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October. 5, 2021

Residential Wildfire Mitigation Plan

Landowners: Hodge & Debora Kerr
Property: 59770 Scale House Road, Bend, OR 97702
Map/Tax Lot: 1812310000600
6.7 Acres

Note: This report is intended to provide an update to an original Residential Wildfire Mitigation Plan, dated April, 2014. A copy of that plan is attached and is included with this report by reference. The recommendations provided in the 2014 Plan remain valid.

Current Status

1. A recently completed cooperative under-burn project with the High Desert Museum has effectively removed all of the brush understory on the parcel. This treatment has effectively reduced a major fire fuels component on the parcel.
2. A secondary effect of this under-burn will result in some limited mortality in some of the smaller Ponderosa pine in the residual stand.
3. The post under-burn pine stand remains partially overstocked to optimize overall forest health. The site pine growing capacity is limited by marginal soil depth/moisture retention capacity. See treatment recommendations below.
4. Updated, more descriptive defensible space treatment approaches are attached in support of meeting the requirements of DCC 18.40.070 B (Firebreaks).

Singletree Enterprises provides a variety of consulting services for application to wildland fire, forest resources management and community preparedness planning. John Jackson retired from the Oregon Department of Forestry as a Unit Forester after 28 years of progressive fire management and natural resource related assignments. At the time of his retirement, he was qualified as an Incident Commander (ICT2), Operations Section Chief (OSC1) and Agency Representative. Previous qualifications included Fire Behavior Analyst and Safety Officer and a variety of operations-related positions. John graduated from Oregon State University with B.S. degrees in Biological Science ('69) and Zoology ('70).

Please note-There is no guarantee that these recommended mitigation actions will prevent a fire from occurring. They are intended to reduce fire behavior and intensity

Post Under-burn Forest Management/Wild Fire Mitigation

1. While the above-referenced under-burn provided mitigation of the brush fuel loading, it also provided a "thinning effect" on small pine thickets and those trees with lower branches. Within the next year or two, some mortality will occur in these areas. This provides a moisture conservation benefit for the residual stand. It also provides an opportunity for homeowners to identify and remove the dead/dying trees in further support of wildfire intensity mitigation.
2. Monitoring Brush Regrowth: After either an under-burn or brush mowing, the brush regrowth will occur. A variety of factors such as moisture availability and the amount of sunlight hitting the forest floor will affect the rate of growth. Regrowth should be assessed on a not less than 5-year interval with a 10-year documentation. If growth reaches one foot in height in significant patches, retreatment on such areas should occur.
3. As referenced above in item #1, due to the limited pine growth capacity of the soils on this parcel, thinning of over-dense stands should be considered. This reduces moisture competition, allows the residual stand to become more vigorous. It also helps keep any fire ignition that may occur to stay on the ground, with a much lower resistance to control.

DCC 18.40.070 B

A "Defensible Space" two page document is attached for review. It provides a more descriptive set of actions while complying with the fire break requirements.

Summary of Oregon Residential Specialty Code R327.4-Wildfire Hazard Mitigation

This 7-page summary is for information only and is outside of my expertise. It does however have some good information on building design and materials.

Please feel free to contact me if additional questions develop.

John Jackson

Attachments:

- Previous "Residential wildfire Mitigation Plan-2014" for this parcel.
- "Defensible Space", 2 pages.
- "Summary of Oregon Residential Specialty Code R327.4-Wildfire Hazard Mitigation", 7 pages.

Residential Wildfire Mitigation Plan

6.7 Acres
T. 18 S. R. 12 E. Section 31
TL 99

Landowners:
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61056 Snowberry Place
Bend, OR 97702

Prepared by

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Residential Wildfire Mitigation Plan

At the request of the landowners, this wildfire mitigation plan was developed for a planned residence on the above-referenced 6.7 acre parcel. In addition to recommendations for vegetation management and access, this plan will address fire-wise selections of building design and building materials.

These recommendations relate directly to the provisions of DCC 18.40.060 through 18.40.080 and those of the Oregon Forestland-Urban Interface Fire Protection Act of 1997. Please refer to these code requirements for specific specifications.

Access and Site Design

The location of this parcel provides an opportunity for effective wildland fire mitigation using existing roads on the east and west boundaries. Scale House Road on the west side of the parcel is paved and provides all weather access to the subject parcel as well as the adjoining residence to the south. A looped residential driveway design with both ends connecting to Scale House Road is recommended. Provide for adequate maneuvering space/turn-around for fire apparatus adjacent to the residence. The driveway should be of adequate width and engineering specifications to support large, heavy fire apparatus. Driveway intersections with Scale House Road should be designed with adequate turn radius and width to allow for smooth turns to either the north or south by fire equipment.

An old logging railroad grade traverses in a north-south direction along the east side of this parcel. This old route continues across the adjoining parcel to the south and should be considered as an alternative access route for both emergency egress from the residence and for fire apparatus access with connection to the primary driveway. This grade is of adequate design to support emergency fire equipment. It should be kept clear of vegetation and blow-down from the adjacent forest stand. Any deterioration of the running surface should be repaired to ensure all weather use.

The design of the access road system should emphasize connecting loops while avoiding any dead-end routes with limited turn-around capacity.

Vegetation Management

The provisions of both DCC 18.040.070 and the Oregon Department of Forestry's *Oregon Forestland-Urban Interface Fire Protection Act of 1997 ("Senate Bill 360")* apply to this parcel. Generally, the standards result in similar results on the ground, but both should be reviewed and blended for compliance. The provisions of SB 360 are addressed in the "Landowners Guide" available from the ODF website (http://www.oregon.gov/odf/pages/fire/sb360/sb360.aspx). Alternatively, copies are available from any of the local Department of Forestry offices.

Defensible Space around Structures

The threat to the structures from wildfire is primarily conveyed through two mechanisms:

- Direct impingement of heat or flame
- Spotting from firebrands carried from an upwind fire, from up to half-mile away

The effects of direct flame or high intensity heat are mitigated by establishment of defensible space around the residence. The above-referenced documents are intended to guide homeowners in accomplishing this objective by creation of a shaded fuel break around the structures with adequate treatment of ladder fuels to reduce fire behavior.

The following are of particular significance for this residence. Please see the ODF Landowner's Guide for illustrations and "how-to" guidance.

- Progressively reduce the flammable vegetation available to carry fire from the surrounding forest fuels to the buildings. The "primary" fuel break should contain substantially less vegetation allowing for more vegetation further away from residences. The objective is to reduce vegetation continuity both horizontally and vertically. The intent of discontinuity of the vegetation is to reduce the "availability" of adequate fuels to carry fire from the wildland areas to the structure.

- The "shaded fuel break" provides the benefit of cooler ground and fuel temperatures (reduces the ignition potential from firebrands), and can help intercept wind-borne firebrands before they reach the structure.

- Annual maintenance ("Spring Clean-up") prior to each summer fire season is critical: remove accumulated pine needles from roof and gutters; trim or remove annual growth of weeds, grass and wind-blown debris; remove any dead tree limbs; remove dead vegetation from shrub/brush species (e.g. Bitterbrush).

Vegetation Management around Access Routes

Effectiveness of access routes is greatly reduced by vegetation accumulations on either side of them. A well-maintained access route can often still use used even if a fire is burning adjacent to it. This is because lower levels of available fuels results in more modest fire behavior, in turn resulting in less heat being projected to passing vehicles.

Recommendations:

- Reduce the volume of more flammable vegetation for 30 feet along the east side of Scale House Road. Remove dead bitterbrush. Retain clumps of younger, more vigorous species. Remove blow-down, break-up ladder fuel situations and mow any annual grasses from the previous summer. These actions can help reduce

spread rates of any road-side related ignitions as well as limiting any spreading from parcel to the west of Scale House Road.

- Conduct the same types of treatments on both east and west sides of the old railroad grade on the east perimeter of the parcel. As before, these treatments will enhance usability of this road for fire apparatus adding to fire fighter safety and expand its effectiveness as a fire break.

- The forest management activity already completed by the adjoining landowner to the north of the parcel will provide enhanced fire risk mitigation to any fire spreading from the northwest (prevailing winds). Similar forest management work (perhaps to lesser degree based on landowner objectives) on the Kerr parcel would result in improved forest health and reduced fire intensity potential. Remove dead and thin overstocked/suppressed trees.

- Consider creating a route running east-west just south of the north property boundary. This does not require actually creating a "road", but rather a route that would allow passage of a pick-up sized wildland fire vehicle to enhance initial response access and landowner access in support of forest management activities.

- Establish and maintain fully functional access/connection between the railroad grade and Scale House Road via the driveway on the adjoining parcel to the south for emergency use.

- Establish a connection between the loop driveway to the residence and the old railroad grade on the east side of the parcel.

- Consider an emergency use agreement/gate on the railroad grade road with the landowner to the north. This could be kept locked as needed to restrict inappropriate unauthorized use.

Forest Management

The landowners have indicated an interest in maintaining wildlife habitat as well as visual and sound buffering around their residence. These values can be retained while still removing some of competition stress within the pine stand on the property. Wildlife tree clumps interspaced with openings will enhance more heterogeneity in the forest structure. An overall reduction in anticipated in fire intensity, flame length, etc can also be expected. Reduced inter-tree competition will also allow larger dominant individual trees to be more vigorous and resilient to insect and disease threats.

The Oregon Department of Forestry website links to http://mylandplan.org/ which is a web-based tool for developing forest planning ideas. It also provides links to a substantial number of references.

Fire-Wise Building Design and Materials

Choice of building design and materials can have a large impact on the survivability of a residence in areas dominated by wildland fuels. The Bend Fire Department has information available on this issue. In addition Fire Wise (firewise.org) has information on their website that specifically addresses design and materials (http://www.firewise.org/~/media/Firewise/Files/Pdfs/Booklets%20and%20Brochures/BookletGuidetoFirewiseLandscapeandConstruction.pdf).

In Central Oregon, the items listed below have particular significance:

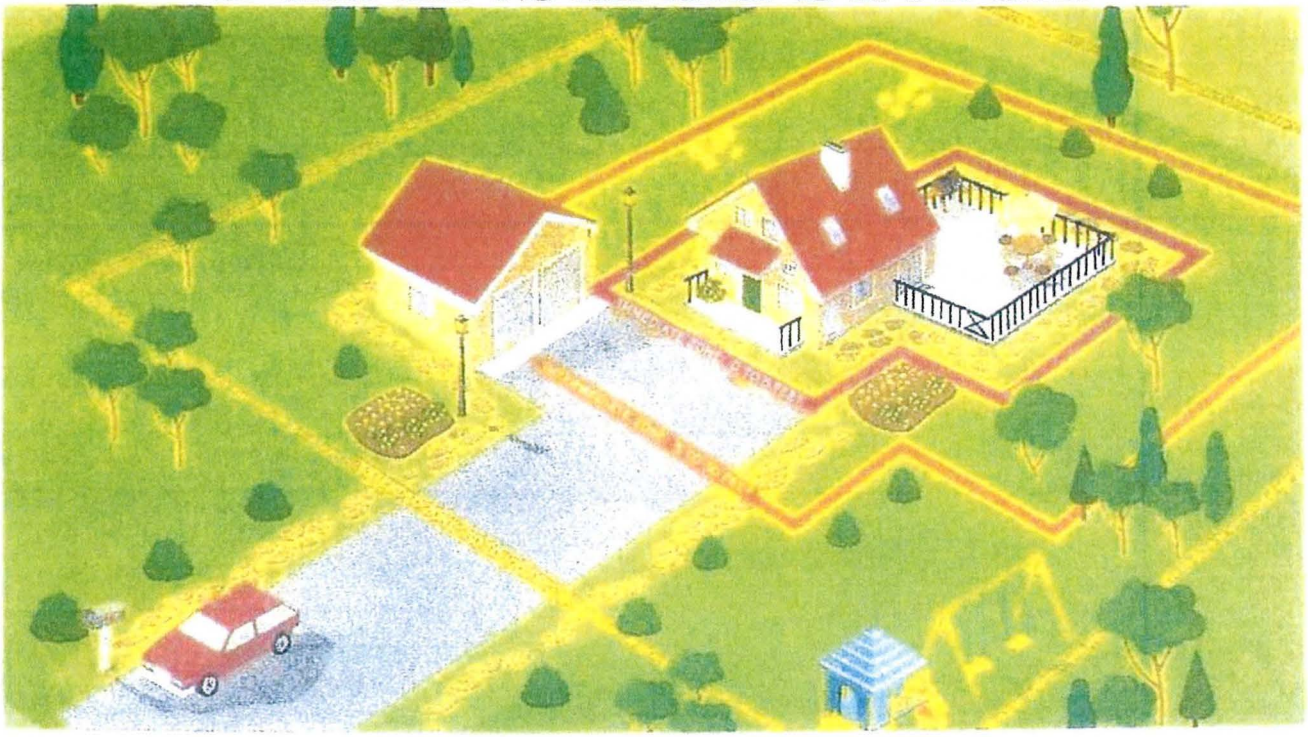
- Use non-flammable materials to establish patio-style outdoor living space. Avoid the use of slightly elevated decks that increase the potential for accumulation of wind-blown flammable debris and firebrands. Screen the openings under any existing decks that do not allow adequate space for routine clean-out.

- Install a fire-resistant roof. If gutters are used, they should be cleaned out at least once each year during spring clean-up. Be sure that any needle accumulation on the roof is removed prior to fire season.

- Fire resistant siding in combination with defensible space landscaping adds substantially to building resilience to fire.

- Avoid exterior design that creates crevices that may accumulate firebrands. Wind blown snow flakes around the building will help illustrate where wind-blown firebrands are apt to accumulate.

DEFENSIBLE SPACE



Wildfire threatens people and homes across the U.S. When homes are built in and around forests, they become part of the wildland-urban interface (WUI).

Research around home destruction vs. home survival in wildfires point to embers and small flames as the main way that the majority of homes ignite in wildfires. Embers are burning pieces of airborne wood and/or vegetation that can be carried more than a mile through the wind can cause spot fires and ignite homes, debris, and other objects.

Experiments, models and post-fire studies have shown homes ignite due to the condition of the home and everything around it, up to 200' from the foundation. By taking care of the 200' around your home, you are putting in what's called defensible space.

Your defensible space can be broken into three (3) main zones: the Immediate, Intermediate, and Extended zone.

Immediate zone
The home and the area 0-5' from the furthest attached exterior point of the home; defined as a non-combustible area. Science tells us this is the most important zone to take immediate action on as it is the most vulnerable to embers. START WITH THE HOUSE ITSELF then move into the landscaping section of the Immediate Zone.

Intermediate zone
5-30' from the furthest exterior point of the home. Landscaping/hardscaping- employing careful landscaping or creating breaks that can help influence and decrease fire behavior

Extended zone
30-100 feet, out to 200 feet. Landscaping – the goal here is not to eliminate fire but to interrupt fire's path and keep flames smaller and on the ground.

Correct defensible space can give your home a 85% chance of survival during a wildfire situation.

DEFENSIBLE SPACE

Immediate zone

- Clean roofs and gutters of dead leaves, debris and pine needles that could catch embers.
- Replace or repair any loose or missing shingles or roof tiles to prevent ember penetration.
- Clean debris from exterior vents & reduce embers that could pass through vents in the eaves by installing 1/8 inch metal mesh screening.
- Repair or replace damaged or loose window screens and any broken windows Screen or box-in areas below patios and decks with wire mesh to prevent debris and combustible materials from accumulating.
- Move any flammable material away from wall exteriors - mulch, flammable plants, leaves and needles, firewood piles - anything that can burn. Remove anything stored underneath decks or porches.

Intermediate zone

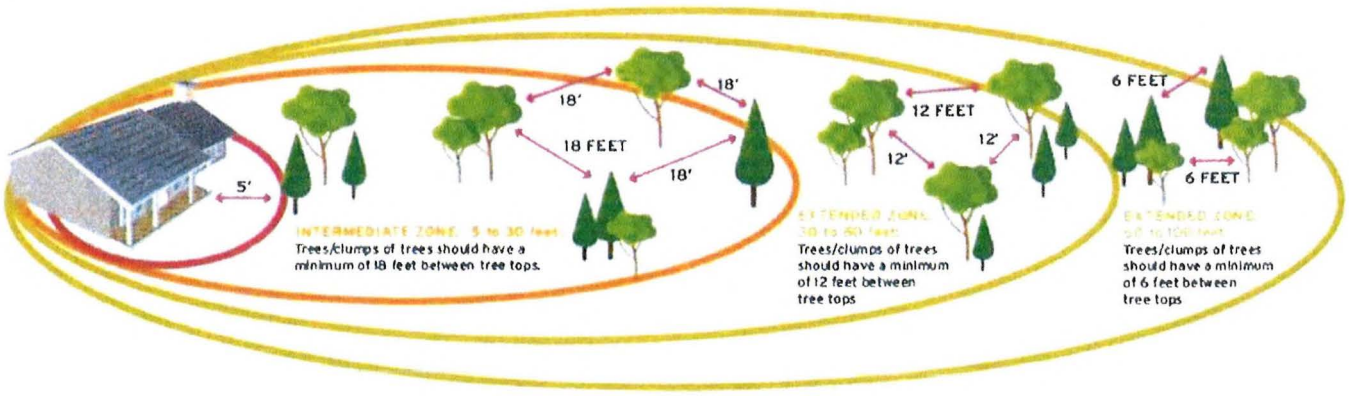
- Clear vegetation from under large stationary propane tanks.
- Create fuel breaks with driveways, walkways/paths, patios, and decks.
- Keep lawns and native grasses mowed to a height of four inches.
- Remove ladder fuels (vegetation under trees) so a surface fire cannot reach the crowns. Prune trees up to six to ten feet from the ground; for shorter trees do not exceed 1/3 of the overall tree height.
- Space trees to have a minimum of eighteen feet between crowns with the distance increasing with the percentage of slope.
- Tree placement should be planned to ensure the mature canopy is no closer than ten feet to the edge of the structure.
- Tree and shrubs in this zone should be limited to small clusters of a few each to break up the continuity of the vegetation across the landscape.

Extended zone

- Dispose of heavy accumulations of ground litter/debris.
- Remove dead plant and tree material.
- Remove small conifers growing between mature trees.
- Remove vegetation adjacent to storage sheds or other outbuildings within this area.
- Trees 30 to 60 feet from the home should have at least 12 feet between canopy tops.
- Trees 60 to 100 feet from the home should have at least 6 feet between the canopy tops.

Ensure your roof is made of non-flammable materials; asphalt shingles, metal or tile.

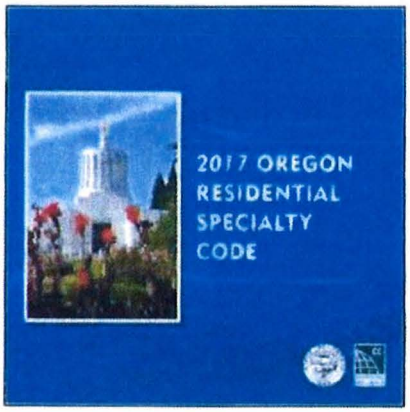
TREE SPACING



Summary of Oregon Residential Specialty Code R327.4-Wildfire Hazard Mitigation

1) Introduction

In 2018, the Oregon Building Codes Division (BCD) engaged stakeholders from the fire service, local government, and homebuilders to develop wildfire mitigation code standards that have a consistent and predictable application BCD amended the Oregon Residential Specialty Code (ORSC) section R327 (Wildfire Hazard Mitigation) in January 2019 and made it available for local adoption.



2) Scope

If adopted by a local jurisdiction, the new provisions of ORSC R327.4 shall apply to new dwellings and their accessory structures, with some exceptions, located in a wildfire hazard zone on a *qualifying lot of record*.

What is a qualifying lot of record?

R327.4.1 requires qualifying lots of record to meet all of the following:

1. Be located in a wildfire hazard zone as identified using Oregon Department of Forestry (ODF) criteria (OAR 629-044-0200 through OAR 629-044-0260).
2. The local municipality shall determine if qualifying lots of record consist of individual lots or lots that must be part of a development that contain a minimum number of lots.
3. The local municipality shall determine whether a lot of record is either located within or outside of a wildfire hazard zone. Notification of the finding shall be provided in conjunction with a land use approval.
4. Lots created prior to the effective date of the local ordinance are exempt from the requirements for a period of 3 years from the date of the land use approval.
5. Requirements for lots created after the effective date of the local ordinance shall be valid for 3 years. After 3 years, the lot shall be re-evaluated under the current provisions of the adopting ordinance prior to issuing a building permit.

Exceptions: Dwellings and accessory structures constructed in a subdivision, do not need to comply with R327.4 when at least 50% of the lots have existing dwellings that were not constructed in accordance with R327.4.

The municipality may waive the requirements of R327.4 for any lot, property or dwelling, or the remodel, replacement or reconstruction of a dwelling within the jurisdiction.

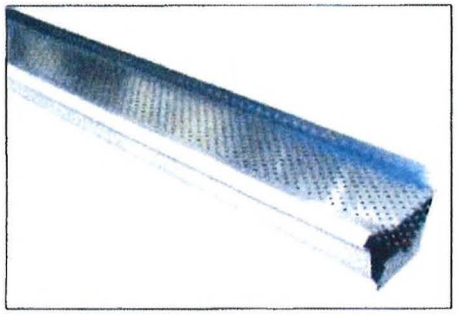
The municipality must include a process for resolving of disputes related to the applicability of R327.4.

3) Overview of code requirements

Adoption of ORSC section R327.4 will provide additional wildfire hazard mitigation provisions that affect the following construction materials and/or methods of construction:

(A) Roofing/Gutters R327.4.3

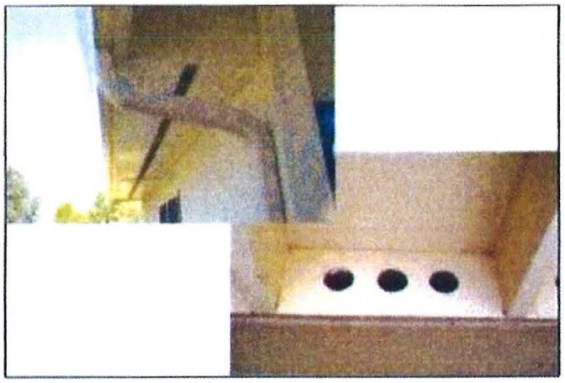
- Roofing shall be asphalt shingles, slate shingles, metal roofing, tile, clay, or concrete shingles or other approved roofing which is equivalent to a minimum Class B rated roof assembly.
  WOOD SHINGLE AND SHAKE ROOFS ARE NOT PERMITTED.
- Roof gutters, when required, shall be constructed of non-combustible materials and be provided with a means to prevent accumulation of leaves and debris in the gutter.

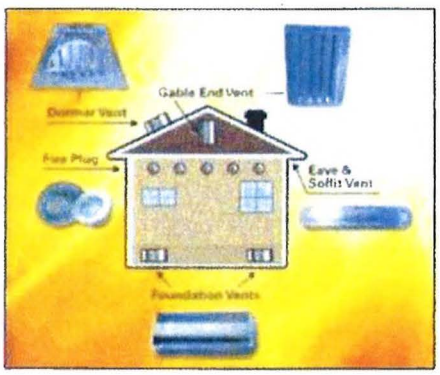


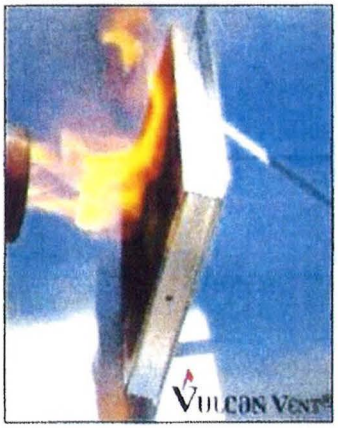
(B) Ventilation R327.4.4

- Openings shall be covered with non-combustible corrosion resistant metal wire mesh (openings 1/16"-1/8") or approved alternate.
- Ventilation openings shall not be installed on the underside of eaves, soffits, or cornices.

Exceptions: Special vents manufactured to resist intrusion of flame and burning embers **OR** vent openings located at least 12' above grade or surface below.



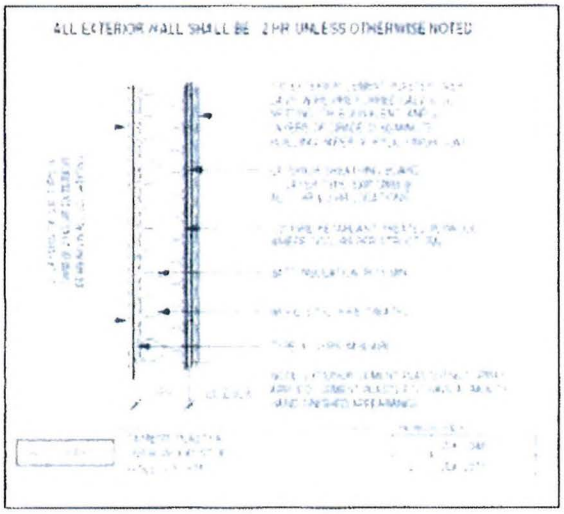


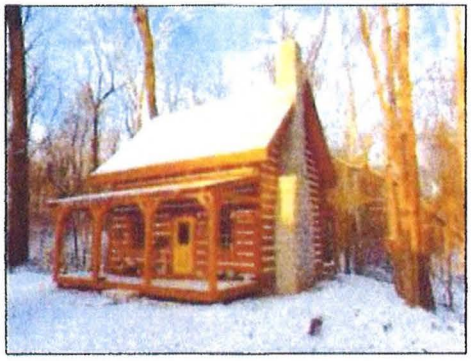


(C) Exterior Walls R327.4.5

- Exterior wall coverings shall comply with one of the following requirements:
  - Non-combustible material
  - Ignition-resistant material
  - Heavy timber assembly
  - Log wall construction assembly
  - Wall assemblies tested in accordance with ASTM E2707 and ORSC section R327.4.5.2

Exceptions: Install one layer of 5/8" Type X exterior gypsum sheathing behind the exterior wall covering on the exterior side of the framing **OR** install the exterior portion of a 1-hour fire resistive exterior wall assembly.





(D) Overhanging projections (e.g. exterior balconies, carports, decks, patio covers porch ceilings, unenclosed roofs and floors, overhanging buildings, and similar projections) R327.4.6

1. Enclosed roof eaves, soffits, and cornices shall be protected by one of the following:
   - Non-combustible material
   - Ignition-resistant material
   - One layer of 5/8" Type X exterior gypsum sheathing applied behind an exterior covering on the underside of the rafter/truss tails or soffit
   - Exterior portion of a 1-hour fire resistive exterior wall assembly applied to the underside of the rafter/truss tails or soffit
   - Assemblies tested in accordance with ASTM E2957 and section R327.4.6.5

   Exception: Protection not required when all framing members are at least 12' above grade.

2. Exterior patio and porch ceilings
   - Exposed underside of exterior patio and porch ceilings greater than 200 sq. ft. in area and less than 12' above grade shall be protected by one of the methods described in (D)(1) above.

3. Floor projections
   - The exposed underside of cantilevered floor projections less than 12' above grade or surface below shall be protected by one of the methods described in (D)(1) above.

4. Underfloor protection
   - The underfloor area of elevated structures shall be enclosed to grade OR the underside of the exposed underfloor shall be protected by one of the methods described in (D)(1) above.

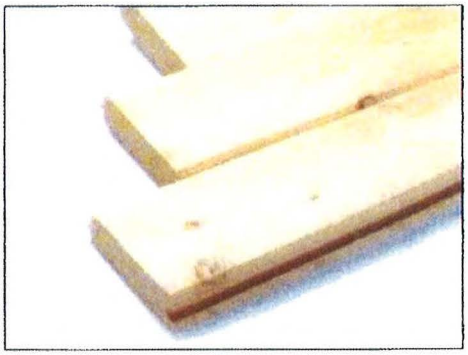
   Exception: Heavy timber columns and beams do not require protection.

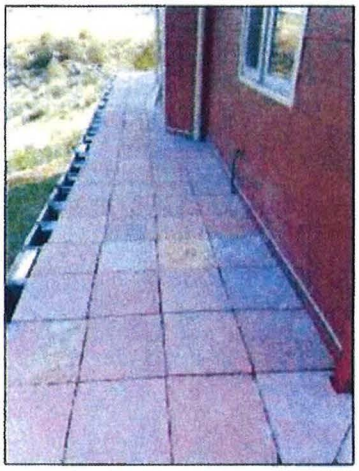
(F) Walking surfaces R327.4.7

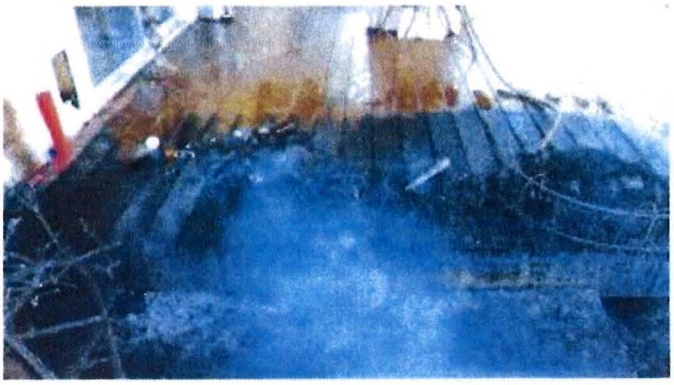
1. Deck, porch, and balcony walking surfaces located greater than 30" and less than 12' above grade or surface below shall be constructed with one of the materials listed below.

   - Exterior fire retardant treated wood
   - Noncombustible material
   - Materials that comply with the performance requirements of specific nationally recognized testing standards. See code section for details.

   Exception: Decks, porches, and balconies not greater than 200 sq. ft. where the walking surface is constructed of nominal 2-inch lumber.

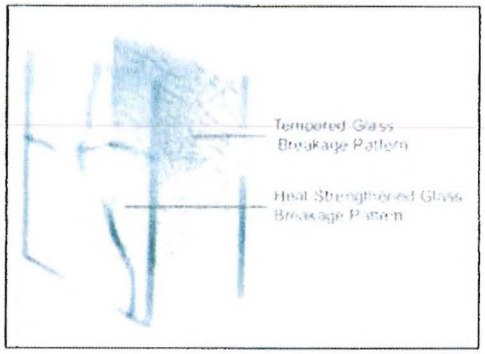






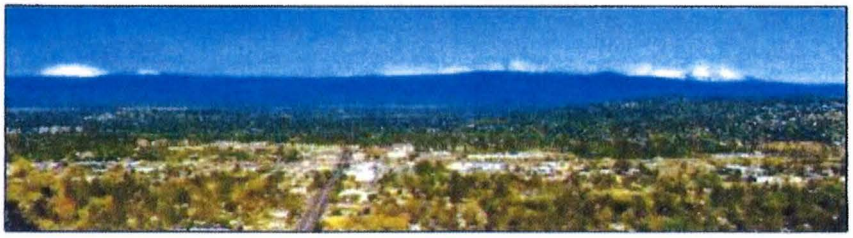
(F) Glazing R327.4.8

- Exterior windows, windows within exterior doors, and skylights shall be tempered glass, multilayered glazed panels, glass block, or have a 20 minute fire rating.



4) Housing cost impact

Oregon Building Codes Division estimates the increased provisions in section R327.4 will add approximately $2,500-$3,000 to the existing cost of a typical 1,200 square foot single family home.[1]



[1] See BCD's Housing Cost Impact Statement – 12/18/19 (Available at www.deschutes.org/wildfirecommittee)