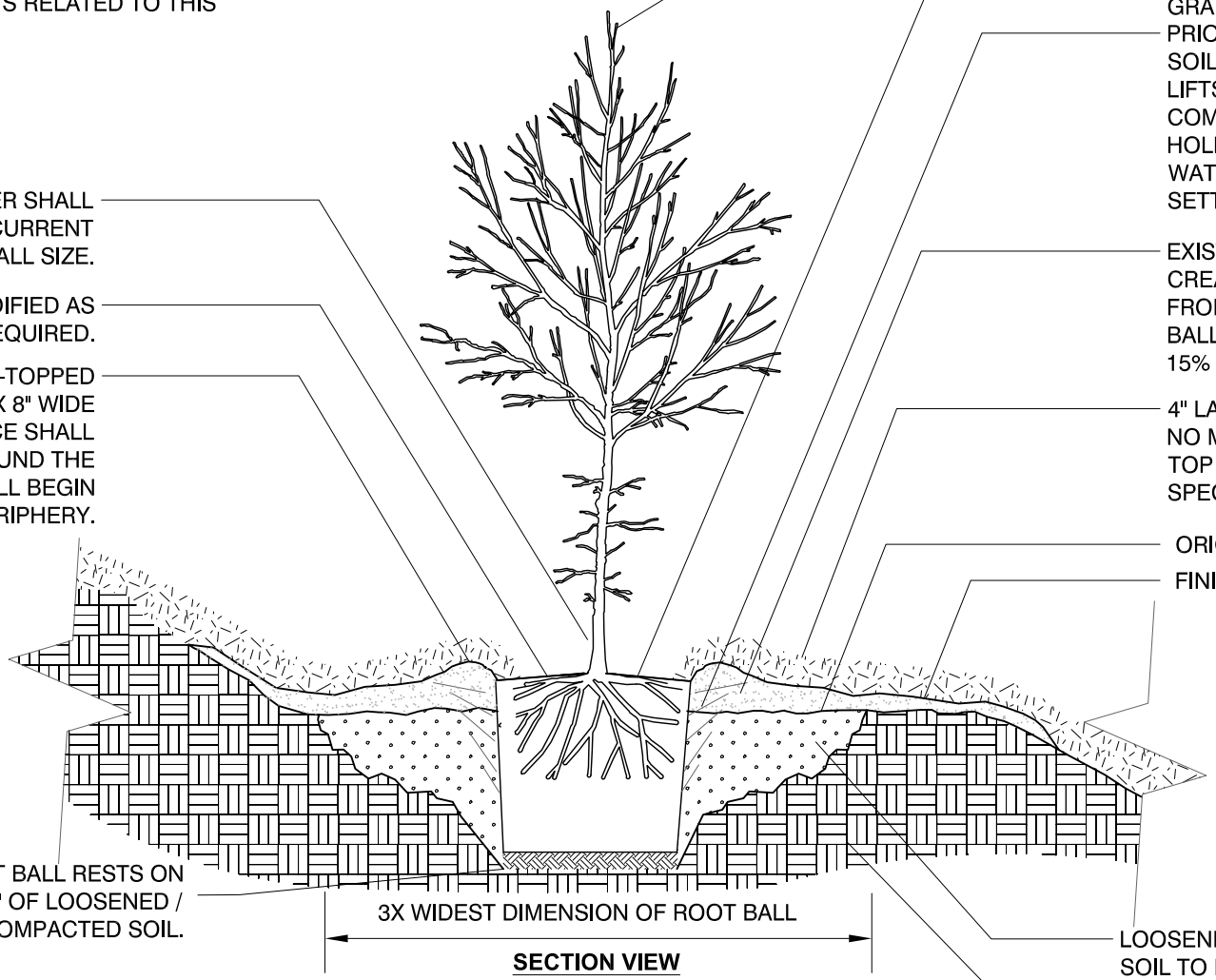


SECTION VIEW

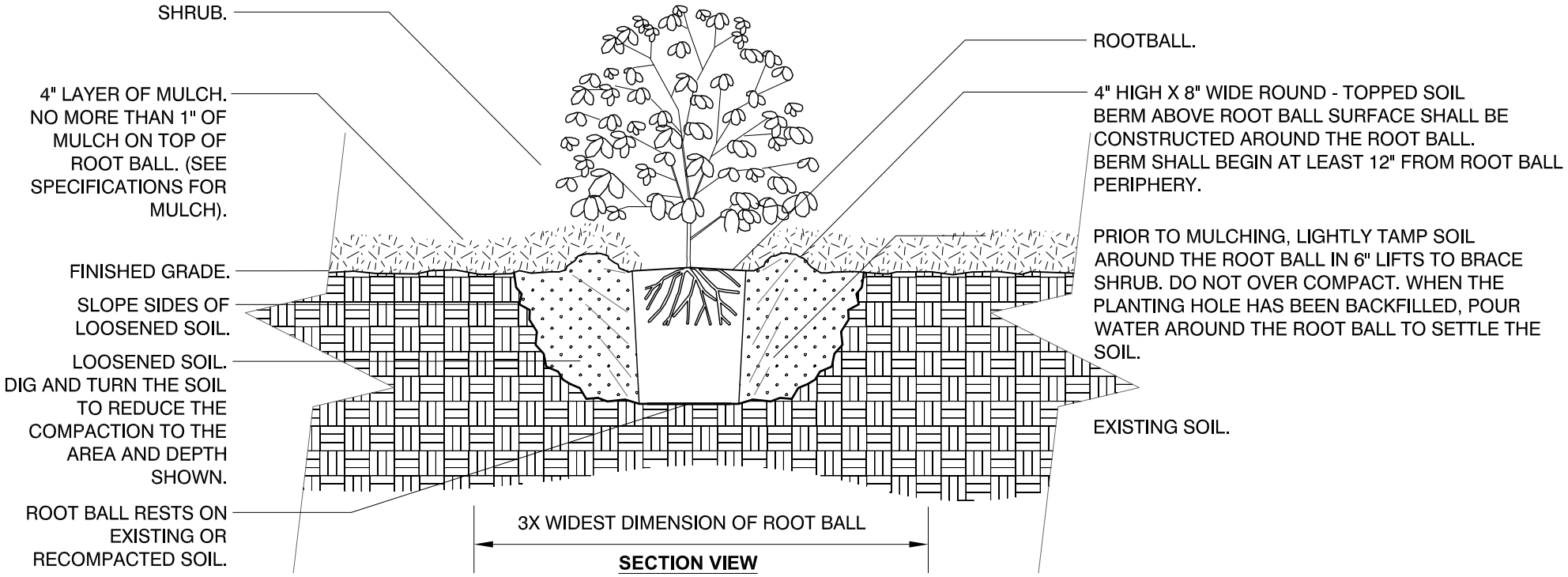
5

TREE PLANTING ON SLOPE

1/2" = 1'-0"

D7 Native Oak Shaded Fuel Break

Construction Details and Additional Resources



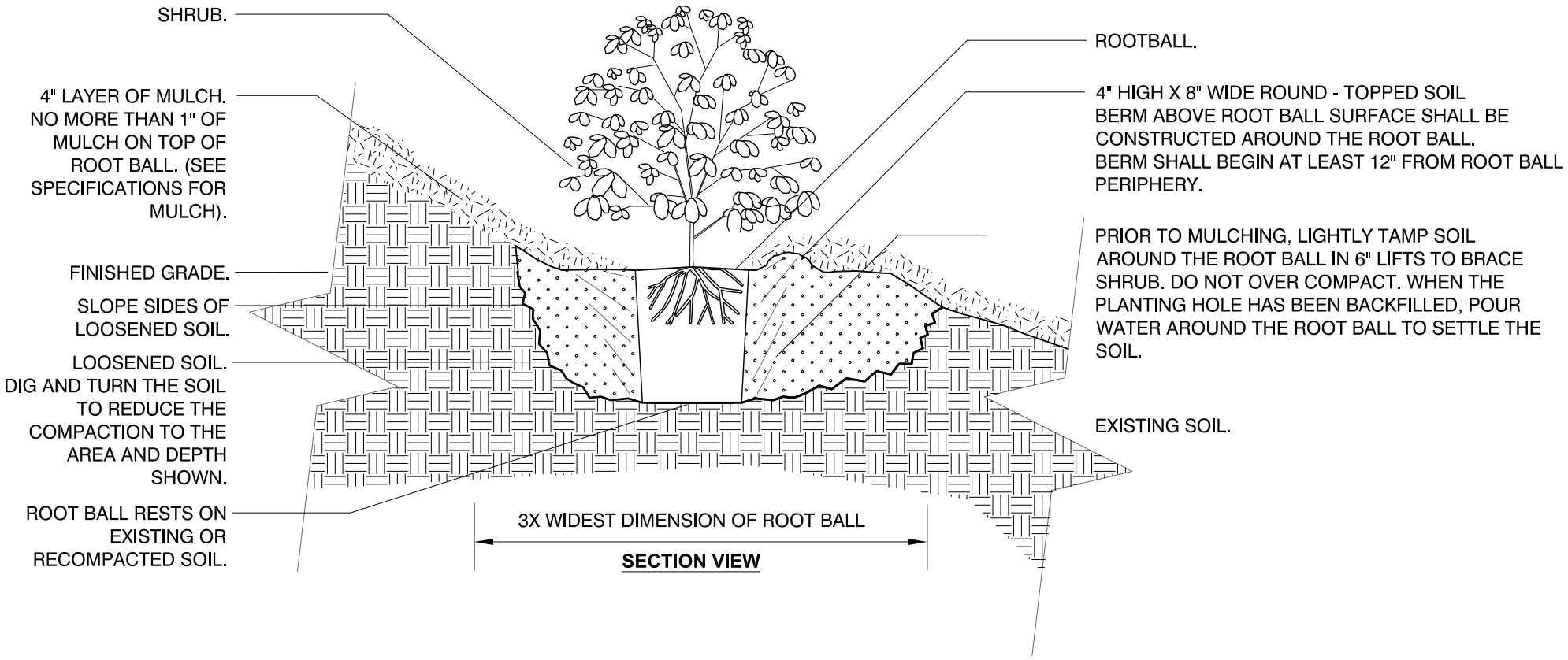
6 SHRUB PLANTING

3/4" = 1'-0"

DETAIL-FILE

D8 Native Oak Shaded Fuel Break

Construction Details and Additional Resources



7 SHRUB PLANTING ON SLOPE (5%)

3/4" = 1'-0"

DETAIL-FILE

Native Oak Shaded Fuel Break

Construction Details and Additional Resources

Works Cited - Native Oak Shaded Fuel Break

1. Nader, G., Henkin, Z., Smith, E., Ingram, R., & Narvaez, N. (2007). Planned herbivory in the management of wildfire fuels. Rangelands, 29(5), 18–24. https://doi.org/10.2111/1551-501X(2007)29[18:PHITMO]2.0.CO;2
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3. The Combustibility of Landscape mulches - fire safe council of san ... Fire Safe San Diego County. (n.d.). http://firesafesdcounty.org/wp-content/uploads/2017/05/The-Combustibility-of-Landscape-Mulches.pdf
4. Hagen, B. W. (1991, March 4). Keeping Native California Oaks Happy. Retrieved June 21, 2023,. https://ucanr.edu/sites/gsobinfo/files/58914.pdf
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