

Minnesota Rule 1335 FLOODPROOFING REGULATIONS

Existing Rule Amendment Language	Comments
<p><u>1335.0200</u> ADOPTION OF "FLOOD PROOFING REGULATIONS."</p> <p>Sections 100 to 1406 of the 1972 edition of "Flood Proofing Regulations" (FPR) as promulgated by the Office of the Chief Engineers, U.S. Army, Washington, D.C. is incorporated by reference and hereby made a part of the State Building Code subject to the amendments in parts 1335.0200 to 1335.3000.</p> <p>FPR sections 201.2 to 208.2 are placed in the appendix of this code.</p>	<p>Repeal 1335.0200</p> <p>Add: 1335.0100 TITLE; INCORPORATION BY REFERENCE.</p> <p>Parts 1335.0010 to 1335.972 are known and may be cited as the "Minnesota Floodproofing Regulations."</p> <p>Chapters 1 to 9 of the 2014 edition of the American Society of Civil Engineers/Structural Engineering Institute Standard 24 FLOOD RESISTANT DESIGN AND CONSTRUCTION ("ASCE/SEI 24-14 Standard"), promulgated by the American Society of Civil Engineers, Reston, VA, are incorporated by reference as part of the Minnesota Floodproofing Regulations except as qualified by the applicable provisions in Minnesota Rules, chapter 1300, and as amended in this chapter. Portions of this chapter reproduce excerpts from the ASCE/SEI 24-14 Standard, American Society of Civil Engineers, Reston, VA, copyright 2015, reproduced with permission, all rights reserved.</p> <p>The ASCE/SEI 24-14 Standard is not subject to frequent change and a copy of the ASCE/SEI 24-14 Standard with amendments for use in Minnesota is available in the office of the commissioner of labor and industry.</p>
<p><u>1335.0300</u> FLOODPROOFING REGULATIONS, SECTION 200.2.</p> <p>FPR section 200.2 is amended to read as follows:</p> <p>Official Floodplain Zoning Map: The official plain zoning map showing the extent and boundaries of the primary and secondary flood hazard areas is hereby declared and established as part of these regulations. Hereinafter reference to term "primary flood hazard areas" in these regulations shall be synonymous with the term "floodplain areas" as used in parts 6120.5000 to 6120.6200.</p>	<p>Renumber and modify 1335.0300</p> <p>1335.0120 Definitions</p> <p>Flood Hazard Map shall be defined as follows:</p> <p>Flood Hazard Map- The official plain zoning map showing the extent and boundaries of the primary and secondary flood hazard areas is hereby declared and established as part of these regulations. Hereinafter reference to term "<u>Flood Hazard Area</u>" in these regulations shall be synonymous with the term "floodplain areas" as used in parts 6120.5000 to 6120.6200.</p>
<p><u>1335.0400</u> FLOODPROOFING REGULATIONS, SECTION 200.3.</p> <p>FPR section 200.3 is amended to read as follows:</p> <p>Regulatory Flood Datum: For the purpose of these regulations, the regulatory flood datum, or as hereinafter referred to, the "RFD," is hereby declared and established for use as the reference datum for determining the elevation above mean sea level to which floodproofing protection shall be provided. Hereinafter reference to the term "regulatory flood datum" in these regulations shall be synonymous with the term "flood protection elevation" as used in parts 6120.5000 to 6120.6200.</p>	<p>Renumber and modify 1335.0300</p> <p>1335.0120 Definitions</p> <p>Design Flood Elevation shall be defined as follows:</p> <p>Design Flood Elevation- Elevation of the <i>design flood</i>, including <i>wave height</i>, relative to the <i>datum</i> specified on the community's <i>flood hazard map</i>. Hereinafter reference to the term "<i>Design Flood Elevation</i>" in these regulations shall be synonymous with the term "<i>flood protection elevation</i>" as used in parts 6120.5000 to 6120.6200. Design Flood Elevation (DFE) in this rule</p>

equates to the Base Flood Elevation (BFE) as found in Minnesota Rule 6120.

Need Definition for *Stage Increase* (SI):

Flood Protection Elevation (FPE): The lowest elevation permissible for habitable space within an area subject to flooding. $FPE = BFE + SI + 1$ foot of elevation.

1335.0500 FLOODPROOFING REGULATIONS, SECTION 201.1.

FPR section 201.1 is amended to read as follows:

Application: These regulations shall apply to the construction, alteration, and repair of any building or parts of a building or structure in the flood hazard area(s) of the municipalities. Additions, alterations, repairs, and changes of use occupancy shall comply with all provisions for new buildings and structures as otherwise required in the building code, except as specifically provided in these regulations.

Repeal 201.1 and 201.2

Replaced with model code Section 1.1 Scope.

Modify Section 1.1 Scope as follows:

1.1 Scope

This standard provides minimum requirements for flood resistant design and construction of structure that are subject to building code requirements and that are located in whole or in part, in Flood Hazard Areas. This standard applies to the following: (1) new construction, including subsequent work to such structures, and (2) work classified as substantial improvement of an existing structure that is not an historic structure (see Fig. 1-1)

1335.0600 FLOODPROOFING REGULATIONS, SECTION 201.2.

FPR section 201.2 is amended to read as follows:

This section shall apply unless equivalent provisions are incorporated in the city or county flood plain zoning ordinance.

Nonconforming Use: A structure or the use of a structure or premises which was lawful before the passage or amendment of the ordinance but which is not in conformity with the provisions of these regulations may be continued subject to the following conditions:

1. No such use shall be expanded, changed, enlarged, or altered in a way which increases its nonconformity.
2. No structural alteration, addition, or repair to any conforming structure over the life of the structure shall exceed 50 percent of its market value at the time of its becoming a nonconforming use, unless the structure is permanently changed to a conforming use.
3. If such use is discontinued for 12 consecutive months, any future use of the building premises shall conform to these regulations. The assessor shall notify the zoning administrator in writing of instances of nonconforming uses which have been discontinued for a period of 12 months.
4. If any nonconforming use or structure is destroyed by any means, including floods, to an extent of 50 percent or more of its market value, it shall not be reconstructed except in conformance with the provisions of these regulations; provided, the Board of Appeals may permit reconstruction if the use or structure is located outside the floodway and is adequately and

The general provisions of this section shall apply to all new construction and substantial improvements in flood hazard areas. In addition to the requirements of this section (see Fig 1-2):

1. Chapter 2 shall apply to all new construction and substantial improvements in Flood Hazard Areas and High Risk Flood Hazard Areas except those that are identified as Coastal High Hazard Areas and Coastal A Zones;
2. Chapter 3 shall apply to all new construction and substantial improvements in High Risk Flood Hazard Areas;
3. Chapter 4 shall apply to all new construction and substantial improvements in Coastal High Hazard Areas and in Coastal A Zones; and
[Note: Coastal high hazard areas can include locations where wave action can exceed 3 feet in height above the Base Flood Elevation (lake high water elevation) like along Lake Superior, Lake of the Woods, Rainy Lake, Lower and Upper Red Lake, Lake Mille Lacs, Leech Lake, and Lake Winnibigoshish- Discuss].
4. Chapters 5, 6, 7, 8, and 9 shall apply to all new construction and substantial improvements.

The following shall apply unless equivalent provisions are incorporated in the city or county flood plain zoning ordinance.

Nonconforming Use: A structure or the use of a structure or premises which was lawful before the passage or amendment of the ordinance, but which is not in conformity with the provisions of these regulations may be continued subject to the following conditions:

1. No such use shall be expanded, changed, enlarged, or altered in a way which increases its nonconformity.

<p>safely floodproofed, elevated, or otherwise protected in conformance with these regulations.</p> <p>5. Uses or adjuncts thereof which are or become nuisances shall not be entitled to continue as nonconforming uses.</p> <p>6. An alteration, addition, or repair to a nonconforming structure that exceeds 50 percent of its market value must be protected as required by these regulations.</p>	<p><u>2. No structural alteration, addition, or repair to any conforming structure over the life of the structure shall exceed 50 percent of its market value at the time of it becoming a nonconforming use, unless the structure is permanently changed to a conforming use.</u></p> <p><u>3. If such use is discontinued for 12 consecutive months, any future use of the building premises shall conform to these regulations. The assessor shall notify the zoning administrator in writing of instances of nonconforming uses which have been discontinued for a period of 12 months. [Discuss!]</u></p> <p><u>4. If any nonconforming use or structure is destroyed by any means, including floods, to an extent of 50 percent or more of its market value, it shall not be reconstructed except in conformance with the provisions of these regulations; provided, the Board of Appeals may permit reconstruction if the use or structure is located outside the floodway and is adequately and safely floodproofed, elevated, or otherwise protected in conformance with these regulations.</u></p> <p><u>5. Uses or adjuncts thereof which are or become nuisances shall not be entitled to continue as nonconforming uses.</u></p> <p><u>6. An alteration, addition, or repair to a nonconforming structure that exceeds 50 percent of its market value must be protected as required by these regulations.</u></p>
<p><u>1335.0700 FLOODPROOFING REGULATIONS, SECTION 203.3.</u></p> <p>FPR section 203.3 is amended to read as follows:</p> <p>Records: Copies of such tests, reports, certifications, or the results of such tests shall be kept on file in the office of the building official for a period of not less than two years after the approval and acceptance of the completed structure for beneficial occupancy.</p>	<p>Repeal. Now part of MR 1300.0110, Subpart 8.</p>
<p><u>1335.0800 FLOODPROOFING REGULATIONS, SECTION 204.6.</u></p> <p>FPR section 204.6 is amended to read as follows:</p> <p>Board of Appeals: See part <u>1305.0500</u>, Uniform Building Code section 204.</p>	<p>Repeal. Now part of MR 1300.0230.</p>
<p><u>1335.0900 FLOODPROOFING REGULATIONS, SECTION 204.7.</u></p> <p>FPR section 204.7 is amended to read as follows:</p> <p>Validity: It shall be unlawful for any person, firm, or corporation or agency (state or local) to erect, construct, enlarge, alter, repair, move, improve, remove, convert, or demolish any building or structure in the flood hazard area(s), or cause the same to be done, contrary to or in violation of any of the provisions of these regulations and/or the building code.</p>	<p>Renumber and add new section to model code.</p> <p>1.1.1 Validity. It shall be unlawful for any person, firm, or corporation or agency (state or local) to erect, construct, enlarge, alter, repair, move, improve, remove, convert, or demolish any building or structure in the flood hazard area(s), or cause the same to be done, contrary to or in violation of any of the provisions of these regulations and/or the building code.</p>

<p><u>1335.1000</u> FLOODPROOFING REGULATIONS, SECTION 205.1.</p> <p>FPR section 205.1 is amended to read as follows:</p> <p>Statement of Intention to Improve: The owner or any registered architect or licensed professional engineer authorized to represent the owner shall, before preparing final plans for any improvement in the flood hazard area(s), file with the building official a statement of intention to improve, including a brief description of the type of improvement being considered and giving its precise location, on a form provided by the building official. The building official shall note on two copies the elevation of the RFD at the location of the proposed improvement. One copy of the statement of intention to improve must be retained by the building official until a permit copy for improvement on the site is approved or one year has elapsed; a second copy must be returned to the owner for use in final siting and design of the improvement. Assignments of the RFD elevations at all locations must be consistent with the determination of the regulatory flood protection elevation as defined in the community's flood plain zoning controls, if any. This information must be open to public examination at all reasonable times.</p>	<p>Renumber and add new section to model code.</p> <p>1.1.2 Statement of Intention to Improve. The owner or any registered architect or licensed professional engineer authorized to represent the owner shall, before preparing final plans for any improvement in the flood hazard area(s), file with the building official a statement of intention to improve, including a brief description of the type of improvement being considered and giving its precise location, on a form provided by the building official. The building official shall note on two copies the <u>Base Flood Elevation</u> at the location of the proposed improvement. One copy of the statement of intention to improve must be retained by the building official until a permit copy for improvement on the site is approved or one year has elapsed; a second copy must be returned to the owner for use in final siting and design of the improvement. Assignments of <u>Base Flood Elevations</u> at all locations must be consistent with the determination of the regulatory flood protection elevation as defined in the community's flood plain zoning controls, if any. This information must be open to public examination at all reasonable times.</p>
<p><u>1335.1100</u> FLOODPROOFING REGULATIONS, SECTION 205.2.</p> <p>FPR section 205.2 is amended to read as follows:</p> <p>Permits Required: No person, firm, or corporation shall erect, construct, alter, repair, move, remove, convert, or demolish any building or structure or any part thereof, or make any other improvement within the structure or any part thereof, or make any other improvement within the flood hazard area(s), or cause same to be done, without first obtaining a separate flood plain building permit for any such improvement from the building official. Ordinary minor repairs may be made with the approval of the building official without a permit, provided that such repairs shall not violate any provisions of these regulations or of the building code.</p>	<p>Renumber and add new section to model code.</p> <p>1.1.2 Permits Required. No person, firm, or corporation shall erect, construct, alter, repair, move, remove, convert, or demolish any building or structure or any part thereof, or make any other improvement within the structure or any part thereof, or make any other improvement within the flood hazard area(s), or cause same to be done, without first obtaining a separate <u>flood plain building permit</u> for any such improvement from the building official. Ordinary minor repairs may be made with the approval of the building official without a permit, provided that such repairs shall not violate any provisions of these regulations or of the building code. [Discuss about what happens in non-code-enforced areas]</p>
	<p>1.1.3 Permit Applications. To obtain a permit, the applicant shall first file an application which shall include:</p> <ol style="list-style-type: none"> (1) A description of work to be covered by the <u>flood plain building permit</u> including a list of all spaces affected by these regulations giving flood-proofing class, <u>Base Flood Elevation</u>, floor elevations, proposed uses and contents, and references to drawings and specifications which explain the flood-proofing measures that apply to each space. The description shall include an estimate of the total value of the improvement. The description shall be made on a form provided by the building official.

	<p>(2) Construction drawings and specifications, in addition to the drawings and specifications required by the building code, except that drawings and specifications for any and all proposed improvements in the Primary Flood Hazard Area(s) shall be prepared by an engineer or architect licensed by the State of Minnesota. All drawings and specifications shall bear the true name of the author thereof, followed by such title as the author may be lawfully authorized to use. All plans and sections shall be noted with the proposed <i>flood design class</i> [Table 1-1] of the building and shall include detailed drawings of walls and wall openings.</p>
<p><u>1335.1200</u> FLOODPROOFING REGULATIONS, SECTION 205.3.</p> <p>Subpart 1.</p> <p>No. 2.</p> <p>FPR section 205.3, No. 2 is amended to read as follows:</p> <p>Two sets of complete plans and specifications, in addition to plans and specifications required by the building code, except that plans and specifications for any and all proposed improvement in the primary flood hazard area(s) shall be prepared by an engineer or architect licensed by the state to practice as such. All drawings and specifications shall bear the true name of the author thereof, followed by such title as the author may be lawfully authorized to use. All plans and sections shall be noted with the proposed floodproofing class of each space below the RFD including detail drawings of walls and wall openings.</p> <p>Exception: Plans for Group M Division 1 Occupancies need not be prepared by a licensed architect or engineer.</p> <p>Subp. 2.</p> <p>No. 3.</p> <p>FPR section 205.3, No. 3 is amended to read as follows:</p> <p>Two copies of the owner's contingency plan, which shall describe in detail all procedures for temporary placement and removal or contingent protection proposed items in spaces affected by these regulations including:</p> <p>A. plans and schedules for items to be removed and locations of places above the RFD to which they will be removed if these contents violate restrictions associated with the floodproofing class of the space in which they are placed temporarily, including specific organizational responsibilities; and</p>	<p>Renumber and add new section to model code.</p> <p>1.1.4 Construction Documents.</p> <p>Two sets of complete plans and specifications, in addition to plans and specifications required by the building code, except that plans and specifications for any and all proposed improvement in the primary flood hazard area(s) shall be prepared by an engineer or architect licensed by the state to practice as such. All drawings and specifications shall bear the true name of the author thereof, followed by such title as the author may be lawfully authorized to use. All plans and sections shall be noted with the proposed floodproofing class of each space below the <u>Base Flood Elevation</u> including detail drawings of walls and wall openings.</p> <p>Exception: <u>Documents not required to be certified by licensed design professionals in accordance with Minnesota Rule 1800.5200 shall not be required to be certified by a licensed architect. This exception does not waive the requirement for certification by a structural engineer licensed in Minnesota.</u></p> <p>1.1.5 Contingency Plan.</p> <p>Two copies of the owner's contingency plan, which shall describe in detail all procedures for temporary placement and removal or contingent protection proposed items in spaces affected by these regulations including:</p> <p>A. plans and schedules for items to be removed and locations of places above the <u>Base Flood Elevation</u> to which they will be removed if these contents violate restrictions associated with the floodproofing class of the space in which they are placed temporarily, including specific organizational responsibilities; and</p> <p>B. procedures, materials, and equipment for protecting items required to have protection by their floodproofing class, but for which this protection is proposed to be provided contingently, including specific organizational responsibilities for accomplishing this protection.</p> <p>Waivers of restrictions implicitly requested by submission of the owner's contingency plan may be granted by the building</p>

<p>B. procedures, materials, and equipment for protecting items required to have protection by their floodproofing class, but for which this protection is proposed to be provided contingently, including specific organizational responsibilities for accomplishing this protection.</p> <p>Waivers of restrictions implicitly requested by submission of the owner's contingency plan may be granted by the building official as provided by 1101.2.</p>	<p>official as provided by <u>Minnesota Rule 1300.0110, Subpart 12 Modifications.</u></p>
<p>1335.1300 FLOODPROOFING REGULATIONS, SECTION 209.1.</p> <p>FPR section 209.1 is amended to read as follows:</p> <p>New Building and Structures: Every building or structure hereafter erected, that is located in the primary flood hazard area(s) where the ground surface is two feet or more below the RFD, or where flood water velocities may exceed five feet per second, shall be provided with an enclosed refuge space above the RFD, of sufficient area to provide for the occupancy load with a minimum of 12 square feet per person. It shall be provided with one or more exits through the exterior walls above the RFD to an exterior platform and stairway not less than three feet wide.</p>	<p>Renumber and add new section to model code.</p> <p>1.1.6 New Buildings and Structures Every building or structure hereafter erected, that is located in the primary flood hazard area(s) where the ground surface is two feet or more below the <i>Base Flood Elevation</i>, or where flood water velocities may exceed five feet per second, shall be provided with an enclosed refuge space above the <i>Base Flood Elevation</i>, of sufficient area to provide for the building occupant load with a minimum of 12 square feet per person. It shall be provided with one or more exits through the exterior walls above the <i>Base Flood Elevation</i> to an exterior platform and stairway not less than three feet wide.</p>
<p>1335.1400 FLOODPROOFING REGULATIONS, SECTION 209.3.</p> <p>FPR section 209.3 is amended to read as follows:</p> <p>Use of Space Below the Regulatory Flood Datum: No floor level or portion of the building or structure that is below the RFD regardless of structure or space classification shall be used as habitable space, or for storage of any property, materials, or equipment that might constitute a safety hazard when contacted by flood waters.</p>	<p>Renumber and add new section to model code.</p> <p>1.1.7 Space Below the Base Flood Elevation No floor level or portion of the building or structure that is below the <i>Base Flood Elevation</i> regardless of structure or space classification shall be used as <i>habitable space</i>, or for storage of any property, materials, or equipment that might constitute a safety hazard when contacted by flood waters.</p>
<p>1335.1500 FLOODPROOFING REGULATIONS, SECTION 210.7.</p> <p>FPR section 210.7 is amended to read as follows:</p> <p>Placard Types: Placards shall be white rigid plastic or other non-water-susceptible materials eight inches long and 12 inches wide, and shall have printed thereon in black letters the information shown in figure 2.</p>	<p>Renumber and add new section to model code.</p> <p>1.1.8 Placards Placards shall be furnished by the owner, signed by the licensed design professional and submitted to the building official for final signature and posting. Placards shall be white rigid plastic or other non-water-susceptible materials eight inches long and 12 inches wide, and shall have printed thereon in black letters the information shown in figure 2. Placards shall be replaced immediately if removed or defaced.</p>
<p>1335.1600 FLOODPROOFING REGULATIONS, SECTION 300.0.</p> <p>FPR section 300.0 is amended by adding a subsection to read as follows:</p>	<p>Revise charging language of model code Section 1.2 as follows:</p> <p>1.2 Definitions The following definitions apply to the provisions of the entire standard (italicized words in a definition mean the</p>

<p>FPR Section 300.2. Interpretation: For the purpose of these regulations, where definition of terms as set forth in this chapter conflict in meaning with those as set forth in part 6120.5000, the latter shall take precedence.</p>	<p>words are defined in this section). <u>Where definition of terms as set forth in this chapter conflict in meaning with those as set forth in part 6120.5000, the latter shall take precedence.</u></p> <p>** Discuss: MR 6120 was last updated in 2008. Do we want to hang our definitions on 15 year old language?</p> <p>The new definitions seem more applicable. Duplicates: Channel, Flood, Floodplain/Flood hazard area, Floodplain, Floodproofing, Floodway.</p>
<p>1335.1700 FLOODPROOFING REGULATIONS, SECTION 301.2.9.</p> <p>FPR section 301.2.9 is amended to read as follows:</p> <p>Habitable space (room) is space in a structure for living, sleeping, eating, or cooking. Bathrooms, toilet compartments, closets, halls, storage rooms, laundry or utility space, and similar areas, are not considered habitable space.</p>	<p>Repeal. Model code now uses <i>Residential</i> as a broader term that is more applicable.</p> <p>Also see section 2.3 Elevation Requirements for related conditions but not requiring this definition.</p>
<p>1335.1800 FLOODPROOFING REGULATIONS, SECTION 301.4.1.</p> <p>FPR section 301.4.1 is amended to read as follows:</p> <p>Building Code: The State Building Code setting forth standards for the construction, addition, and modification and repair of buildings and other structures for the purpose of protecting health, safety, and general welfare of the public.</p>	<p>Revise to modify model code section 1.5.1 General as follows:</p> <p>1.5.1 General. New Construction and substantial improvements, shall be designed, constructed, connected, and anchored to resist flotation, collapse, or permanent lateral movement resulting from the action of hydrostatic, hydrodynamic, wind and other loads during design flood or lesser, conditions in accordance with the requirements of this standard if specified or if not specified in this standard then in accordance with the <u>Minnesota State Building Code requirements approved by the authority having jurisdiction</u>. Design shall include the loads and load combinations described in Section 1.6.</p> <p>Design and construction in flood hazard areas shall account for each of the following in accordance with this standard:</p> <ol style="list-style-type: none"> 1. Elevation of the structure, 2. Foundation types and site-specific geotechnical factors, 3. Resistance of structures to damage up to and during the design flood, 4. Obstructions or enclosures below elevated structures, 5. Structural members and connections required to resist design loads, 6. Use of flood damage-resistant materials, 7. Floodproofing, 8. Utilities, 9. Means of Egress, and 10. Adverse impacts to other structures and property.

1335.1900 FLOODPROOFING REGULATIONS, SECTION 402.1.

FPR section 402.1 (table 2) is amended to read as follows:

General: Table 2 indicates the various degrees of protection required to permit use of spaces for each floodproofing; the chart in itself shall not be construed as being exhaustive with respect to all requirements imposed by these regulations. In any disputes arising over the interpretation of this chart, the written provisions of these regulations shall be considered as definitive.

**FLOOD-PROOFING CLASSIFICATION OF SPACES
MINIMUM REQUIREMENTS**

Flood-Proofing Classes	Water-Proofing	Structural Loads	Closure of Openings	Internal Flooding & Draining	Flooring	Walls and Ceilings	Contacts	Electrical	Mechanical
W1 Completely Dry	Type A	Class 1	Type 1		Class 1	Class 1	Class 1		
W2 Essentially Dry	Type B	Class 1	Type 2	See Chapter 8	Class 2	Class 2	Class 2	See Chapter 12	See Chapter 13
W3 Flooded with Potable Water	Type A	Class 2	Type 3		Class 3	Class 3	Class 3		
W4 Flooded with Flood Water	Type C	Class 3	Type 4		Class 4	Class 4	Class 4		
W5 Non-Flood-Proofing	-	-	Type 5		Class 5	Class 5	Class 5		

Repeal 1335.1900. Model code is completely reformatted to address requirements in a different way. New model code does not allow use of space below the design flood elevation for anything except storage of vehicles and non-hazardous material storage.

1335.1950 FLOODPROOFING REGULATIONS, SECTION 612.1.

FPR section 612.1 is amended to read as follows:

Methods: A building must be considered completely floodproofed if the lowest elevation of all space within the building perimeter is above the RFD as achieved by:

- (1) building on natural terrain beyond the RFD limit line on natural undisturbed ground;
- (2) building on fill; or
- (3) building on stilts.

These methods may be used alone or in combination to achieve the required degree of floodproofing. Data and design procedures must be based on organized and acceptable disciplines involved and the following additional requirements.

Repeal 1335.1950

Development in floodways is addressed in Section 2.2

Building Construction Elevation requirements are addressed in Model Code section 2.3.

Use of fill is addressed in model code Section 2.4

Buildings on stilts is not specifically addressed but would be the result of having no installed enclosures below the design flood elevation per Section 2.7, and having a floor elevation above the design flood elevation per Section 2.3. The new language is more performance based and would include building on stilts as one of many options or combinations that would result in a compliant support structure.

1335.2000 FLOODPROOFING REGULATIONS, SECTION 612.2.1.

FPR section 612.2.1 is amended to read as follows:

Recommend repealing.

Model code requirements are more performance based and stated in general terms. See section 1.5.3.1 for Geotechnical Considerations for similar language related

<p>Natural Terrain: In addition to the requirements of the building code, the building shall be located not less than 15 feet back from the line of incidence of the RFD on the ground, foundation design shall take into consideration the effects of soil saturation on the performance of the foundations, the effects of flood waters on slope stability shall be investigated, normal access to the building shall be by direct connections with areas above the RFD and all utility service lines shall be designated and constructed as required to protect the building and/or its components from damage or failure during a flooding event to the RFD.</p>	<p>to stability of foundation soils during various types of flood conditions.</p> <p>** Discuss if we need to amend Section 1.5 to include similar language to the existing amendment to provide a somewhat more prescriptive solution.</p>
<p><u>1335.2100</u> FLOODPROOFING REGULATIONS, SECTION 612.2.2.</p> <p>FPR section 612.2.2 is amended to read as follows:</p> <p>Building on Fill: The building and all parts thereof may be constructed above the RFD on an earth fill. Prior to placement of any fill or embankment materials, the area upon which fill is to be placed, including a five-foot strip measured horizontally beyond and contiguous to the toe line of the fill, shall be cleared of standing trees and snags, stumps, brush, down timber, logs and other growth, and all objects including structures on or above the ground surface or partially burned. The area shall be stripped of topsoil and all other material which is considered unsuitable by the building official as foundation material. All combustible and noncombustible materials and debris from the clearing, grubbing, and stripping operations shall be removed from the proposed fill area and disposed of at locations above the RFD and/or in the manner approved by the building official. Fill material shall be of a selected type, preferably granular and free-draining placed in compacted layers. Fill selection and placement shall recognize the effects of saturation from flood waters on slope stability, uniform and differential settlement, and scour potential.</p> <p>The minimum elevation of the top slope for the fill section shall be no more than one foot below the RFD. Minimum distance from any point of the building perimeter to the top of the fill slope shall be either 15 feet or twice the depth of fill at that point, whichever is the greater distance. This requirement does not apply to roadways, driveways, playgrounds, and other related features which are not integral and functional parts of the building proper. Fill slopes for granular materials shall be not steeper than one vertical on 1-1/2 horizontal, unless substantiating data justifying steeper slopes are submitted to the building official and approved. For slopes exposed to flood velocities of less than five feet per second, grass or vine cover, weeds, bushes, and similar vegetation undergrowth will be considered to provide adequate scour protection.</p>	<p>Recommend repealing 1335.2100</p> <p>Model code is more performance based and addresses use of fill in Section 1.5.4 Use of Fill and related Section 2.4 Use of Fill. Fewer specifics in the new model code, but gets to the same issues regarding ground stability under flood conditions. New code will require a certified designer and a design.</p> <p>Further guidance is provided in Commentary Section C2.4 Use of Fill.</p> <p>** Discuss if we want to continue to include language regarding slope protection with vegetation, maximum slopes, etc. See Commentary Section C2.4.</p>
<p><u>1335.2150</u> FLOODPROOFING REGULATIONS, SECTION 612.3.</p> <p>FPR section 612.3 is amended to read as follows:</p>	<p>Consider repealing.</p> <p>Refer to Section 1.4.2 Consideration for Flood Protective Works and related commentary section C1.4.2 Consideration for Flood Protective Works</p>

<p>Protection by Dikes, Levees, and Floodwalls: Dikes, levees, and floodwalls must not be considered to provide FP1 or FP2 floodproofing or flood protection unless</p> <p>(1) the dike, levee, or floodwall is built in accordance with recognized and accepted engineering practice and methods, and</p> <p>(2) the design data has been submitted to the Department of Natural Resources and the Federal Emergency Management Agency for revision of the community's flood insurance study (flood insurance rate map) and official zoning map.</p>	<p>“Buildings protected by dikes and levees do not provide complete or absolute protection to an area, they only reduce the frequency or intensity of the flooding.” It seems to be an error to consider buildings in Flood Design Class 2, 3, or 4 (Table 1-1) to be protected from flood if sheltered by these types of structures.</p> <p>**Discuss. This is potentially a radical change for most buildings since most buildings fall into Flood Design Class 2 and would have been deemed protected under the current rule. See current amendment 1335.3100 below.</p>
<p>1335.2200 FLOODPROOFING REGULATIONS, SECTION 802.1.</p> <p>FPR section 802.1 is amended to read as follows:</p> <p>Applicability: Spaces to be intentionally flooded with flood water (W4) shall be provided with the necessary equipment, devices, piping, controls, etc. necessary for automatic flooding during the flood event and drainage system(s) shall utilize approved piping materials and have sufficient capacity for raising or lowering the internal water level at a rate comparable to the anticipated rate of rise and fall of a flood that would reach the RFD. These pipe systems shall be directly connected to the external flood waters to maintain a balanced internal and external water pressure condition. Provisions shall be made for filling the lower portions of the structure first and for interconnections through or around all floors and partitions to prevent unbalanced filling of chambers or parts within the structures. All spaces below the RFD shall be provided with air vents extending to at least three feet above the elevation of the RFD to prevent the trapping of air by the rising water surface. All openings to the filling and drainage systems shall be protected by screens or grilles to prevent the entry or nesting of rodents or birds in the systems.</p>	<p>Recommend repeal.</p> <p>Related model code sections: 6.3 Wet Floodproofing, 2.7 Enclosures Below the Design Flood Elevation, 4.6 Enclosed Areas Below the Design Flood Elevation, and Chapter 7 Attendant Utilities and Equipment which has to do with installation of utilities within and below the Design Flood Elevation.</p> <p>**Discuss if we want to include a section specific to intentional flooding of building areas with potable water in order to counterbalance external flood loading and mitigate contamination of the building interior. Model code does not specifically address this. Seems like a less-than-optimal solution.</p>
<p>1335.2300 FLOODPROOFING REGULATIONS, SECTION 1101.3.2.</p> <p>FPR section 1101.3.2 is amended by changing the "contents class" of food products from X to 1.</p>	<p>Repeal.</p> <p>The new model code does not address building contents. Contents and classes of contents are typically not regulated by the Minnesota Department of Labor and Industry, Construction Codes and Licensing Division unless they are hazardous.</p>
<p>1335.2400 FLOODPROOFING REGULATIONS, SECTION 1301.2.1.</p> <p>FPR section 1301.2.1 is amended to read as follows:</p> <p>Heating systems utilizing gas- or oil-fired furnaces shall have a float-operated automatic control valve installed in the fuel supply line which shall be set to operate when flood waters reach an elevation equal to the floor level of the space where furnace equipment is installed. <u>A manually operated gate valve that can be operated from a location above the RFD shall be provided in the fuel supply line</u> to serve as a supplementary safety provision for fuel cutoff. The heating equipment and fuel storage tanks shall be mounted on and securely anchored to a</p>	<p>Discuss</p> <p>Reference Model Code Section 7.4 Mechanical, Heating, Ventilation and Air Conditioning Systems</p> <p>**Verify if we want to continue to include the manually operated gate valve in the fuel line above the Design Flood Elevation as a supplementary safety provision.</p> <p>Tanks are referred to Section 9.7 Tanks where they are required to be anchored and designed to withstand applied forces.</p>

<p>foundation pad or pads of sufficient mass to overcome buoyancy and prevent movement that could damage the fuel supply line. As an alternate means of protection, elevation of heating equipment and fuel storage tanks above the RFD on platforms or by suspension from overhead structural systems will be permitted. All unfired pressure vessels will be accorded similar treatment. Fuel lines shall be attached to furnaces by means of flexible or swing type couplings. All heating equipment and fuel storage tanks shall be vented to an elevation of at least three feet above the RFD. Air supply for combustion shall be furnished if required for systems installed in W1 or W2 spaces and piping or duct work for each purpose shall be terminated at least three feet above the RFD.</p>	<p>No specific language regarding venting and ductwork openings a minimum of 3 feet above the Design Flood Elevation.</p> <p>Note that ducts are no longer allowed to be installed below the DFE.</p>
<p><u>1335.2500</u> FLOODPROOFING REGULATIONS, SECTION 1302.2.2.</p> <p>FPR section 1302.2.2 is amended to read as follows:</p> <p>Where the state of dryness of a space is dependent on a sump pump system, or where the stability of a structure during a flood event depends on the relief of uplift pressures on building components, all interior storm water drainage or seepage, appliance drainage, and underslab drain tile systems shall be directly connected to a sump (pump) and discharged at an elevation at least three feet above the RFD.</p>	<p>Repeal</p> <p>Refer to Section 2.7 Enclosures Below the Design Flood Elevation. Enclosures below the DFE are only permitted for parking of vehicles building access, or storage. There is no enclosure allowed that could rely on sump pumps to relieve pressure and keep a space below the DFE dry.</p> <p>** Discuss because we may be generating a lot of existing non-conforming conditions. We may be okay with that, but should discuss that this will not be “business as usual.”</p>
<p><u>1335.2600</u> FLOODPROOFING REGULATIONS, SECTION 1302.2.3.1.</p> <p>FPR section 1302.2.3.1 is amended to read as follows:</p> <p>All vents shall extend to an elevation of at least three feet above the RFD.</p>	<p>** Discuss.</p> <p>Not found in the model code anywhere. Do we want to add this into Chapter 7 in to Section 7.3 Plumbing Systems, and Section 7.4 Mechanical Systems?</p>
<p><u>1335.2700</u> FLOODPROOFING REGULATIONS, SECTION 1302.3.</p> <p>FPR section 1302.3 is amended to read as follows:</p> <p>Sewage Disposal/Treatment: Individual sewage disposal and/or treatment facilities will be permitted in a flood hazard area but only at locations where connection with a public sewer system is not permissible or feasible. Such facilities shall conform to applicable standards, criteria, and rules of the Minnesota Department of Health and Pollution Control Agency in terms of size, construction, use, and maintenance and with standards and criteria of the Minnesota Department of Natural Resources regarding setbacks from normal high water mark of a watercourse in accordance with the public water classification.</p>	<p>** Discuss retaining.</p> <p>Applicable Section 7.3.4 Sanitary Systems. Consider amending the model code to include the amended language.</p>
<p><u>1335.2800</u> FLOODPROOFING REGULATIONS, SECTION 1302.3.1.</p>	<p>Repeal and coordinate with Section 7.3.4 Sanitary Systems above.</p>

<p>FPR section 1302.3.1 regarding cesspools/sewage disposals has been amended by deleting this section in its entirety.</p>	
<p><u>1335.2900</u> FLOODPROOFING REGULATIONS, SECTION 1302.3.2.</p> <p>FPR section 1302.3.2 regarding seepage pits has been amended by deleting this section in its entirety.</p>	<p>Repeal and coordinate with Section 7.3.4 Sanitary Systems above.</p>
<p><u>1335.3000</u> FLOODPROOFING REGULATIONS, SECTION 1302.4.1.</p> <p>FPR section 1302.4.1 is amended to read as follows:</p> <p>Water supply wells, tanks, filters, softeners, heaters, and all appliances located below the RFD shall be protected against contamination by covers, walls, copings, or castings. All vents shall be extended to a minimum elevation of three feet above the RFD.</p>	<p>Amend Section 7.3.3 Plumbing Systems Installed Below Minimum Elevations. Plumbing systems and components, including plumbing fixtures, shall be elevated above the elevation specified in Table 7-1. Where plumbing systems and components have openings below the elevation specified in Table 7-1, the openings shall be protected with automatic backwater valves or other automatic backflow devices. Devices shall be installed in each line that extends below the Design Flood Elevation to prevent the release of sewage into floodwaters and to prevent infiltration by floodwaters into the plumbing. Redundant devices requiring human intervention shall be permitted. <u>All vents shall be extended to a minimum elevation of three feet above the Design Flood Elevation.</u></p>
<p><u>1335.3100</u> FLOODPROOFING REGULATIONS, SECTION 1405.3.</p> <p>FPR section 1405.3 is amended to read as follows:</p> <p>Protection by Dikes, Levees, and Floodwalls: Dikes, levees, and floodwalls must not be considered to provide floodproofing or flood protection unless</p> <p>(1) the dike, levee, or floodwall is built in accordance with recognized and accepted engineering practice and methods, and</p> <p>(2) the design data has been submitted to the Department of Natural Resources and the Federal Emergency Management Agency for revision of the community's flood insurance study (flood insurance rate map) and official zoning map.</p>	<p>Repeal.</p> <p>See Section 1.4.2 Consideration for Flood Protective Works and related commentary section C1.4.2 Consideration for Flood Protective Works “Buildings protected by dikes and levees do not provide complete or absolute protection to an area, they only reduce the frequency or intensity of the flooding.” It seems to be an error to consider buildings in Flood Design Class 2, 3, or 4 (Table 1-1) to be protected from flood if sheltered by these types of structures.</p>
<p>Illustration Figure i: Diagrams showing normal channel, Primary Flood Hazard Area, Secondary Flood Hazard Area, Floodway, Floodway Fringe, etc.</p>	<p>Can accept new model code as equivalent. Figure C1.2 in the commentary shows the cross section illustrating the stream channel, Floodway, Floodway Fringe, Base Flood Elevation, and Special Flood Hazard Area (1% Annual Chance Floodplain) Also includes Figure C1-3 which shows examples of flood plain maps and various flood hazard zones.</p>

Review of the Existing Model Code	Parallel Section in the Proposed Model and Comments
Section 100.1 Introduction to Floodproofing and Building Codes. This chapter provides a narrative overview of the purpose behind the floodproofing regulations.	There is no equivalent section. This section is not code, but actually could be quite helpful as a narrative to explain why we have these provisions. Discuss
Chapter 2	
200.1 Purpose/ application of the code. This section establishes the Floodproofing regulations as part of the Building Code.	1.1 Scope. MR 1335 is not incorporated into the state building code through MR 1300. So, although this model code section does not include incorporation language, it is not necessary. Recommend adopting as written.
200.2 Official Flood Plain Zoning Map: Just a declaration that there is a map. Not necessary.	No parallel language.
200.3 Regulatory Flood Datum (RFD): A declaration and establishment as a reference datum.	No specific parallel language. The model code defines a Design Flood Elevation (DFE) in Section 1.2 as a related item. Recommend adopting as written.
201.1 Scope- Application: Language includes preamble for local municipality adoption. Also references the building code for coordinating construction related work.	Corresponds to Section 1.1 Scope. Now required in all jurisdictions per MR 1300, so original language no longer required. Adopt as written.
201.2 Non-conforming use. Extensive section regarding existing conditions and continuation of use.	Not found in the new model, but covered in Minnesota Rule 1311.
202 Alternate Materials and Methods of Construction	Completely covered by MR 1300.0110, Subpart 13.
203 Tests	Completely covered by MR 1300
204 Organization and Enforcement	Completely covered by MR 1300
205 Permits	Completely covered by MR 1300
206 Inspections	Completely covered by MR 1300
207 Certificate of Occupancy	Completely covered by MR 1300
208 Public Notice of Flood Hazard. Requires the building official to post public notice of the flood hazard elevations and remind building owners to maintain their floodproofing systems so that they remain operational	Not included in the model code. Discuss This seems like more of a policy/recommendation rather than something that should be included in construction requirements. Maybe we can add something like it to MR 1300 under Duties of the Building Official. Recommend NOT including here.
209 Provision of Safe Refuge. Requires not less than 12 square feet per occupant of refuge space above the RFD elevation for buildings with floor elevations located 3 feet below the RFD. 209.3 regulates the use of space located below the RFD to non-habitable spaces.	No provisions in the new code for areas of safe refuge when the surrounding grade is below the DFE. Section 1.5.2 limits use below the DFE to parking vehicles, building access, and storage.
210 Classification and Posting of Buildings and Structures. This section requires classification of spaces into “completely dry, essentially dry, flooded with potable water, flooded with flood water, non-flood-protected” and that the buildings are posted with placards conveying the information.	Table 1-1 classifies building types into flood design classifications based upon occupancy and use. Flood Design Class establishes the minimum elevation of the lowest floor in Table 2-1 and is factored into design loads in Section 1.6 Design options are “Dry Floodproofing,” and “Wet Floodproofing” discussed in Chapter 6. Both conditions still only allow parking, storage, and building access below the DFE. No Placards are required in the model code. Discuss amending to include placards to indicate the flood elevation, the floor elevations, and whether any floors located below the DFE are dry-floodproofed or wet floodproofed. Allowable uses for spaces below the DFE

	and prohibition of other uses below the DFE. Also indicate any human-intervention measures/procedures required in anticipation of flooding conditions.
Definitions:	Amend to include definitions for: Building Official, Freeboard,
Minnesota Rule 6120.5400 Requires that local governments submit to the commissioner flood data, floodplain maps, and degree of flood damage potential for areas over 2 square miles and larger.	Amend definition of Flood Hazard Map to mean the floodplain maps submitted to the commissioner in accordance with Minnesota Rule 6120.5400.
Chapter 4	
400 Floodproofing classification of space	Table 1-1
401 Descriptions of floodproofing classes.	Chapter 6
Chapter 5 Waterproofing	6.2 Dry Floodproofing. Discuss: Previous code Chapter 5 had very detailed descriptions of construction and joinery between building components. Discuss the need to amend to include the level of detail. Otherwise, relying on architects and engineers to design without given parameters.
Chapter 6 Structural Requirements	Section 2.6 refers to ACI 530/ASCE 5/TMS 402, Building code requirements and specifications for masonry structures, and ACI 318 Building Code Requirements for Structural Concrete.
601 Classes of Loads Classifies loads into Class 1 "Waterproof" - where the spaces below the DFE are intended to remain dry; Class 2 "Internal Flooded"- where the interior spaces are intentionally flooded with potable water to alleviate hydrostatic pressures; and Class 3 "Internal Flooded"- where interior spaces are intentionally flooded with flood waters.	These sections correspond to new requirements in Chapter 6 Dry Floodproofing and Wet Floodproofing.
602 Water Loads Includes a series of definitions. The old code does not have nuanced meanings to common terms such as "Uplift", "Vertical Load", and "Lateral Load."	1.2 Definitions Some definitions are included without material change. Others are common language such as "Uplift", "Vertical Load", and "Lateral Load." Recommend amending into Section 2.7 design criteria for hydrodynamic loads found in 602.3 and the associated hydrostatic loading on walls perpendicular and to the up-stream side of the flow. Also reference 1.5.3.3 for Basic Design and Construction Requirements which seem vague. Verify if Section 2.5 Slabs on Grade and associated foundations should be amended to include hydrostatic vertical loading when located below the DFE.
603 Impact Loads Defines Types of Impact Loads and design criteria for each:	Section 2.7 Enclosures Below the Design Flood Elevation 2.7.1 Dry Floodproofed enclosures must meet criteria of Section 6.2. Other enclosures must meet the criteria of ACI 530 for masonry walls, ACI 318 for concrete walls.

<ul style="list-style-type: none"> • Normal Impact: 1000 lb. force traveling at flood water speed acting on 1 square foot of surface. • Special Impact Load: Load intensity at 100 lb. per foot acting horizontally over a one-foot wide horizontal strip at the RFD or any level below it. Can ignore if there are permanent barriers in place. • Extreme Impact Load: Deemed impractical to design except in special cases where the loads can be anticipated and potential for damage is severe. 	<p>The other enclosures shall have openings to allow for automatic entry and exit of flood waters.</p> <p>Recommend amending into Section 2.7 design criteria for normal impact loads and special impact loads.</p>
<p>604 Soil Loads</p> <p>General language regarding soil loads and reference to designing for expansive soils when necessary.</p>	<p>Amend Sections 2.5 Slabs on Grade and 2.6 Foundation Walls to include language requiring structural consideration of expansive soils in Wilkin, Traverse, and Big Stone counties.</p>
<p>605 Hurricane and Tidal Wave Loads</p> <p>Code indicates this type of design is out of scope.</p>	<p>More specific to Chapter 4 Coastal High Hazard Areas and Coastal A Zones which may be designated along portions of Lake Superior shoreline.</p>
<p>606 Loading Conditions- Relates back to the building code for typical design loading conditions.</p>	<p>Since conformance to MR 1305 is required state-wide, additional cross reference to the building code is not necessary.</p>
<p>607 Combined Loads- Discusses use of full intensity for design dead loads, snow loads, and wind loads. Live loads must be considered for worst-case scenarios with respect to bearing pressure and uplift.</p>	<p>Section 1.6 Loads in Flood Hazard Areas refers to ASCE/SEI 7. ASCE/SEI 7-16 Standard addresses load considerations during flood conditions in Sections 5.3 and 5.4. Consideration is very similar.</p>
<p>608 Allowable Stresses- This is a minimal section not allowing overstressing.</p>	<p>ASCE/SEI 7-16 Standard provides design criteria without overstressing.</p>
<p>609 Allowable Soil Pressures- Requires consideration of differing soil bearing capacity under saturation conditions and impact of expansive soils.</p>	<p>Soil conditions are addressed in more general terms in Section 1.5.3.1 Geotechnical Considerations and include reduced bearing capacity, liquefaction, soil consolidation, and scour.</p>
<p>610 Stability- Section includes criteria to resist overturning, flotation, and anchorage.</p>	<p>Addressed by Section 1.5.3 Foundation Requirements with references to various load combinations discussed in Section 1.6.2 as well as specific criteria discussed in Table 2-1 <i>Minimum Elevation of the Top of Lowest Floor for Flood Hazard Areas other than Coastal High Hazard Areas and High Risk Flood Hazard Areas</i> or Table 4-1 <i>Minimum Elevation of Bottom of Lowest Supporting Horizontal Structural Member of Lowest Floor- High Hazard Areas</i> as applicable.</p>
<p>611 Reduction of Uplift Pressures- Section includes criteria for creating barriers to flood water for the purpose of mechanically extracting water by using pumps to alleviate hydrostatic pressure on floor slabs and foundation walls.</p>	<p>The type of floodproofing described in the previous code which would allow for an active type of dry floodproofing below the DFE is no longer allowed by the model code. The system relies upon high velocity pumps to keep water pressure against floors and walls to sustainable levels. If pumps fail or power fails, the condition quickly becomes dangerous and loss can be catastrophic. Section 6.2 prohibits reliance on sump pumps as a means for dry floodproofing but may be utilized to manage incidental seepage.</p>
<p>612 Requirements for Other Flood-Proofing Methods</p>	

<ol style="list-style-type: none"> 1. Building on natural terrain beyond the RFD limit line on natural undisturbed ground. Includes consideration of setback requirements, the effects of soil saturation on foundation performance, and slope stability. Also includes requirements that building access and building utilities must be located above the RFD. 2. Building on fill: Requires clearing of the ground from trees, shrubs, and debris within 5 feet beyond the toe-line of the fill. Fill shall be suitable for the flood conditions anticipated including inundation and scouring as applicable. Fill materials shall be free-draining. Minimum horizontal distance from any point on the perimeter of the building to the top of the fill slope shall be minimum 25 feet but not less than twice the depth of the fill. Fill slopes for granular material shall be not greater than 1 unit vertical for every 1.5 units horizontal. Scour protection for areas exposed to flood velocities of 5 feet per second or more shall be protected with stone or rock slope protection. For areas exposed to flood velocities of less than 5 feet per second, ground cover vegetation shall be deemed sufficient scour protection. 3. Building on stilts- Clear spacing limited to not more than 8 feet parallel to the direction of flow. Solid walls or walled-in columns (walls with pilasters) are allowed when constructed parallel to the general direction of flow. Bracing provided shall cause the least disruption to flood flow and least potential for trapping debris. Design shall include consideration of scour around vertical members. 4. Protection by dikes, levees and/or flood walls. Buildings are considered floodproofed when protected by dikes, levees, or floodwalls. 	<ol style="list-style-type: none"> 1. New code is specific to construction with floors at or below the DFE. Consider amending to include structures where the bottom of the foundation is below the DFE...not just the floor, setbacks from DFE based upon geology, slope stability, and soil performance under inundation conditions. Also consider amending to require building access and utility access above the DFE to ensure building operations under flood conditions. 2. Use of Fill is discussed in Section 1.5.4 which references Section 2.4 for ordinary flood hazard locations and Section 4.5.4 for high hazard locations. Section 1.5.4 requires certified engineering to address soil stability during rapid water rise and rapid draw down, prolonged inundation and scour. No prescriptive criteria. Section 2.4 calls for suitable fill materials and placement in not more than 12 inch lifts. This section also indicates a maximum fill slope of 1:1.5, but does not indicate a minimum setback from the top of the fill slope. Consider amending. Also consider amending to include types of scour protection. Section 4.5.4 is not applicable. 3. Section 1.5.3.4 Addresses building on Piers, Posts, Columns, or Piles referring to “all applicable standards” which include structural design, but no requirements regarding orientation or designs that could trap floating debris. Consider amending. 4. Dikes, levees and flood walls are not considered as flood design protection for buildings. Discuss since this is a major shift in approach. We may want to consider amending to allow dikes, levees and flood walls to provide flood protection if the protective structure designs include freeboard above the 500 year flood design elevation. When a structure is within the 500-year flood zone (0.2% chance of flooding in any given year), there is a 6% chance of being flooded over the life of a 30 year mortgage. FEMA does not require flood insurance for buildings in the 500 year flood plane.
<p>Chapter 7 Closure of Openings</p>	
<p>701 Types of Closures</p> <ol style="list-style-type: none"> 1. Type 1: complete and impermeable sealed barrier at full hydrostatic pressure of flood to RFD 2. Type 2: Essentially dry (limited seepage) barrier at full hydrostatic pressure of flood to RFD 3. Type 3: Barriers/seals impermeable to water borne contamination under equalized pressure. (for wet floodproofing) 	<p>Section 2.7 allows only limited uses below the design flood elevation. When permitted, dry floodproofing generally does not allow openings below the DFE but will allow some limited openings requiring human intervention per Section 6.2.3.</p> <p>Section 2.7 requires all other enclosed areas below the DFE to have either prescriptive or designed openings to allow flood waters to enter and exit the enclosed areas and alleviate hydrostatic pressure.</p>

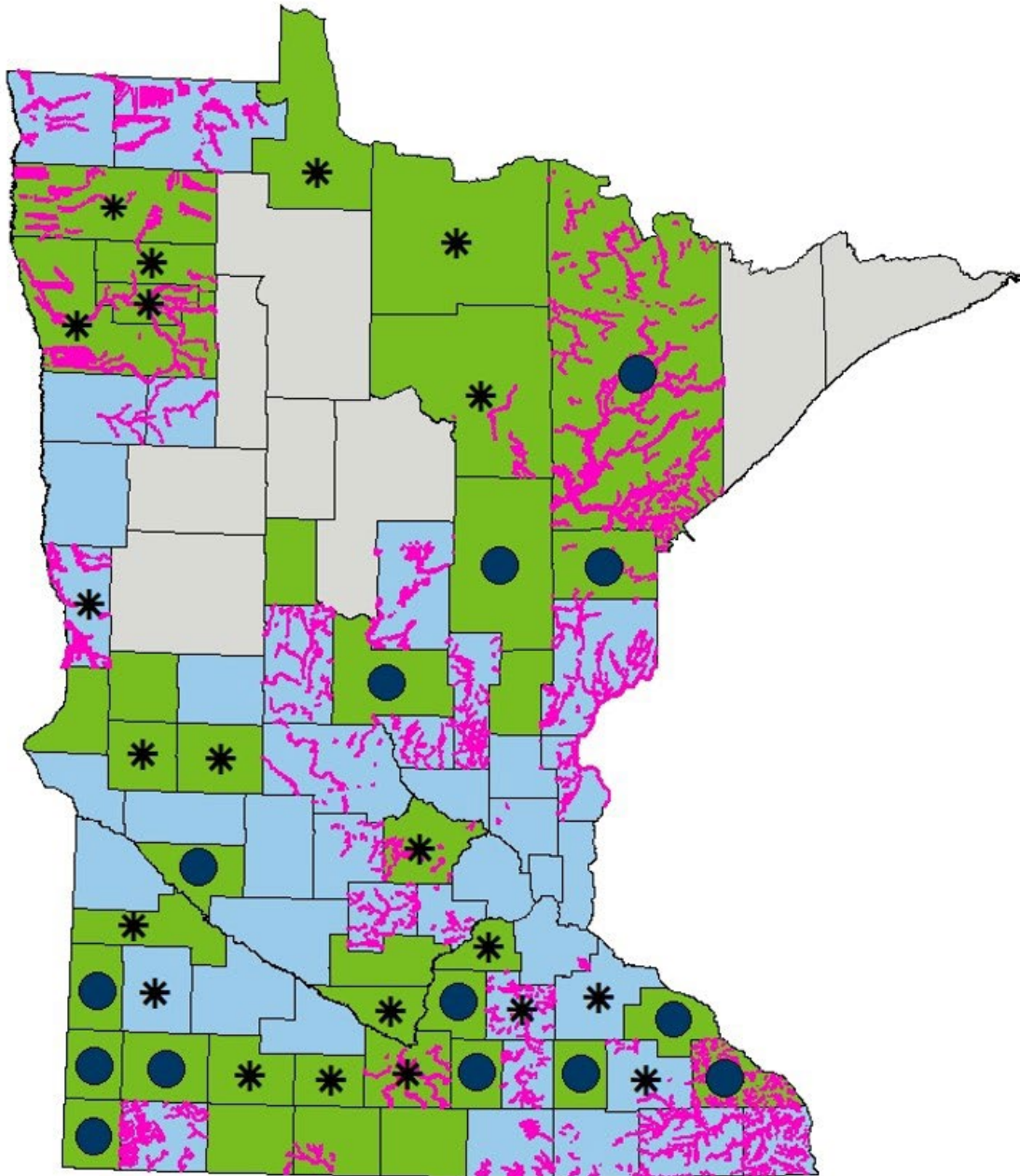
<p>4. Type 4: barriers to the passage of flood carried debris and the loss of floating items from the interior, but not required to form impermeable seals.</p> <p>5. Type 5: existing spaces that do not meet the above criteria.</p>	
<p>702 Requirements- Lists requirements for openings below the RFD.</p>	<p>Requirements not included because openings in dry floodproofed areas are not permissible except under extenuating circumstances and requiring human intervention criteria per Section 6.2.3.</p>
<p>703 Special Applications of Closure Assemblies</p> <p>Allows doors, windows and other types of opening below the RFD for buildings where normal operation has the spaces unoccupied for 72 hours or more.</p>	<p>No parallel allowances or criteria.</p>
<p>Chapter 8 Internal Flooding and Drainage</p>	
<p>801 Intentional Flooding with Potable Water.</p> <p>Section allows intentional flooding with potable water to alleviate hydrostatic pressures without flood water contamination of the interior.</p>	<p>Wet Floodproofing in Section 6.3 does not include or exclude the use of potable water. However the uses allowed in these spaces (parking and agricultural) do not seem to lend themselves to the expense of flooding with potable water. Discuss to clarify.</p>
<p>802 Automatic Flooding with Flood Water-</p> <p>Calls for piping connecting the exterior to the interior such that interior water levels approximate the flood levels on the exterior. Requires filling the lower portions of the building first and having connections between spaces to eliminate differential filling within the building. Designs shall also include vents to prevent the trapping of air below the water surface.</p>	<p>Wall openings are required by Section 2.7 to alleviate hydrostatic pressures. Most buildings with floors below the DFE are required to be allowed to flood and uses are limited those where flooding would have a very low impact. Requires a minimum of two openings on different walls of each enclosed area.</p>
<p>803 Emergency Flooding of Waterproofed Spaces</p> <p>Requires waterproofed areas located below the RFD to have provisions for flooding the space when the flood elevation exceeds the RFD unless demonstrated to be structurally sufficient and approved by the building official. (Design criteria not provided)</p>	<p>No equivalent provisions in the new floodproofing criteria.</p>
<p>Chapter 9 Flooring</p> <p>Includes restrictions on flooring materials and various classifications of finished flooring types.</p>	<p>Materials are addressed in Chapter 5.</p> <p>Flooring finishes are not specifically addressed because uses allowed below the DFE are required to be flood-damage resistant such as steel, concrete, masonry, or preservative treated wood.</p>
<p>Chapter 10 Walls and Ceilings</p>	<p>Materials are addressed in Chapter 5.</p> <p>Wall and ceiling finishes are not specifically addressed because uses allowed below the DFE are required to be</p>

Includes restrictions on wall and ceiling materials and various classifications of finished walls and ceiling types.	flood-damage resistant such as steel, concrete, masonry, or preservative treated wood.
<p>Chapter 11 Contents of Buildings and Structures</p> <p>Chapter classifies a variety of materials some of which are prohibited from being stored in buildings having a floor level below the RFD. Other materials are only permitted not less than one floor above the RFD and so on.</p>	<p>Commercial storage is not permitted in Flood Design Class 1. Commercial storage must have a floor elevation not less than 1 foot above the base flood elevation or above the DFE, whichever is higher. No commercial storage below the DFE.</p> <p>Discuss because this could have significant impact on warehousing adjacent to rivers.</p>
Chapter 12 Electrical	
1201.1 Main Power Service: Must be located above RFD	7.2.1 Electrical service conduits below the DFE shall be waterproofed or conform to the provisions of NFPA 70 for wet locations. Underground service shall be buried to a depth sufficient to prevent movement, separation, or loss due to erosion and local scour.
<p>1201.2 Stationary equipment: switchgear, control centers, transformers, distribution and main lighting panels shall all be located above the RFD.</p> <p>Portable equipment may be located below the RFD if it can be disconnected from a single location and relocated. Disconnect assemblies shall have submersible seals rated for up to 72 hours submersed.</p>	<p>7.2.3 Electric meters shall be located above the DFE unless the meter and the vertical lines extending to the meter are located in a waterproof enclosure.</p> <p>7.2.4 Panelboards, disconnect switches and circuit breakers shall be located above the DFE.</p> <p>7.2.5 Electrical elements below the DFE limit allowances to that required to meet life safety provisions, limited to 120v, suitable for submergence per NFPA 70 and elements suitable for wet locations.</p>
1201.3 Normal and Emergency Lighting Circuits- If extending below the RFD, must come from one common panel located above the RFD with a single disconnect.	7.2.5 Electrical lighting and power below the DFE must come from on common panel located above the DFE with a single disconnect. Elements must comply with NFPA 70 provisions for wet locations.
<p>1201.4 Emergency Lighting Requirements- Locations below the RFD where personnel may be required to conduct emergency operations work with water present shall be provided with automatically operated emergency lighting facilities and emergency lighting circuits which are de-energized prior to personnel working in water. Energy for emergency lighting may be via storage battery, generator, separate power supply, or some combination.</p> <p>Several subsections have criteria regarding commercial power supply systems and variations</p>	<p>7.2.5 Electrical lighting (including emergency lighting) and power below the DFE must come from on common panel located above the DFE with a single disconnect. Elements must comply with NFPA 70 provisions for wet locations.</p> <p>Code does not address power reliability or include subsections on various commercial power supply systems.</p>
<p>1201.5 Lighting and Circuits below the RFD.</p> <p>Maximum 120v, shall be de-energized from a single disconnect. After submersion, re-energizing shall not occur before cleaning and inspection of the electrical parts submerged.</p>	7.2.5 Electrical lighting and power below the DFE must come from on common panel located above the DFE with a single disconnect. Elements must comply with NFPA 70 provisions for wet locations.
1201.6 Submersible equipment	Same as above

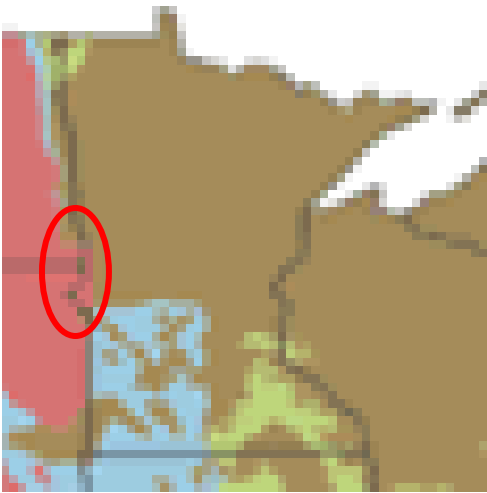
1201.7 Submersible wiring	Same as above
1201.8 Elevators- Electrical power equipment and components shall be located above the RFD.	7.5 Elevators- All elevator power equipment and components shall be located above the DFE (except the hydraulic components of a hydraulic elevator). Where there is potential for an elevator cab to descend into flood waters, the elevator shall be equipped with controls to prevent the cab from descending into flood water.
1201.9 Electrical Heating Equipment- Electric unit heaters below the RFD shall be installed as portable Equipment per 1201.2.	Not specifically addressed.
1201.10 Sump Pump Installation- Sumps installed to keep areas of the structure free of water shall be provided with independent float operated warning alarms and shall be connected to emergency standby generator. Generator shall be located above the RFD and capable of providing power for 125% of the anticipated duration of the design flood.	New code does not allow reliance upon sump pumps to keep building locations from flooding.
1301.1- Mechanical Scope: Applies to buildings having heating, air conditioning, and ventilations systems including all appurtenances in structures within a flood hazard area.	
1301.2 Location: HVAC equipment shall to the maximum extent possible be installed in areas and spaces above the RFD. When not feasible, equipment shall be directly accessible from locations above the RFD.	7.1 Equipment must be located above the DFE.
1301.2.1 Systems using gas or oil fired furnaces shall have a float installed in the fuel supply line to operate when flood waters reach an elevation equal to the floor level of the space where the furnace equipment is installed. A secondary valve control located above the RFD shall be provided.	7.4 Systems using gas or oil fired furnaces shall have a float installed in the fuel supply line to operate when flood waters rise above the DFE. Note: Equipment is not permitted to be installed below the DFE.
13.1.2.1.1 All ductwork for warm air heating systems located below the RFD shall be provided with emergency openings for internal flooding and drainage of the ducts with all openings having covers with gravity operators for closure during normal operations.	7.4 Ductwork and ductwork insulation shall be at or above the DFE unless designed, constructed, and installed to resist all flood-related loads and to prevent flood water from entering or accumulating within the ductwork. Air intake openings and exhaust outlets shall be at or above the DFE. Tanks associated with HVAC shall meet the requirements of Section 9.7.
1301.2.2 Air conditioning and ventilation systems installed below the RFD shall be installed in W1 or W2 spaces only.	7.1 Equipment must be located above the DFE.
1301.2.3 HVAC installed below the RFD and not installed in W1 or W2 spaces shall have all bearings, seals, shafts, gears, clutches, or controls not capable of withstanding water or silt damage or hydrostatic or hydrodynamic loading shall be provide with suitable protective waterproofing enclosures as required by the building official unless they are considered expendable.	7.1 Equipment must be located above the DFE.
1302 Plumbing systems	7.3 Plumbing Systems

<p>1302.1 Applicability- applies to sanitary drainage, storm drainage, sanitary facilities, water supply, storm water and sewage disposal systems.</p> <p>1302.1.1 allows existing systems to remain in use.</p> <p>1302.1.2 Requires permits to change existing systems or install new ones.</p> <p>1302.1.3 Requires that materials for new work consider the hydrostatic, hydrodynamic, and chemical actions of flood waters on the interior and exterior of piping systems, joints, connections, valves, traps, seals, and fixtures.</p>	<p>Section 7.3 includes sanitary collection systems, rain runoff collection systems sanitary facilities, and plumbing fixtures, water supply systems, (including water heaters and water conditioning equipment) and sewage disposal systems.</p> <p>Section 1.1 Establishes scope as applicable to new construction and alterations to existing work. Existing systems in use are allowed to remain implicitly because they are out of scope.</p> <p>Permits are required by MR 1300. Verify that/if permits are required in non-code-enforced areas below the DFE.</p>
<p>1302.2 Below the RFD: Sanitary sewer and storm drain systems with openings below the RFD shall have auto-back water valves or other backflow prevention at each discharge passing through the exterior wall. W1 spaces shall have manually operated shut-off valves that can be operated from a location above the RFD as supplementary protection.</p> <p>1302.2.1 Spaces below the RFD “protected” by the owner’s “contingency plan” may use standpipes attached to floor drains, clean-outs, and other openings below the RFD and/or manually operated shut-off valves or closure devices.</p> <p>1302.2.2 Where dryness or structural stability depends on sump pumps, all interior storm water drainage or seepage and under-slab drain tile system shall be directly connected to a sump with pump and discharged not less than 3 feet above the RFD.</p> <p>1302.2.3 Sanitary sewer and septic required to remain in operation shall be provided with a sealed holding tank and isolation/diversion piping, ejectors and appurtenances necessary for the storage of 150% of anticipated demand for the duration of the RFD. All vents shall be not less than 3 feet above the RFD. Pipe openings through the exterior wall and below the RFD shall be flood-proofed/waterproofed.</p>	<p>7.3.4 Sanitary Systems:</p> <ul style="list-style-type: none"> • Design to minimize infiltration of flood waters into the sanitary system and discharges from the system into flood waters. • Backflow prevention required for systems located below the DFE. • No “protection by contingency plan” under the new provisions. • No designs allowed which rely upon sump pumps to keep spaces dry or to alleviate hydrostatic/hydrodynamic pressures on the building structure. • Tanks required to hold 150% of the anticipated sewage capacity associated with occupancy during the flood conditions AND during the subsequent periods of saturated soil when sewage will not percolate. • Vents and openings shall be located not less than 3 feet above the DFE. • Any tanks must be designed to resist 1.5x the buoyancy uplift forces when waters are at the DFE.
<p>1302.3 Sewage Disposal/Treatment: Sewage treatment facilities below the RFD are permitted, except cesspools and seepage pits. Designs shall consider the geology of the area, adjacent wells, and the effects of flooding. Installations in low swampy areas or where water tables are high are prohibited.</p>	<p>Not specifically addressed in the new provisions, but completely handled by the plumbing code. (verify)</p>







<p>1302.4 Water Supply: Potable water supplies located in a Flood Hazard Area shall be designed and installed to prevent contamination. No water supply wells shall be located within a building used for human habitation.</p> <p>1302.4.1 Wells, filters, softeners, heaters and all appliances below the RFD shall be protected from contamination. Vents shall be extended to not less than 3 feet above the RFD.</p> <p>1302.4.2 Backflow devices shall be installed on the main water service lines at building entry points. Devices shall be installed at accessible locations.</p> <p>1302.4.3 Water supply wells shall be drilled or driven. Wells must be deeper than 25 feet below the ground surface.</p>	<p>7.3.3 Plumbing Systems Installed Below Minimum Elevations.</p> <p>Plumbing fixtures not permitted below the DFE. Where openings occur below the DFE, they must be protected from contamination with either valves or backflow prevention. Redundant devices requiring human intervention are permitted.</p>
	<p>Consider incorporating ASCE/SEI 7, Chapter C5 into the Minnesota Rule 1335 Book.</p>



- DFIRM Counties
- Paper Map Counties
- Unmapped Counties
- Estimated 1% Base Flood Elevations
- ✱ Preliminary DFIRMs Available
- Countywide Modernization



[Expansive Soil Causes Basement & Foundation Problems \(geology.com\)](http://geology.com)

-  Over 50 percent of these areas are underlain by soils with abundant clays of high swelling potential.
-  Less than 50 percent of these areas are underlain by soils with clays of high swelling potential.
-  Over 50 percent of these areas are underlain by soils with abundant clays of slight to moderate swelling potential.
-  Less than 50 percent of these areas are underlain by soils with abundant clays of slight to moderate swelling potential.
-  These areas are underlain by soils with little to no clays with swelling potential.
-  Data insufficient to indicate the clay content or the swelling potential of soils

ftp://ftp.dnr.state.mn.us/pub/waters/floodplain/County_data/

[Floodplain Training and Education | Minnesota DNR \(state.mn.us\)](http://state.mn.us)