AGENDA COVER MEMO

Memorandum Date:	May 24, 2019
Agenda Date:	June 11, 2019
TO:	Board of County Commissioners
DEPARTMENT:	Public Works / Land Management Division
PRESENTED BY:	Rachel Serslev, Planner
AGENDA ITEM TITLE:	DISCUSSION/ Floodplain Regulations in Lane Code and Potential Floodplain Code Updates.

I. AGENDA ITEM SUMMARY

The purpose of this work session to continue the discussion on floodplain regulations located in Lane Code Chapter 16.244 and 10.271 and potential ways to update these code sections, as requested by the Board on March 19, 2019.

II. DISCUSSION

A. Background Analysis

On January 15, 2019, the Board adopted Ordinance No. 18-08, modernization of Lane Code Chapter 16. Subsequently, the Board directed staff to return for a work session to discuss resource zone siting standards. Commissioner Sorenson also requested information on floodplain siting standards be included in this discussion.

On March 19, 2019, staff returned to the Board to have a combined work session on fire siting standards and floodplain regulations. The Board provided direction that, due to the complexities of each topic, separate work sessions be scheduled. Therefore, staff has prepared this memorandum to only address current floodplain regulations and potential code updates.

i. Current Code

Standards pertaining to the Floodplain Combining Zone (/FP-RCP) are located in Lane Code Chapter 16.244 and Lane Code 10.271 (for lands within urban growth boundaries) (**Attachment 1**). The existing requirements in Lane Code are generally consistent with the Federal

Emergency Management Agency's (FEMA) regulations. Lane Code contains provisions for flood hazard reduction, which pertains to all development proposed in the 100-year (1% chance of flood in any given year) Special Flood Hazard Area (SFHA). Standards vary between different floodplain classifications, such as the 'A' zone, 'AE' zone, and floodway. Some general requirements include elevation, flood openings and anchoring of structures in the floodplain. In the floodway, development, including fill, is prohibited unless certified by a registered professional engineer that the development will not result in any increase of flood levels during a base flood event.

There are areas of flood hazard in the county where FEMA, through the National Flood Insurance Program (NFIP), has not conducted a detailed study of the potential flood hazard, meaning a base flood elevation (BFE) has not been determined for these areas. These areas are designated as 'A' zones and the current code requires that structures proposed in this zone be constructed so that the lowest floor is elevated two feet above the highest adjacent grade. 'AE' flood zones are areas where a detailed study has been conducted and BFE data has been established. In these zones, structures are required to be elevated one foot above the determined BFE. Proposals for fill in the floodplain are also considered development and require a permit pursuant to Lane Code 16.244.

ii. Potential Topics for Code Updates

The Board has requested additional information on the floodplain combining zone as well as possible topics for floodplain code updates. The Board was specifically interested in receiving additional information regarding balanced cut and fill and substantial improvement calculations. Additionally, staff has identified other areas for potential code amendments based on the Oregon Model Floodplain Code, resource documents from the NFIP and the Association of State Floodplain Managers, and floodplain regulations adopted by other jurisdictions. Potential policy changes identified by staff include limiting development in the floodway, increasing freeboard requirements, limiting critical facilities in the floodplain, and exempting small accessory structures from floodplain requirements.

Potential Policy: Code Amendment Requiring Balanced Cut and Fill

Lane Code defines the placement of fill in the floodplain as development and requires a development permit (Type I process) to document the location and amount of fill being placed. Typically, fill permit requests are for road or driveway construction, restoration projects or retaining walls proposed in the floodplain. Some property owners choose to place fill to meet the elevation requirements for structures, although staff does not recommend this method

due to the findings of the Biological Opinion.[1]

Currently, Lane Code does not require actions to mitigate the effects of placing fill in the floodplain. One effect of fill in the floodplain can be the displacement of flood waters. Other jurisdictions have implemented balanced cut and fill standards in order to counter the displacement of flood waters caused by fill. Balanced cut and fill requirements mean that any fill placed within the floodplain must be replaced or mitigated with an equivalent amount of cut within the floodplain area on the property. Typically, the cut must be on the same property and in the same floodplain vicinity as the placed fill. This action allows compensation for the loss of floodplain function caused by the added fill.

Potential Policy: Code Amendment Requiring Cumulative Calculation for Substantial Improvements

Lane Code defines substantial improvement as any repair, reconstruction or improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure. This definition of substantial improvement is consistent with the minimum requirements of the Code of Federal Regulations (CFR), Title 44, Volume 1, which contains the minimum NFIP requirements. When an alteration or replacement of an existing structure meets the definition of a substantial improvement, the entire structure must be improved to comply with current floodplain codes and permitting requirements. Substantial improvement provisions are intended to bring development constructed prior to floodplain regulations into compliance with current floodplain standards to reduce the overall flood risk to those properties. FEMA requires the cost of the entire improvement project be counted cumulatively. However, Lane Code does not currently have any provisions that require substantial improvements to be calculated cumulatively within any specific time range, which is generally inconsistent with federal regulations.

Builders or homeowners may want to avoid the potentially costly implications of a project being classified as a substantial improvement. Under the current Lane Code, an individual can apply for permits for only part of the proposed project and then later applying for a second permit to complete the work. This reduces the cost of work proposed under each permit and separately they may not meet the substantial improvement threshold. As a result, the structure will not have to meet floodplain regulations. While this may result in short term savings, the disadvantage is that significant investment is being made in the SFHA without adequate flood protection measures.

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https://www.westcoast.fisheries.noaa.gov/publications/habitat/2016_04-14_fema_nfip_nwr-2011-3197reducedsize.pdf

As one way to address this, some jurisdictions have implemented a cumulative substantial improvement requirement. This type of provision requires that all improvements to a structure undertaken over a period of time, may it be one, five or 10 years, be added up in a substantial improvement calculation. Once the improvements made over time total 50 percent of the value of the structure, the structure must be brought into compliance with the floodplain code.

Potential Policy: Code Amendment to Limit Development in the Floodway

The floodway is an extremely hazardous area due to the velocity of flood waters that carry debris and potential projectiles and have high erosion potential. The regulatory floodway provides a mechanism for prohibiting development in the floodway unless it can be demonstrated that the development will not result in any increase in flood levels during a base flood discharge. This is called a 'no-rise' certification, which must be completed by a registered professional engineer when any encroachment is proposed in the floodway. A no-rise certification must accompany any Floodway Development permit (Type II process).

Given the hazards associated with the floodway and the potential for development in the floodway to increase flood levels or change floodplains downstream from the development, the Board may be interested in considering further limiting or prohibiting development in the mapped floodway.

Potential Policy: Code Amendment to Increase Freeboard Requirements

Current floodplain requirements can be improved upon by increasing the amount of freeboard required when elevating a structure in the SFHA. Freeboard is the amount of required elevation of a structure above the BFE. The NFIP minimum regulations require a structure's lowest finished floor be elevated at or above the BFE. Oregon Residential Specialty Code (ORSC) has adopted a more stringent freeboard requirement of one foot above BFE.[2] Lane Code is consistent with the ORSC because it requires one foot of freeboard in the 'AE' zone and two feet of freeboard in the 'A' zone.

The Association of State Floodplain Managers has identified a number of benefits to having additional freeboard requirements (**Attachment 2**). Generally, a higher elevated structure reduces the amount of structural damage during a flood event and can have significant cost reductions for flood insurance premiums. For example, in the 'AE' zone, requiring two feet of elevation instead of one foot can result in approximately a 34% reduction

[2] 2011 Oregon Residential Specialty Code Part III, Chapter 3, Section R322.2.1

in flood insurance premiums on average (See **Table 1**).

Table 1: Flood Insurance Premium Comparison[3]

Zone	Freeboard	Premium
AE	At BFE (no freeboard)	$2,147
AE	BFE + 1 foot	$1,106
AE	BFE + 2 feet	$734
AE	BFE + 3 feet	$614

*Premiums are for a single-family house, one floor, slab on grade, stem wall foundation, or crawlspace with proper flood openings, $200,000 in building coverage, $80,000 in contents coverage, $1,000 deductible, no CRS discount, April 2017 *Flood Insurance Manual*.

As the amount of required freeboard increases, the benefits to flood insurance premiums diminish. Requiring freeboard in excess of three feet above the BFE does not yield significant benefits to flood insurance premiums. Therefore, staff recommends a two or three foot requirement for freeboard.

Potential Policy: Code Amendment to Limit Development of Critical Facilities in the Floodplain

Regulating the placement of critical facilities in the floodplain can enhance the community's resiliency in a flood event and can increase life safety when developing the floodplain. The Oregon Model Flood Damage Prevention Ordinance defines "Critical Facility" as a facility for which even a slight chance of flooding may be extremely detrimental to the function of the facility. Critical facilities include, but are not limited to schools, nursing homes, hospitals, police, fire, and emergency response installations, installations which produce, use or store hazardous materials or hazardous waste[4]. Currently, Lane code does not contain a definition for critical facilities or require specific flood hazard reduction methods for critical facilities. The Model Code suggests regulating critical facilities by locating them outside of the SFHA where possible, requiring three feet of freeboard or elevation to the height of the 500-year floodplain, elevation of access to and from the facility to three feet above the BFE or to the height of the 500-year floodplain, and flood-proofing and sealing measures. These measures could be adopted to better protect the community's critical facilities located in a flood hazard area.

Potential Policy: Code Amendment to Exempt Small Accessory

[3] Flood Insurance Manual, April 2017
[4] Oregon Model Flood Damage Prevention Ordinance, January 2009

Structures from Floodplain Standards

The Model Code also contains provisions for small accessory structures for relief from elevation or flood-proofing. These provisions are not in the CFR, but are recommended by the Model Code. Lane Code does not contain provisions for exempting small accessory structures from floodplain regulations. This results in any structure, no matter the use or size, to be elevated or flood-proofed. This requirement can put an unnecessary cost burden on the property owner. Per the Model Code, structures that can qualify for an exemption from some flood hazard reduction requirements are those that are single story, less than 200 square feet in size, and solely used for parking or storage, as well as a number of other specific requirements. The exemption still requires the structures to be anchored and constructed to equalize hydrostatic flood forces (See **Attachment 3** for all suggested provisions regarding small accessory structure exemptions).

The possible amendments discussed above, specifically, cumulative substantial improvement requirements, using a threshold lower than 50 percent for substantial improvements and protection of critical facilities, are considered by FEMA as higher regulatory standards. Higher regulatory standards can receive additional credits for the Community Rating System (CRS). The CRS is a voluntary program for NFIP participating communities. Lane County is a participating community of the NFIP and CRS. The CRS provides incentives in the form of insurance premium discounts for flood insurance holders within the participating community. Communities can gain additional credits through the CRS and greater insurance premium discounts by going beyond the minimum floodplain management requirements and developing additional measures to protect life and property from flood hazards. Currently, Lane County is rated as a CRS class seven (class one being the highest rating and receiving the highest premium discount) and receives a 15% discount on flood insurance premiums.

B. Health Implications

Any amendments to floodplain standards may have implications on public health and safety if there were a flood event. The purpose of floodplain regulations is to ensure that people and property are reasonably safe from flooding. That said, the purpose of this work session is to provide a platform for improving these regulations so that they better protect the public in Lane County. Actual health implications, if any, are unknown at this point.

III. RECOMMENDATION

No staff recommendation at this time.

IV. FOLLOW UP

Staff is requesting Board direction on a number of specific topics/potential policy changes described above.

Based on the discussion and direction from the Board, staff can return to the Board for further discussion or staff can draft amendments to Lane Code for review by the Lane County Planning Commission.

V. ATTACHMENTS

Attachment 1: Lane Code 16.244, Floodplain Combining Zone *(9 pages)*

Attachment 2: The Benefits and Costs of Building Higher, Association of State Floodplain Managers (*2 pages*)

Attachment 3: Excerpt from the Oregon Model Flood Damage Prevention Ordinance: 5.2-5 Small Accessory Structures (*1 page*)

(14) Responsibility for SIR Preparation. Preparation of the SIR is the responsibility of the applicant. All costs borne in preparation shall be paid by the applicant.

(15) Qualifications for SIR Preparation. The SIR shall be prepared by a person or team of persons qualified by experience, training and area. The applicant shall either:

(a) Choose a person or team of persons from a current list of qualified persons or firms to be compiled and maintained by the Department of Public Works, Land Management Division, and approved by the Board of County Commissioners; or

(b) Designate a person or team of persons to prepare the SIR with said persons' qualifications, subject to the approval of the Planning Commission, based on standards established by the Board of County Commissioners.

(16) Contents of SIR. The contents of the Site Investigation Report are specified in the standard SIR document as set forth in the Lane Manual.

(17) Condition Imposed Based on SIR Recommendations. Based on the information and recommendations provided in the SIR, the Planning Director may impose conditions upon the proposed development for the purposes of safety, health, welfare and in keeping with the purpose of the /BD-RCP Zone.

(18) Appeal to Hearings Official. An applicant may appeal to the Hearings Official the determination of the Preliminary Investigation, or the imposition of conditions based on the SIR, and the manner for such an appeal shall be as provided by LC 14.080 except for LC 14.080(1)(a).

(19) Applicable Geographical Features. The /BD-RCP Zone is applied to all coastal beach and dune landforms as specified in the Lane County Rural Comprehensive Plan. These are:

(a) Beaches.
(b) Foredunes.
(c) Active dune forms.
(d) Recently stabilized dune forms.
(e) Older stabilized dune forms.
(f) Interdune forms.

The boundaries of the /BD.-RCP Zone are shown on the Lane County zoning maps as specified by LC 16.252.

(20) Application of Zone to Federal Lands. The application of the /BD-RCP Zone shall be held in abeyance until such a time as these lands or portions of these lands may pass into private, State or County ownership. The Rural Comprehensive Plan designation shall provide appropriate Federal agencies with local recommendation for proper use of these lands. *(Revised by Ordinance No. 7-87, Effective 6.17.87; 7-91, 6.5.91; 5-96, 11.29.96; 6-10, 09.17.10; 7-10, 11.25.10; 18-02, 8.9.18)*

FLOODPLAIN COMBINING ZONE (/FP-RCP) RURAL COMPREHENSIVE PLAN

16.244 Floodplain Combining Zone (/FP-RCP).

(1) Purpose. It is the purpose of this section to promote the public health, safety and general welfare, and to minimize public and private losses due to flood conditions in specific areas. The provisions of this section are designed to:

(a) Protect human life and health.

(b) Minimize expenditure of public money and costly flood control projects.

(c) Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public.

(d) Minimize prolonged business interruptions.

(e) Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, and streets and bridges located in areas of special flood hazards.

(f) Help maintain a stable tax base by providing for the sound use and development of areas as special flood hazard so as to minimize future flood blight areas.

(g) Ensure that potential buyers are notified that property is in an area of special flood hazard.

(h) Ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

(2) Methods of Reducing Flood Losses. In order to accomplish its purpose, this section includes methods and provisions for:

(a) Restricting or prohibiting uses which are dangerous to health, safety and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities.

(b) Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction.

(c) Controlling the alteration of natural floodplains, stream channels and natural protective barriers, which help accommodate or channel flood waters.

(d) Controlling filling, grading, dredging and other development, which may increase flood damage.

(e) Preventing or regulating the construction of flood barriers, which will unnaturally divert flood waters or which may increase flood hazards in other areas.

(3) Lands to Which This Section Applies. This section shall apply to all areas of flood hazard within Lane County, and overlay the regulations of the underlying zone.

(a) Areas of flood hazard for Lane County under the jurisdiction of the Rural Comprehensive Plan are identified by the Federal Insurance Administration in a scientific and engineering report entitled "THE FLOOD INSURANCE STUDY FOR LANE COUNTY, OREGON UNINCORPORATED AREAS", with accompanying Flood Insurance Rate Maps.

(b) Areas of flood hazard shall also include any land area designated by the Director as susceptible to inundation of water from any source where the above-referenced maps have not identified any special flood areas.

(c) Flood hazard areas shall be adopted by Board Order, made a part of Lane Manual (LM 11.020) and filed in the office of the Department. Such studies shall form the basis for the administration and implementation of this section.

(4) Warning and Disclaimer of Liability. The degree of flood protection required by this section is considered reasonable for regulatory purposes. Larger floods can and will occur on rare occasions. Flood heights may be increased by human-made or natural causes. This section does not imply that land outside the areas of special flood hazards or uses permitted within such areas will be free from flooding or flood damages. This section shall not create liability on the part of Lane County, any officer or employee thereof, for any flood damages that result from reliance on this section or any administrative decision lawfully made hereunder.

(5) Development Subject to Director Approval. Approval shall be obtained before construction or development begins within any area of special flood hazard. Approval shall be required for all structures, manufactured homes, and "development" as this term is defined in LC 16.244(6). Application for approval shall be filed with the Department pursuant to Type I procedures of LC Chapter 14.

(6) Definitions. Except as otherwise provided in LC 16.244, the definitions below shall be used for LC 16.244.

Area of Special Flood Hazard. The land in the floodplain within a community subject to a one percent chance of flooding in any given year.

Base Flood. A flood that has a one percent chance of being equaled or exceeded in any given year.

Basement. Any area of a building having its floor subgrade (below ground level) on all sides.

Development. For the purposes of LC 16.244, development is defined in LC 16.090, and shall include dredging, paving, and drilling operations and the storage of equipment and materials.

Existing Manufactured Home Park or Subdivision. Existing manufactured home park or subdivision means a manufactured home park for which the construction of facilities for servicing the lot on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, either final site grading or the pouring of concrete pads and the construction of streets) are completed before December 18, 1985 the effective date of Lane County's conversion to the Regular Flood Insurance Program.

Expansion to an Existing Manufactured Home Park or Subdivision. Expansion to an existing manufactured home park or subdivision means the preparation of additional sites by the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including the installation of utilities, either final site grading or pouring of concrete pads, or the construction of streets).

Flood or Flooding. A general and temporary condition of partial or complete inundation of normally dry land areas from the overflow of inland or tidal waters and/or the unusual and rapid accumulations and runoff of surface waters from any source.

Flood Elevation Determination. A determination by the Director of the water surface elevations of the base flood from the approved flood hazard studies.

Flood Hazard Boundary Map, (FHBM). An official map of the County furnished by the Federal Insurance Administration, labeled a Flood Hazard Boundary Map (FHBM) and delineating the boundaries of flood hazard areas.

Flood Insurance Rate Map (FIRM). The official map on which the Federal Insurance Administration has delineated both the areas of special flood hazards and the risk premium zones applicable to the community.

Flood Insurance Study. The official report provided by the Federal Insurance Administrations that includes flood profiles and the water surface elevation of the base flood.

Floodplain. A physical geographic term describing any land area susceptible to being inundated by water from any source.

Floodplain Management. The operation of an overall program of corrective and preventative measures for reducing flood damage, including, but not limited to, emergency preparedness plans, flood control works and floodplain management regulations.

Floodplain Management Regulations. This Floodplain ordinance, together with building code requirements, health regulations and any combination thereof, which provide standards for the purpose of flood damage prevention and reduction.

Floodproofing. Any combination of structural and nonstructural additions, changes or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents.

Floodway, Regulatory. The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the waters of a base flood without cumulatively increasing the water surface elevation more than one foot.

Start of Construction. For the purposes of LC 16.244, the start of construction is defined in LC 16.090, and shall include the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

Structure in a Flood Hazard Area. A walled and roofed building, a mobile home or a tank used in the storage of gas or liquid which is principally above ground.

Substantial Improvement. Any repair, reconstruction or improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure either (a) before the improvement or repair is started, or (b) if the structure has been damaged, and is being restored, before the damage occurred. For the purpose of this definition "substantial improvement" is considered to occur when the first alteration of any wall, ceiling, floor or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure. The term does not, however, include either (1) any project or improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement

official and which are the minimum necessary to assure safe living conditions, or (2) any alteration of a structure listed on the National Register of Historic Places or a State Inventory of Historic Places.

(7) Requirements of the Director. The Director shall:

(a) Review all development applications to determine that the permit requirements of this section have been satisfied.

(b) Review all development applications to determine that all necessary permits have been obtained from those Federal, State or Local governmental agencies from which prior approval is required.

(c) Review all development applications to determine if the proposed development is located in the floodway. If located in the floodway, assure that the encroachment provisions of LC 16.244(8)(d) are met.

(d) When base flood elevation data has not been provided in the Flood Insurance Study for Lane County, Oregon unincorporated areas, the Director shall obtain, review and reasonably utilize any base flood elevation and floodway data available from a Federal, State or other source in order to administer this section.

(e) Where base flood elevation data is provided through the Flood Insurance Study or required as in LC 16.244(7)(d), obtain and record the actual elevation (in relation to mean sea level) of the lowest floor (including basement) of all new or substantially improved structures, and whether or not the structure contains a basement.

(f) For all new or substantially improved flood-proofed structures:

(i) Verify and record the actual elevation (in relation to mean sea level) to which the structure was flood proofed; and

(ii) Maintain the flood-proofing certifications required for elevation of nonresidential construction in zones A1-10, AH and AE.

(g) Maintain for public inspection all records pertaining to the Provisions of this section.

(h) Notify adjacent communities and the Department of Land Conservation and Development prior to any alteration or relocation of a watercourse, and submit evidence of such notification to the Federal Insurance Administration.

(i) Require that a program of periodic inspection and maintenance be provided with the altered or relocated portion of said watercourse so that the flood carrying capacity of the watercourse is not diminished.

(j) Make interpretation, where needed, as to exact location of the boundaries of areas of special flood hazards (for example, where there appears to be a conflict between a mapped boundary and actual field conditions). A person contesting the location of the boundary may appeal the interpretation to the Hearings Official as provided in LC 14.080 except for LC 14.080(1)(a).

(k) Record a notice of designation of substantial damage to a residential structure at Lane County Deeds and Records when the residential structure meets (i) and (ii) below. This form will be provided by the Director. Once the structure has been brought into compliance and at the request of the property owner, the Director is required to sign a notice of remedy of substantial damage that is recorded at Lane County Deeds and Records. The notice of remedy will declare the previously recorded notice of substantial damage void.

(i) Has sustained substantial damage; and

(ii) Has not been brought into compliance with LC 16.244.

(8) Provisions for Flood Hazard Reduction. In all areas of flood hazard, the following standards are required:

(a) Provisions applicable to Unnumbered A, A1-10, AH and AE zones:

(i) All new construction and substantial improvements shall be constructed with approved materials and utility equipment resistant to flood damage.

(ii) All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage.

(iii) Electrical, heating, ventilation, plumbing and air-conditioning equipment and other service facilities shall be designed and/or otherwise elevated or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

(b) Review of Building Permits. Where elevation data is not available either through the Flood Insurance Study or from another authoritative source, applications for building and manufactured home placement permits shall be reviewed to assure that proposed construction will be reasonably safe from flooding. The test of reasonableness shall include the use of historical data, high water marks, photographs of past flooding, etc., where available.

(c) Floodways. Located within areas of special flood hazard established in LC 16.244(3) are areas designated as floodways. Since the floodway is an extremely hazardous area due to the velocity of flood waters which carry debris, potential projectiles and erosion potential, the following provisions apply:

(i) Prohibit encroachments, including fill, new construction, substantial improvements and other development unless certification by a registered professional engineer is provided demonstrating that encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge. This evidence shall utilize hydrologic and hydraulic analyses performed in accordance with standard engineering practices.

(ii) Where base flood elevations have been provided but floodways have not, the cumulative effect of any proposed development, when combined with all other existing and anticipated development, shall not increase the water surface elevation of the base flood more than one foot at any point.

(iii) If LC 16.244(8)(c)(i) is satisfied, all new construction and substantial improvements shall comply with all applicable flood hazard reduction provisions for development in zones A1-30, AH and AE.

(iv) Subdivision and partitioning of land for residential purposes is prohibited if land is located entirely within the Floodway.

(d) Development in areas of special flood hazard shall also comply with the provisions in *Table 1: Provisions for Flood Hazard Reduction.*

Table 1: Provisions for Flood Hazard Reduction

Flood Zone	**Foundations and Anchoring**
Unnumbered A	(1) All new construction and substantial improvements shall be anchored to prevent flotation, collapse and lateral movement of the structure. (2) All manufactured homes must likewise be anchored to prevent flotation, collapse and lateral movement, in accordance with the State of Oregon, Manufactured Dwelling Standard.
A1-30, AH and AE	(1) All new construction and substantial improvements subject to less than 18 inches of flood water during a 100-year flood shall be anchored to prevent flotation, collapse and lateral movement. (2) All manufactured homes subject to less than 18 inches of flood water during a 100-year flood shall be anchored and/or supported to prevent flotation, collapse and lateral movement, in accordance with the State of Oregon, Manufactured Dwelling Standard. (3) All new construction, substantial improvements and manufactured homes not in an existing manufactured home park or existing manufactured home subdivision subject to 18 inches or more of flood water during a 100-year flood, shall be anchored to prevent flotation, collapse, and lateral movement which may reasonably occur independently or combined. Designs for meeting this requirement shall be certified by an Oregon registered engineer or architect. (4) All manufactured homes in existing manufactured home parks and existing

	manufactured home subdivisions shall be anchored to prevent flotation, collapse, and lateral movement, in accordance with the State of Oregon, Manufactured Dwelling Standard. (5) Foundations for all new construction, substantial improvements, and manufactured homes that are not in an existing manufactured home park or existing manufactured home subdivision subject to 18 inches or more of flood water during a 100-year flood or located within a designated floodway, shall be certified by an Oregon registered professional engineer or architect to meet the following minimum foundation requirements: (a) concrete footings sized for 1000 psf soil pressure unless data to substantiate the use of higher values are submitted. (b) footings extending below the frost line. (c) reinforced concrete, reinforced masonry, or other suitably designed supporting systems to resist all vertical and lateral loads which may reasonably occur independently or combined. (6) All Manufactured homes located in an existing manufactured home park or existing manufactured home subdivision shall be supported in accordance with the State of Oregon, Manufactured Dwelling Standard.
Flood Zone	**Utilities**
Unnumbered A	(1) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system. (2) New and replacement public or community sewerage facilities shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharge from the systems into flood waters; and (3) Individual sewerage facilities shall be located to avoid impairment to them or contamination from them during flooding.
A1-30, AH and AE	(1) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system. Public water systems which utilize wells for a source(s) shall be constructed such that the top well elevation is at least one foot above the 100-year flood elevation. (2) New and replacement public or community sewerage facilities shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharge from the systems into flood waters. (3) Individual sewerage facilities shall be located to avoid impairment to them or contamination from them during flooding.
Flood Zone	**Elevation: Residential**
Unnumbered A	New construction and substantial improvement of any residential structure shall have the lowest floor, including basement, elevated two feet above the highest adjacent grade. Crawlspace construction is outlined in FEMA Technical Bulletin 11-01 entitled "Crawlspace Construction of Buildings located in Special Flood Hazard."
A1-30, AH and AE	New construction and substantial improvement of any residential structure shall have the lowest floor, including basement, elevated to one foot above base flood elevation. Crawlspace construction is outlined in FEMA Technical Bulletin 11-01 entitled "Crawlspace Construction of Buildings located in Special Flood Hazard."
Flood Zone	**Elevation: Nonresidential**
Unnumbered A	New construction and substantial improvement of any commercial, industrial or other nonresidential structure shall either have the lowest floor, including basement, elevated two feet above grade; or, together with attendant utility and sanitary facilities, shall be flood-proofed to a level two feet above the highest adjacent grade, so the structure is watertight with walls substantially impermeable to the passage of water.

A1-30, AH and AE	New construction and substantial improvement of any commercial, industrial or other nonresidential structure shall either have the lowest floor, including basement, elevated to a level at least one foot above the base flood elevation; or, together with attendant utility and sanitary facilities shall: (a) be flood-proofed to one foot above the base flood level, so the structure is watertight with walls substantially impermeable to the passage of water; (b) have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; (c) be certified by a registered professional engineer or architect that the design and methods of construction are in accordance with accepted standards of practice for meeting provisions of this subsection based on their development and/or review of the structural design, specifications and plans. Such certification shall be provided to the official as set forth in LC 16.244(7)(f)(ii). Nonresidential structures that are elevated, not flood-proofed, must meet the same standards as residential construction of fully enclosed areas below the lowest floor in zones A1-30, AH and AE. (d) Applicants flood-proofing nonresidential buildings shall be notified that flood insurance premiums will be based on rates that are one foot below the flood-proofed level (e.g., a building constructed to the base flood level will be rated as one foot below that level).
Flood Zone	**Elevation of Manufactured Homes**
Unnumbered A	(1) All manufactured homes not in an existing manufactured home park or subdivision shall have the lowest floor elevated two feet above the highest adjacent grade. (2) All manufactured homes within an existing manufactured home park or subdivision shall be elevated such that the underside of the floor of the manufactured home is three feet above the finish grade.
A1-30, AH and AE	(1) All manufactured homes that are placed or substantially improved within Zones A1-30, AH and AE, (i) on sites outside of a manufactured home park or subdivision, (ii) on sites in a new manufactured home park or subdivision, (iii) on sites in an expansion to an existing manufactured home park or subdivision, or (iv) on sites within an existing manufactured home park or subdivision and upon which manufactured homes have incurred substantial damage as the result of a flood, shall be elevated on a permanent foundation such that the underside of the floor of the manufactured home is elevated to a height of one foot above the base flood elevation. (2) All manufactured homes to be placed or substantially improved on sites in an existing manufactured home park that are not subject to the provisions of LC 16.244(8)(d), paragraph (1) "Elevation of Manufactured Homes in Flood Zone A1-30, AH and AE" shall be elevated so that either (i) the underside of the floor of the manufactured home is one foot above the base flood level, or (ii) the manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than 36 inches in height above grade.
Flood Zone	**Elevation of Recreational Vehicles**
A1-30, AH and AE	Recreational vehicles shall (i) be on the site for fewer than 180 consecutive days and be fully licensed and ready for highway use, or (ii) shall satisfy the permit requirements of LC 16.244(5) and the requirements for elevation of manufactured

	homes in zones A1-30, AH and AE and be anchored to prevent flotation, collapse, and lateral movement. "Ready for highway use" means that the recreational vehicle is on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions.
Flood Zone	**Enclosed Areas**
Unnumbered A	Fully enclosed areas below the lowest floor shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect, or must meet or exceed the following minimum criteria: (a) A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided. The bottom of all openings shall be no higher than one foot above grade. (b) Openings shall be located to allow unrestricted cross-flow of floodwaters through the enclosed area from one side to the other. (c) Openings may be equipped with screens, louvers, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.
A1-30, AH and AE	For residential construction, fully enclosed areas below the lowest floor shall be designed to automatically equalize hydrostatic flood forces in exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or must meet or exceed the following minimum criteria: (a) A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided. The bottom of all openings shall be no higher than one foot above grade. (b) Openings shall be located to allow unrestricted cross-flow of floodwaters through the enclosed area from one side to the other. (c) Openings may be equipped with screens, louvers, or other coverings or devices provided that they permit the automatic entry and exit of flood waters.
Flood Zone	**Roads**
Unnumbered A	Adequate provisions shall be made for accessibility during a 100-year flood, so as to ensure ingress and egress for ordinary and emergency vehicles and services during potential future flooding.
A1-30, AH and AE	(1) Adequate provisions shall be made for accessibility during a 100-year flood, so as to ensure ingress and egress for ordinary and emergency vehicles and services during potential future flooding. (2) No road surface of any new street, road or access road shall be at an elevation less than one foot below the base flood height.
Flood Zone	**Subdivisions and Partitions**
Unnumbered A	(1) All subdivision proposals shall be consistent with the need to minimize flood damage; (2) All subdivision proposals shall have public utilities and facilities such as sewer, gas, electrical and water systems located and constructed to minimize flood damage; (3) All subdivision proposals shall have adequate drainage provided to reduce exposure to flood damage; and

	(4) Where base flood elevation data has not been provided or is not available from another authoritative source, it shall be generated for subdivision proposals and other proposed developments which contain at least 50 lots or five acres (whichever is less).
A1-30, AH and AE	(1) All subdivision and partitioning proposals shall be consistent with the need to minimize flood damage. (2) All subdivision proposals shall have adequate drainage to reduce exposure to flood damage, including returning water. (3) 100-year flood elevation data shall be provided and shown on final partition maps and subdivision plats. Applicant must show the boundaries of the 100-year flood and floodway on the final subdivision plat. (4) A permanent monument shall be established and maintained on land partitioned or subdivided showing the elevation in feet above mean sea level. The location of such monument shall be shown on the final partition map or subdivision plat. (5) All subdivision proposals shall have public utilities and facilities such as sewer, gas, electrical and water systems located and constructed to minimize flood damage.

(9) Emergency Permits. The Director may issue an emergency permit orally or in writing:

(a) If issued orally, a written permit shall follow within five days confirming the issuance and setting forth the conditions of operation.

(b) Emergency permits may be issued to protect existing shorelines or structures under immediate threat by flood or storm waters or for the prevention of channel changes that threaten immediate and significant loss of property.

(c) A representative of Lane County may inspect the project site to verify that an emergency condition exists and that the emergency action will not significantly impact water resources.

(d) Emergency permits shall be in effect for the time required to complete the authorized emergency action and shall not exceed 60 days.

(e) The emergency permit shall be circulated for public information within 10 days of issuance.

(f) The Director shall condition emergency permits to protect and conserve the waters of this County.

(10) Variance Procedures.

(a) Scope. Variance to a requirement standard or procedure of this section, with respect to the provisions for flood hazard reduction, may be approved by the Director if an application is submitted, reviewed and approved pursuant to the criteria for approving variances in LC 16.256, and the application complies with the additional criteria listed below.

(i) Variances may be issued for the reconsideration, rehabilitation or restoration of structures listed on the National Register of Historic Places of the State Inventory of Historic Places, without regard to the procedures set forth in the remainder of this subsection.

(ii) Variances shall not be issued within any designated floodway if any increase in flood levels during the base flood discharge would result.

(b) Conditions. Reasonable conditions may be established in connection with a variance as deemed necessary to secure the purpose and requirements of this section. In cases where a variance is granted to allow residential construction with a lowest floor elevation below the required minimum elevation, or nonresidential flood-proofing below the required minimum elevation, the applicant shall record a deed covenant, that the cost of flood insurance will be commensurable with the increased risk resulting from the reduced floor elevation of flood-proofing. *(Revised by Ordinance No. 7-87, Effective 6.17.87; 12-87, 8.13.87; 19-87, 10.14.87; 3-91, 5.17.91; 2-98, 4.8.98; 1-07, 3.23.07; 14-08, 11.5.14; 18-02, 8.9.18)*

Costs of Building Higher

Under the rules of the National Flood Insurance Program, buildings must be protected to the Base Flood Elevation (BFE). Therefore, the cost of freeboard is just the additional cost of building higher than the minimum NFIP standard.

A study conducted by ASFPM in February 2017 estimated the approximate cost of building higher for a 2,000-square foot house. The study assumed the house was constructed to NFIP standards and then estimated the additional cost of building higher than the BFE (see table below).

Foundation Type*	Cost per add'l foot
Concrete block piers	$890
Crawlspace with concrete block walls	$1,850
Crawlspace with poured concrete walls	$2,155
Stem wall with fill	$2,345
Fill only	$4,470

Using a house on fill with a stem wall (as illustrated on the cover), here are the average construction costs for building higher:

1 foot: $2,345
2 feet: $2,345 x 2 = $4,690
3 feet: $2,345 x 3 = $7,035

**Costs are lower for other foundations.*

Return on Investment

The owner of a building built higher will realize savings in two ways. The most important is when the area floods again and the building is not damaged. Also, the owner doesn't have to relocate, repair and rebuild.

Another form of savings is a reduced cost in flood insurance, which is required by most lenders. For example, using a 2,000-square foot home with a stem wall foundation with the floor 2 feet above the BFE (with fill underneath).

Additional cost of construction:	$4,690
Annual flood insurance premium built to the BFE:	$2,147
Annual flood insurance premium built 2 feet above the BFE:	$734
Annual flood premium savings:	$1,413
Number of years to pay off $4,690 via premium savings:	3.3 years
Added savings realized during a 30-year mortgage:	$37,300*

Another benefit of building is higher is potentially increase in value at the time of sale due to lower risk and lower insurance costs.

**Savings are greater for other foundations.*

The Costs & Benefits of Building Higher

Assn. of State Floodplain Managers

www.floods.org

ATTACHMENT 2

Building in the Floodplain

Communities that participate in the National Flood Insurance Program must ensure all new residential buildings constructed in the floodplain are elevated to or above the base flood elevation (BFE). The base flood is the flood that has a 1% chance of occurring or being exceeded in any given year.

Many communities concluded the BFE is not a sufficient level of protection, saying:

→ Floods higher than the base flood can and do occur.

→ Most flood studies do not account for debris or obstructions during the base flood, thereby underestimating the BFE.

→ NFIP flood studies do not account for the impacts of future development or sea level rise. Over time, the regulatory standard does not keep up with increases in flood elevations.

→ In non-coastal areas, the protection level is measured at the top of the lowest floor, leaving the flooring, subfloor and floor joists exposed to the base flood.

To offset these shortcomings of building only to the BFE, over half of the communities in the country require new buildings to be protected to one or more feet *higher* than the BFE. Floodplain managers call this "freeboard."

Flood Damage Protection

A building built higher than the minimum level required by the NFIP is better protected from:

→ Waves that are higher than the BFE,

→ Unpredictable flooding conditions, such as debris at a bridge or culvert that creates a dam to stream flow,

→ Increases in flood heights due to development and climate change, and

→ Damage to the floor joists and other parts of the building lower than the top of the lowest floor.

Through a national consensus process, building higher has been part of the International Building and Residential Codes and the American Society of Civil Engineers' flood design and construction standard (ASCE 24).

Thousands of dollars in flood damage can be prevented by building higher.

Flood Insurance Premiums

While the BFE is the minimum standard for communities in the NFIP, the program encourages regulations that set a higher protection level (44 CFR 60.1(d)).

As seen in the table below, flood insurance premiums are significantly lower for buildings with 1, 2 or 3 feet of freeboard.

More than 40 years of insurance claims experience has proven these buildings suffer much less flood damage. Less potential for damage means lower premiums.

Flood Insurance Premium Comparison

Zone	Freeboard	Premium
AE	At BFE (no freeboard)	$2,147
AE	BFE + 1 foot	$1,106
AE	BFE + 2 feet	$734
AE	BFE + 3 feet	$614

Premiums are for a single-family house, one floor, slab on grade, stem wall foundation, or crawlspace with proper flood openings, $200,000 in building coverage, $80,000 in contents coverage, $1,000 deductible, no CRS discount, April 2017 *Flood Insurance Manual*

Lower insurance premiums are an immediate benefit to the property owner. Other benefits include less flood damage in the community, less suffering, less business interruption, quicker recovery, and higher property values.

requirements for manufactured homes.

5.2-5 Small Accessory Structures

Relief from elevation or floodproofing as required in 5.2-1 or 5-2-2 above may be granted for small accessory structures that are:

(1) less than 200 square feet and do not exceed one story;

(2) not temperature controlled;

(3) not used for human habitation and are used solely for parking of vehicles or storage of items having low damage potential when submerged;

(4) not used to store toxic material, oil or gasoline, or any priority persistent pollutant identified by the Oregon Department of Environmental Quality shall unless confined in a tank installed in compliance with this ordinance or stored at least one foot above Base Flood Elevation

(5) located and constructed to have low damage potential;

(6) constructed with materials resistant to flood damage;

(7) anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy, during conditions of the base flood;

(8) constructed to equalize hydrostatic flood forces on exterior walls by allowing for the automatic entry and exit of floodwater. Designs for complying with this requirement must be certified by a licensed professional engineer or architect or

(i) provide a minimum of two openings with a total net area of not less than one square inch for every square foot of enclosed area subject to flooding;

(ii) the bottom of all openings shall be no higher than one foot above the higher of the exterior or interior grade or floor immediately below the opening;

(iii) openings may be equipped with screens, louvers, valves or other coverings or devices provided they permit the automatic flow of floodwater in both directions without manual intervention.

(9) constructed with electrical, and other service facilities located and installed so as to prevent water from entering or accumulating within the components during conditions of the base flood.