1. 1:30 P.M. Special Commission Meeting - FP Variance Request, Mackenstadt

1.I. 1:30 PM SM 8-4-2022 Agenda Docs

Documents:

8-4-2022 AAR MACKENSTADT ADDENDUM DOCS.PDF
8-4-2022 DOCS FROM 7-26-2022 CM - MACKENSTADT VARIANCE REQUEST.PDF

2. 1:30 P.M. Special Commission Meeting 8-4-2022 Engineering Certifications

Documents:

EC UPDATED 8-3-22.PDF
ENG CERTS UPDATED 8-3-22.PDF
Cascade County
Special Commission Meeting
August 4, 2022 @ 1:30 p.m.
Commission Chambers, Room 105
325 2nd Avenue North, Great Falls, MT

The Board of Cascade County Commissioners will be broadcasting the Commission Meeting via Zoom.
Webinar participants must register in advance for the Commission Meeting:
https://us02web.zoom.us/webinar/register/WN_LW6uQoGkTGawZWrPhGEdA
After registering, you will receive a confirmation email containing information about joining the webinar.
If you need dial in access: 888 788 0099 (Toll Free) or 877 853 5247 (Toll Free) Webinar ID: 876 4048 6415 Passcode: 238300

Please note the agenda order is tentative and subject to change by the Board without prior notice.
Therefore, members of the public are encouraged to be in attendance at the time the meeting is scheduled to begin.
Public comment during public participation is limited to a maximum seven (7) minutes.

Call to Order                     Chairman Joe Briggs

Pledge of Allegiance

1. Motion to Approve or Disapprove:
   Contract 22-88: Floodplain Variance #2022-013 Request
   Project Location: 76 Eaton Avenue, Great Falls, MT
   Initiated by: Greg & Elizabeth Mackenstadt
   (Tabled: 7/26/2022 Commission Meeting)

2. Public comment on any public matter that is not on the meeting agenda, and that is within the Commissioners’ jurisdiction. (MCA 2-3-103)

3. Adjournment.
#### Agenda Action Report

*Prepared for the*  
Cascade County Commission

<table>
<thead>
<tr>
<th>ITEM</th>
<th>Staff Report for Floodplain Variance #2022-013</th>
</tr>
</thead>
<tbody>
<tr>
<td>INITIATED BY</td>
<td>Greg &amp; Elizabeth Mackenstadt</td>
</tr>
<tr>
<td>SUBJECT</td>
<td>Variance Request from Cascade County Floodplain Regulations (&quot;CCFR&quot;) § 9.3(1)</td>
</tr>
<tr>
<td>PURPOSE</td>
<td>Variance from CCFR § 9.3(1) requiring the lowest floor elevation (including basement) including electrical, heating, duct work, ventilation, plumbing and air conditioning equipment and other services to be two (2) feet above the Base Flood Elevation (BFE). The Design Plan proposes the lowest floor over 7 feet below the BFE.</td>
</tr>
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</table>
| PROJECT LOCATION | 76 Eaton Avenue, Great Falls, MT  
Lot 6D of Block 1 of the Amended Eaton Suburban Addition, Section 20, Township 20 North, Range 04 East, PMM, Cascade County, MT  
FIRM Panel #30013C0626E  
Parcel #2005900 |
| RECOMMENDATION | Denial of Variance Request |
| PRESENTED BY | Charity N. Yonker, CFM  
Planning Director/Floodplain Administrator |
Floodplain Variance #2022-013 – Staff Report Addendum

Presented By: Cascade County Planning Department
Charity N. Yonker, Planning Director/Floodplain Administrator

Regarding: Floodplain Variance #2022-013 to allow an enclosure below the Base Flood Elevation of a residential structure on Parcel #2005900.

The original Staff Report was prepared in advance of the public hearing in front of the Board of County Commissioners on July 26, 2022. On July 22, 2022, the Applicants provided an Elevation Certificate and revised Design Plans, that were not incorporated into the Staff Report. However, the additional materials submitted by the Applicants were provided to the Board of County Commissioners the same day they were received, and they were considered in the July 26, 2022, Commission hearing. The Elevation Certificate shows the lowest floor at 3350.4’ as compared to the Engineer’s original Certifications at 3351’. The revised Design Plans submitted removed all flood vents from the original proposal. Therefore, the July 22, 2022, did not change the Staff Report’s analysis as to whether the variance criteria had been satisfied. The removal of the flood proofing adversely effected the floodproofing criterion.

On July 26, 2022, the Board of County Commissioners postponed the decision on FP Variance #2022-013 after the close of the public hearing. During the hearing, the Applicants clarified that the utilities would be installed at least two (2) feet above the BFE, and no appliances would be placed in the enclosure. Following the hearing, the Applicants provided a clearer copy of the Design Plans to the Planning Department. The Design Plans removed the gypsum from the enclosure. Applicants were also made aware of the need to correct the Elevation Certificate to reference the correct FIRM Panel, to amend the Engineer’s Certification with the correct Base Flood Elevation reference to correspond to the Elevation Certificate, and that these documents may need further amending depending on the outcome of this variance application. On July 29, 2022, the Commission met with the Department of Natural Resources and Conservation (DNRC). DNRC discussed potential liability to the county and consequences to the community as a result of approving the requested floodplain variance.

Originally, the Applicants had stated that the reason for wanting the enclosure at the start of permitting was due to concern that the utilities that ran from the elevated residence to the ground would freeze. A utility chase is allowed, and it can be insulated to prevent freezing. No other reason has been submitted as to why the enclosure is necessary.

A variance shall only be issued upon a determination that the variance is the minimum allowance necessary, considering the flood hazard, to afford relief from the CCFR and provided all of the findings are met.
The following table is provided for the Board’s consideration. This table is in addition to the facts, findings, and conclusions contained in the original Staff Report. For the ease of reading and time, the “Facts” column has been abbreviated. Those findings in “red” represent grounds for denial, if no additional information, testimony, materials, or condition(s) can be imposed by the Board in order to make the finding. If criteria/findings have been found to be satisfied, the box will be marked with a “Yes” in the “Satisfied?” column and the condition and documentation columns will be shaded to show no condition is needed.

<table>
<thead>
<tr>
<th>CCFR § 11.3</th>
<th>Variance Criteria/Finding</th>
<th>Facts</th>
<th>Satisfied?</th>
<th>Proposed Condition to Reach Finding</th>
<th>Documentation Needed</th>
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<tbody>
<tr>
<td>(1)(1)</td>
<td>There is a good and sufficient cause.</td>
<td>Applicants state rebuilding their house is good and sufficient cause. The variance is to allow an enclosure below BFE and will not affect the ability to build a residence.</td>
<td>□ Yes</td>
<td>Applicant has not shown good and sufficient cause to allow the enclosure below BFE. Failure to meet this criterion is grounds for denial.</td>
<td>Applicants’ Variance Application/ Applicants’ testimony</td>
</tr>
<tr>
<td>(1)(2)</td>
<td>Failure to grant the variance would result in exceptional hardship to the applicant.</td>
<td>Failure to grant variance would mean space below elevated structure is left open.</td>
<td>□ Yes</td>
<td>Applicant has not shown an exception hardship will result if this variance is not granted to allow an enclosure below BFE. Failure to meet this criterion is grounds for denial.</td>
<td>Applicants’ Variance Application/ Applicants’ testimony</td>
</tr>
<tr>
<td>(1)(3)</td>
<td>There are no basements or residential dwelling that has the lowest floor elevation below the Base Flood Elevation.</td>
<td>Lowest floor elevation is 3350.4 – 4.6 feet below BFE</td>
<td>□ Yes</td>
<td>A Nonconversion Agreement must be executed prior to the issuance of any Floodplain Permit preventing any residential use in the enclosure below the Base Flood Elevation.</td>
<td>Nonconversion Agreement</td>
</tr>
<tr>
<td>(1)(4)</td>
<td>The lowest floor of crawl spaces are no more than two (2) feet below the exterior lowest adjacent grade and must have an inside</td>
<td>No crawl space proposed.</td>
<td>□ Yes</td>
<td></td>
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<td>11.3</td>
<td>Dimension from interior ground to the bottom of the living floor of less than five (5) feet. The crawl spaces must meet the dry flood proofing requirements in Section 9.5.2.</td>
<td>No data to support there will be no increase to flood heights to existing insurable buildings.</td>
<td>☐ Yes ☒ No</td>
<td>The Applicants’ Engineer must certify and provide supporting technical data demonstrating that granting of the variance will not result in increased flood heights to existing insurable buildings.</td>
<td>Update Engineer’s Certifications &amp; supporting technical data</td>
</tr>
<tr>
<td>(1)(5)</td>
<td>Granting a variance will not result in increased flood heights to existing insurable buildings, additional threats to public safety, extraordinary public expenses, create nuisances, cause fraud on or victimization of the public, or conflict with other existing local laws or ordinances.</td>
<td>Electrocution – threat to public safety. Water contamination – threat to public safety/health. Evacuation – public expense. Once enclosed, high risk it will be utilized for residential use – cause fraud on or victimization of the public. Zoning and Floodplain Permit still required.</td>
<td></td>
<td>All utilities devices (including electricity and plumbing) must be installed 2 feet above the Base Flood Elevation. A utility chase is allowed (including utility insulation) that is made of flood resistant materials, not large enough for a human to enter. A Nonconversion Agreement must be executed prior to the issuance of any Floodplain Permit preventing any residential use in the enclosure below the Base Flood Elevation. The Applicants shall obtain all other required permits for the project prior to doing any work, including the Floodplain Permit.</td>
<td>Update Design Plans to show where the utility chase will be located. Nonconversion Agreement. Floodplain Permit Location/Conformance Permit.</td>
</tr>
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<td>(1)(6)</td>
<td>The proposed use is adequately flood proofed.</td>
<td>Wet flood proofing was removed from Design Plans on 7/22/22.</td>
<td>□ Yes □ No</td>
<td>Wet flood proofing must be completed in accordance with the requirements set forth in CCFR § 9.5(1) including restricting the use of the enclosed space to use as parking, loading, and storage of equipment or materials that are not appreciably affected by floodwater.</td>
<td>Updated Design Plans, Elevation Certificate and Engineers’ Certifications</td>
</tr>
<tr>
<td>(1)(7)</td>
<td>The variance is the minimum necessary, considering the flood hazard, to afford relief.</td>
<td>Lowest floor is over 6 feet below the standard requirement and 4.6 feet below the BFE.</td>
<td>□ Yes □ No</td>
<td>Applicants are not requesting the minimum necessary to have a residence on the property. Failure to meet this criterion is grounds for denial.</td>
<td>Updated Design Plans, Elevation Certificate, and Engineer’s Certifications</td>
</tr>
<tr>
<td>(1)(8)</td>
<td>Reasonable alternative locations are not available.</td>
<td>Entire property is in the RFHA without much topographic variation.</td>
<td>□ Yes □ No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1)(9)</td>
<td>There is no danger to life and property by water that may be backed up or diverted by the obstruction or use.</td>
<td>No data provided.</td>
<td>□ Yes □ No</td>
<td>The Applicants’ Engineer must certify and provide supporting technical data demonstrating there is no danger to life and property by water that may be backed up or diverted by the obstruction or use.</td>
<td>Update Engineer’s Certifications &amp; supporting technical data</td>
</tr>
<tr>
<td>(1)(10)</td>
<td>There is no danger that the obstruction or use will be swept downstream to the injury of others.</td>
<td></td>
<td>□ Yes □ No</td>
<td>The Applicants’ Engineer must certify and provide supporting technical data demonstrating there is no danger that the obstruction or use will be swept downstream to the injury of others.</td>
<td>Update Engineer’s Certifications &amp; supporting technical data</td>
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<td>(1)(11)</td>
<td>Incorporates measures in the construction or alteration of the obstruction or use that lessens the danger.</td>
<td>No data provided.</td>
<td>☒ Yes ☒ No</td>
<td>Wet flood proofing must be completed in accordance with the requirements set forth in CCFR § 9.5(1) including restricting the use of the enclosed space to use as parking, loading, and storage of equipment or materials that are not appreciably affected by floodwater.</td>
<td>Updated Design Plans, Elevation Certificate and Engineer’s Certifications</td>
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<td>(1)(12)</td>
<td>The permanence of the obstruction or use.</td>
<td>Permanent</td>
<td>☒ Yes ☒ No</td>
<td></td>
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<tr>
<td>(1)(13)</td>
<td>There is no adverse affect to anticipated development in the foreseeable future of the area that may be affected by the obstruction or use.</td>
<td>No data provided.</td>
<td>☒ Yes ☒ No</td>
<td>The Applicant’s Engineer shall certify and provide supporting technical data demonstrating there will be no adverse affect to anticipated development in the foreseeable future of the area that may be affected by the obstruction or use.</td>
<td>Update Engineer’s Certifications &amp; supporting technical data</td>
</tr>
<tr>
<td>(1)(14)</td>
<td>There is no adverse affect to existing properties or structures.</td>
<td>No data provided.</td>
<td>☒ Yes ☒ No</td>
<td>The Applicant’s Engineer shall certify and provide supporting technical data demonstrating there will be no adverse affect to existing properties and structures.</td>
<td>Update Engineer’s Certifications &amp; supporting technical data</td>
</tr>
<tr>
<td>(1)(15)</td>
<td>Any increase to the Base Flood Elevation in a Floodway has been approved by FEMA for flood insurance purposes and any increase to the Base Flood</td>
<td>No data provided for encroachment analysis.</td>
<td>☒ Yes ☒ No</td>
<td>The Applicants’ Engineer shall certify and provide supporting technical data demonstrating there will not be more than a 0.5 feet increase to the Base Flood</td>
<td>Update Engineer’s Certifications &amp; supporting technical data</td>
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<td>Elevation in the Floodway or Floodplain of more than 0.5 feet is an alteration of the Regulated Flood Hazard Area has been duly amended pursuant to Section 4 of the CCFR.</td>
<td>Elevation as a result of the proposed project.</td>
<td></td>
<td></td>
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<tr>
<td>(2)(1)</td>
<td>If the new construction or substantial improvements on a lot of one-half acres or less is contiguous to and surrounded by lots of existing structures constructed below the base flood elevation, a variance may be approved. However, as lot sizes increases beyond one-half acre additional technical justification may be required.</td>
<td>Lot is .41 acres.</td>
<td>Yes</td>
<td></td>
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<tr>
<td>(2)(2)</td>
<td>Historical Structures – variances may be issued for the repair or rehabilitation of historic structures upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and the variance is the minimum relief necessary to preserve the historic character and design of the structure.</td>
<td>Not a historical structure.</td>
<td>No</td>
<td></td>
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Elevation in the Floodway or Floodplain of more than 0.5 feet is an alteration of the Regulated Flood Hazard Area has been duly amended pursuant to Section 4 of the CCFR.

If the new construction or substantial improvements on a lot of one-half acres or less is contiguous to and surrounded by lots of existing structures constructed below the base flood elevation, a variance may be approved. However, as lot sizes increases beyond one-half acre additional technical justification may be required.

Historical Structures – variances may be issued for the repair or rehabilitation of historic structures upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and the variance is the minimum relief necessary to preserve the historic character and design of the structure.
Motions for Consideration:

1. "I move that the Board **deny** the Applicant's requested Variance from CCFR Section 9.3(1) be denied upon a finding that one or more of the variance criteria/findings listed in CCFR Section 11.3 have not been met."

OR

2. "I move that the Board **approve** the Staff Report and Addendum with Findings of Fact, additional materials provided, testimony, and public comments, and **approve** the Applicants' requested variance from Cascade County Floodplain Regulation § 9.3(1) to allow the enclosure of the proposed residential structure below the Base Flood Elevation on Parcel #2005900 with the following conditions:

   1. A **Nonconversion Agreement** must be executed prior to the issuance of any Floodplain Permit preventing any residential use in the enclosure below the Base Flood Elevation;

   2. All utilities devices must be installed 2 feet above the Base Flood Elevation. A utility chase is allowed (including utility insulation) that is made of flood resistant materials, not large enough for a human to enter and shall be included on the Design Plans;

   3. Wet flood proofing must be completed in accordance with the requirements set forth in CCFR § 9.5(1) including restricting the use of the enclosed space to use as parking, loading, and storage of equipment or materials that are not appreciably affected by floodwater; and

   4. The Applicant's Engineer shall certify and provide supporting technical data demonstrating:

      i. That granting of the variance will not result in increased flood heights to existing insurable buildings;

      ii. There is no danger to life and property by water that may be backed up or diverted by the obstruction or use;

      iii. There is no danger that the obstruction or use will be swept downstream to the injury of others;

      iv. There will be no adverse affect to anticipated development in the foreseeable future of the area that may be affected by the obstruction or use;

      v. There will be no adverse affect to existing properties and structures; and

      vi. There will not be more than 0.5 feet increase to the Base Flood Elevation as a result of the proposed project.

5. The Applicants shall obtain all other required permits for the project prior to doing any work, including the Floodplain Permit and a Location/Conformance Permit in order to comply with local laws and ordinances.
WALL SECTION, TYP.

SECTION DRAWING
SCALE: 1" = 1'-0"
Agenda Action Report
Prepared for the
Cascade County Commission

ITEM

Public Hearing
Staff Report for Floodplain Variance #2022-013

INITIATED BY

Greg & Elizabeth Mackenstadt

SUBJECT

Variance Request from Cascade County Floodplain Regulations ("CCFR") § 9.3(1)

PURPOSE

Variance from CCFR § 9.3(1) requiring the lowest floor elevation (including basement) including electrical, heating, duct work, ventilation, plumbing and air conditioning equipment and other services to be two (2) feet above the Base Flood Elevation (BFE). The Design Plan proposes the lowest floor over 7 feet below the BFE.

PROJECT LOCATION

76 Eaton Avenue, Great Falls, MT
Lot 6D of Block 1 of the Amended Eaton Suburban Addition, Section 20, Township 20 North, Range 04 East, PMM, Cascade County, MT
FIRM Panel #30013C0626E
Parcel #2005900

RECOMMENDATION

Denial of Variance Request

PRESENTED BY

Charity N. Yonker, CFM
Planning Director/Floodplain Administrator
The subject property is described as Parcel #2005900 and located in the Flood Fringe of insurance Zone AE of FEMA's designated Regulated Flood Hazard Area based on Flood Insurance Rate Map (FIRM) Panel #30013C0626E (eff. March 19, 2013).

Cascade County Floodplain Permit Application #2022-005 was submitted by Greg & Elizabeth Mackenstadt to build a residential structure on their property following the destruction of their previous home on the property as the result of the Gibson Flats Fire that occurred on December 1, 2021. That Application remains insufficient for a number of reasons:

1. The Elevation Certificate submitted was a previous Elevation Certificate dated 2016 (for undeveloped lot), that was not based on "Construction Designs" for this project and did not all data required, e.g., floor elevations;

2. The Design Plans need to be modified: a) the Design Plans submitted by the Architect for the proposed home does not show the Base Flood Elevation (BFE) or the structural elevations in reference to the BFE; b) the Design Plans submitted shows appliances in the ground-level enclosure;

3. The Engineer's Certification states that floodproofing is being proposed within two (2) feet of ground level, which is not allowed for residential structures in the Flood Fringe (only allowed for non-residential structures) and that the project is designed in compliance with the Cascade County Floodplain Regulation (CCFR) and further provides that the lowest floor is 3351.7, below the Base Flood Elevation showing noncompliance with CCFR § 9.3(1).

A variance from zoning was applied for and granted by the Zoning Board of Adjustment on April 21, 2022, from Cascade County Zoning Regulations § 8.6 that requires a Letter of Map Change be obtained from FEMA before any Location/Conformance Permit can be issued for a residential structure in the designated floodplain area. This variance allowed the property owners to consider elevating the structure without being constrained to structural fill only. Essentially, if that variance was not obtained, this floodplain variance would not be a consideration.

Thereafter, the Planning Department was informed that the property owners poured the foundation while their Floodplain Permit Application was still pending based on the submitted Design Plans presumably putting the lowest floor at about 3351.7'. On June 15, 2022, the Planning Department in a phone conversation with Mr. Mackenstadt told Mr. Mackenstadt to cease and desist construction. It was stated by Mr. Mackenstadt that he understood and that he would not need a formal cease and desist letter sent to him.

The Applicant has requested a variance from CCFR § 9.3 to allow a complete enclosure, consisting of a tuck under one car garage, framed out and finished storage room and laundry facilities. The Engineer working on behalf to the property owners represents that
the lowest floor is 3351.7' and the Base Flood Elevation is 3355' in his certification, though no Elevation Certificate has been submitted showing these calculations based on the Design Plans submitted. The Design Plans propose wet flood proofing, when flood proofing of a residential structure is not allowed unless a variance is obtained.

6. Legal Notice of this public hearing was completed with a mailing to surrounding property owners sent on June 28, 2022, and resent on July 8, 2022, and a legal ad in the Great Falls Tribune was published on Sunday, July 17, 2022, and Sunday, July 24, 2022.

7. Section 9.3 “RESIDENTIAL REQUIREMENTS” of the Cascade County Floodplain Regulations (“CCFR”) provides that “[n]ew construction, alterations, and substantial improvements of residential dwellings including manufactured homes and recreational vehicles on site for more than 180 consecutive days must be constructed such that:

a. The lowest floor elevation (including basement) including electrical, heating, duct work, ventilation, plumbing and air conditioning equipment and other services is two (2) feet above the Base Flood Elevation. Elevating may be by either suitable fill, stem walls, pilings or other acceptable means;

b. Crawl spaces must be designed so that the crawl space floor is at or above the Base Flood Elevation. Crawl spaces having an inside dimension of more than five (5) feet from the ground to the living floor level must meet the requirements in this section for a basement;

c. Where existing streets, utilities, lot dimensions, or additions onto existing structures make strict compliance with the provisions impossible, a lesser amount of fill or alternative flood proofing measures may be permitted only by variance approval; and

... (other provisions in this Section are not relevant to this proposal).

8. The following definitions are taken from the CCFR § 2.2:

- **Base flood elevation** means the elevation above sea level of the base flood in relation to the National Geodetic Vertical Datum of 1929 or the North American Vertical Datum of 1988 or unless otherwise specified.

- **Flood Proofing** means any combination of structural or non-structural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, HVAC systems, structures and their contents.

- **Lowest floor** means any floor used for living purposes, storage or recreation. This includes any floor that could be converted to such a use.

- **Structure** means a walled and roofed building, including a gas or liquid storage tank that is principally above ground, as well as a manufactured home. A structure is also, bridge, culvert, dam, diversion, wall, revetment, dike, or other projection that may impede, retard, or alter the pattern of flow of water.

**Analysis & Findings of Fact**

Section 11.3 of the CCFR states that “a variance shall only be issued upon a determination that the variance is the minimum allowance necessary, considering the flood hazard, to afford relief from the CCFR and provided all of the findings are met.
(1) There is good and sufficient cause; (44 CFR 60.6(a)(3)).

Applicants: Yes, the rebuilding of our houses does show good and sufficient cause. We need our home built back so we have a place to live.

Staff: If this variance is not granted, the Applicants are still allowed to build a residential structure that complies with the CCFR requirements, which would be a residential structure having the lowest floor 2' above the Base Flood Elevation. The Applicants have not shown good and sufficient cause to allow deviation from this standard based on their Variance Application. Alternative designs could be considered that Applicants are not willing to modify and submit to the Department. This variance consideration has not been satisfied based on the Variance Application.

(2) Failure to grant the variance would result in exceptional hardship to the applicant; (44 CFR 60.3(a)(3)) & ARM 36.15.218(b)).

Applicant: The event of arson (file) has caused extreme hardship due to the loss of properties. It was not self-created. This is my only option to rebuild my home. This is the exact concrete footprint that was previously approved on permit FP 2016-012. Home which burned was only 5 years old.

Applicants' Additional Response: Exceptional hardship has been unfairly burdened by the general rules to obtain permits to rebuild. The previous permit FP 2016-012 was approved. If this variance is not granted it creates further unnecessary hardship resulting from the application placed before us. We the Mackenstadts and residents of Gibson Flats did not self-create this extreme hardship. If granted this variance will achieve some level of justice to those that burned our homes. The exceptional hardship is in fact the loss of multiple homes.

Staff: If this variance is not granted, the Applicants will be required to comply with the CCFR requirements which will still allow the Applicants to construct a residential structure.

FEMA requires substantially damaged structures to be brought up to compliance with the regulatory requirements. Further, the previous Floodplain Permit was issued for the previous house that required compliance with the same version of the CCFR as today and the past Floodplain Administrator sent out a letter to the Applicants requesting an Elevation Certificate because it appeared by the site photos that the home was not built to CCFR requirements, and an Elevation Certificate was not provided to the Department. There is no record the Applicants obtained any variances to allow deviation from these requirements.

Applicants make the argument that the requirement to obtain permits (floodplain and zoning permits) is causing the exception hardship. These permits are required for any development in this area and throughout the county, and would have been triggered, despite of arson, for an alteration of an existing structure, grading, filling, excavation, and any new development. These requirements have been adopted by the Commission to benefit all of Cascade County. The National Flood Insurance Program which the County participates in to make flood insurance available to county citizens expresses that one of the purposes of the program is to make communities more flood resilient by eliminating or reducing flood risk to property and life. Compliance with permitting is not an exceptional
hardship. If this is the case, every person who is developing in the Regulated Flood Hazard Area would be able to claim "exceptional hardship" due to permitting requirements.

While it is unfortunate that fire destroyed the previous home, the Applicants have an opportunity to construct the residential structure in compliance with the regulations whether it is by designing a compliant structure and/or getting the necessary variances to lawfully deviate from those standards. The Applicants want to enclose the area to have a garage, laundry facilities and “storage” room, in an area that would otherwise remain unenclosed or designed only for parking and access to meet the regulatory standards. An exceptional hardship has not been demonstrated as to why this residential structure cannot be designed to meet regulatory standards. It has no effect on the Applicants’ ability to have a home. Applicants have a permitted garage on their adjacent parcel and the site plan submitted for the house also show a future garage on the property. There is no exceptional quality about this property compared to properties adjacent to it to cause a unique hardship: the lot is not irregular, topography is relatively flat, and surrounding properties are situated similarly in the Flood Fringe. No exceptional hardship unique to this property compared to other properties in Gibson Flats or other properties in the county located in the Flood Fringe. Therefore, this request does not represent exceptional hardship. This variance consideration has not been satisfied based on the Variance Application.

There are no basements or residential dwelling that has the lowest floor elevation below the Base Flood Elevation.

Applicant: Yes, the permanent [sic] foundation is below the base flood elevation. Living area is above base flood elevation by 3 ft.

Staff: The Applicants are requesting their proposed residential structure to be below the Base Flood Elevation. The proposed bedroom, kitchen and bath are shown on the Design Plans as being above Base Flood Elevation, but a “storage” room that could be easily converted to a bedroom or other typical living space is below the BFE in addition to the proposed laundry facilities for residential usage.

This variance consideration has not been satisfied since this residential structure would be below the BFE. If a variance was granted, a Nonconversion Agreement would need to be execute prior to issuance of a Floodplain Permit whereby the Applicants agree to not allow anyone to reside in this enclosed area below the BFE. Even then, since it is part of the residential structure, there is high risk that this area will be converted to a bedroom/living area by the current Applicants or future property owners.

The lowest floor of crawl spaces is no more than two (2) feet below the exterior lowest adjacent grade and must have an inside dimension from interior ground to the bottom of the living floor of less than five (5) feet. The crawl spaces must meet the dry flood proofing requirements in Section 9.5.2.

Applicant: The foundation base elevation is 3351.7 (slab) only a portion of the 4 cement walls are below BFE, a portion of the cement foundation from 3357.7 to first floor is approximately 3 feet in excess to the BFE. (See Drawing)

Staff: This criterion is not applicable and deemed satisfied since this project is not contemplating a crawl space.
Granting of a variance will not result in increased flood heights to existing insurable buildings, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public, or conflict with other existing local laws or ordinances; (44 CFR 60.6 (a)(3) & (ARM 36.15.218(a)).

Applicant: There would be no public threats, nuisances to anybody by building my home back the way it was prior to the 12-1-22 fire. (3) No extraordinary public expense would occur [sic] due to the foundation/home.

Staff: In order for this project to prevent harm to the Applicants during a 100-year flood event, it would have to be adequately flood proofed and no portion of the enclosed area could be utilized for human habitation to prevent loss of life and diverting floodwaters onto others. This enclosed area, based on the Design Plans, shows the inside of the enclosure will be framed out for interior walls. Allowing such an enclosure, will result in loss of property in a flooding event. Once this area is enclosed the public has an increased risk of being victimized by fraud: the area can easily be converted to a bedroom without anyone knowing other than the Applicants. In the event of a 100-year flood event this enclosure is projected to be inundated with approximately 3.3 feet of flood waters. If individuals are trapped in this space, that means there is an increased risk to life, the safety of emergency responders and an increase in emergency recover time, and therefore increased public expense. This directly contradicts the purposes/policies set forth in the CCFR, namely to “[p]rotect human life and health,” and “[m]inimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public.” See CCFR § 1.4(2). This variance consideration has not been satisfied.

The proposed use is adequately flood proofed; (ARM 6.15.218(c)).

Applicant: The permanent [sic] foundation level is concrete with (2) 8’x7’ overhead openings which can be left open if ever flooded to allow water to pass through.

Staff: The Applicants are proposing four (4) flood vents and a garage door for wet proofing the enclosure. This does not meet the wet flood proofing requirements to be considered “adequate.”

Section 9.5 of the “Wet Flood proofing” requirements require building designs to allow internal flooding of the lowest floor that meet specific requirements. Only limited uses for parking, loading, and storage of equipment or materials that are not appreciably affected by floodwaters are allowed. Materials for the walls and floors must be resistant to flooding to an elevation two (2) feet or more above the Base Flood Elevation. The openings and walls must be designed to allow entry and exit of floodwater to equalize hydrostatic forces, e.g., screens, louvers, valves, and other covers or devices that: (1) Automatically allow entry and exit of floodwaters; (2) Have two (2) or more openings with a total net area of not less than one (1) square inch for every one (1) square foot of enclosed area subject to flooding; AND (3) Have the bottom of all openings no higher than one (1) foot above grade.

Concrete is being proposed which is a good flood resistant material. The proposed garage door does not allow automatic entry and exit of floodwaters but will require human intervention to get them to open and close which does not meet the requirements for wet proofing. The residential dwelling footprint is proposed to be 24’ x 30’, equal to 720 square
feet. The flood vents proposed are 16" x 8", equal to 128 square feet. Proper wet proofing would require six (6) flood vents if they are non-engineered/certified (128 x 6 = 768 sq. ft.). The Engineer has stated four (4) flood vents will be used. A copy of the proposed flood vent from Amazon was provided saying it is a certified flood vent indicating they are ICC-ES certified for 250 sq. ft. However, the Elevation Certification should contain this information about the flood vents and provide in the comments of the Elevation Certificate documentation of the vents engineering certification report. No Elevation Certificate has been provided for this project proposal. The Applicants are familiar with flood vents as they have utilized them in the design of their garage on a different parcel in the Gibson Flats Area. Gypsum board is being proposed on the walls of the enclosure, which is not a flood resistant material. Based on the Design Plans adequate flood proofing has not been demonstrated.

The Design Plan shows that internal walls creating separate enclosures will be utilized. The Applications and the Engineering Certification does not address how they hydrostatic pressures and hydrodynamic forces in a 100-year flood event will be equalized in these separate internal enclosures. FEMA Technical Bulletin for Enclosures provides that the flood vent calculation for the entire enclosure, is separate from any internal flood vents for internal walls.

This variance consideration has not been satisfied. If this variance is granted, adequate flood proofing and restriction on use of the enclosed area should be a condition of approval.

(7) The variance is the minimum necessary, considering the flood hazard, to afford relief; (44 CFR 60.6(a)(4)).

Applicant: I need a [sic] home to live in.

Staff: The Applicants are requesting a deviation of approximately 6 feet from the 2 feet of freeboard requirement for the lowest floor elevation. The Applicants can design a residence that meets the requirements without obtaining an additional variance from the 2 feet of freeboard requirement. For an enclosure to be allowed below the lowest floor, no appliances can be included, and the area must be flood resistant materials and wet flood proofed. Therefore, this variance request is not the minimum necessary to build a residence on the property. This variance consideration has not been satisfied.

(8) Reasonable alternative locations are not available; (MCA 76-5-406(3) & ARM 36.15.218(d)).

Applicant: No place to build – Also property was inherited and is of sentimental value. There has been a house at 76 Eaton Avenue for over 50 years.

Staff: The entire parcel and even other adjacent parcels owned by the Applicants are all located in the Regulated Flood Hazard Area leaving no other alternative locations that would be more favorable. Applicants also have existing septic at this location. This variance consideration is satisfied.

(9) There is no danger to life and property by water that may be backed up or diverted by the obstruction or use; (MCA 76-5-406(1)).
Applicant: I have submitted all of the data, and info in prior permit and info required no bodies of water or streams in the area.

Staff: Prior Floodplain Application are considered on their own merits based on the project proposal. Applicants’ have not provided such data to be considered or utilized for this variance request. The additional concrete in the floodplain will act to divert water. Wet proofing in accordance with the regulations would be required, but still does not change the fact that a concrete slab will divert water elsewhere on the property and onto other adjacent properties creating an increase flood risk to others.

(10) There is no danger that the obstruction or use will be swept downstream to the injury of others; (MCA 76-5-406(2)).

Applicant: The openings in bottom level would be sufficient for water to pass through in a high water event as there are no bodies of water near this structure.

Staff: The Engineer’s certification provides that backwater pressure will be relieved by the four (4) flood vents with little to no flood flow velocities and forces, and the concrete floor will be anchored to footings to reduce buoyancy and uplift forces. However, he states that “[d]ebris-induced loads present the highest level of unpredictability and danger to the building.” In the event this structure’s support columns and/or 6-inch foundation are under cut, the integrity of the entire structure has the potential to fail. The Engineer’s certification also states the design and construction will be done to withstand flood depths. Based on the representations of the Engineer, there is no danger that the obstruction or use will be swept downstream to the injury of others. The Engineer makes clear that the certification is not intended to constitute a warranty or guarantee of performance expressed or implied.

(11) Incorporates measure in the construction or alteration of the obstruction or use that lessens the danger; (MCA 76-5-406(4)).

Applicant: Adding openings in bottom level would less obstruction to the flow of water.

Staff: If the project demonstrated compliance with wet flood proofing requirement, then it would lessen the danger as a result of the project. However, the current Design Plans to include the garage door and only four (4) flood vents are not adequate to demonstrate this since a garage door does not allow for automatic entry and exit of floodwaters at any time without human intervention and six (6) of the proposed flood vents would be required. This variance consideration is not currently satisfied, but could be with proper flood proofing that would work to stabilize hydrostatic and hydrodynamic forces.

(12) The permanence of the obstruction or use; (MCA 76-5-406(5)).

Applicant: The [sic] bottom level is concreted (reinforced).

Staff: This structure and use will be permanent. This variance consideration is satisfied.

(13) There is no adverse effect to anticipated development in the foreseeable future of the area that may be affected by the obstruction or use; (44 CFR 60.6(a)(3), MCA 76-5-406(6) & ARM 36.15.218)).
Applicant: There would be no impact in the surrounding areas.

Staff: Having a four-sided, concrete structure will divert flood water onto surrounding properties to the detriment of existing properties and structures, without adequate wet flood proofing to allow floodwaters to penetrate the enclosure. Many structures no longer exist in the area as a result of the fire, but future development could be affected. The Gibson Flats area has been used residentially. Typical structures in the area have included homes, private shops, garages, and sheds on relatively small lots. It is likely that such residential uses will continue. Lot sizes to the North, East and West are small and if they were developed to their full potential residentially, flood water displacement could become an issue. This entire area is very low – approximately 5 feet below the BFE (3355'). In a 100-year flood event any structure not elevated to at least the BFE will be similarly inundated by floodwaters. It is not anticipated that this project if adequately wet proofed would adversely affect future development that would not already be a concern in the area with flooding. This variance consideration could be satisfied with proper wet flood proofing.

(14) There is no adverse effect to existing properties or structures.

Applicant: Home [sic] would not affect existing properties in the event of flood because it is built 8 ft off the ground with openings in the concrete.

Staff: Have a four-sided, concrete structure with a 6' thick slab will divert flood water onto surrounding properties to the detriment of existing properties and structures, without adequate wet flood proofing to allow floodwaters to penetrate the enclosure. Many structures no longer exist in the area as a result of the fire. This variance consideration could be satisfied with proper wet flood proofing.

(15) Any increase to the Base Flood Elevation in a Floodway has been approved by FEMA for flood insurance purposes and any increase to the Base Flood Elevation in the Floodway or Floodplain of more than 0.5 feet is an alteration of the Regulated Flood Hazard Area has been duly amended pursuant to Section 4. (44 CFR 60.6(a)(1)).

Applicant: The home is built on 8 ft concrete wall with openings in concrete footing to allow water to pass through.

Staff: The Engineer's certification provides only that an encroachment analysis is not required. It does not certify that there will not be an increase to the BFE of the Floodplain more than 0.5 feet. No data or analysis has been provided indicating how the addition of two (2) 8' x 24' and two (2) 8' x 38' walls, framing materials, gypsum board, etc. will not result in an increase to the BFE. Concrete is a very dense material. The foundation alone will act to repel water and the walls will also displace floodwater with the added material to the floodplain. Approximately 3.3 feet of floodwaters during a 100-year flood event will inundate this area. The additional concrete will displace flood waters. This would be mitigated by proper wet flood proofing.

Not enough information as been provided as part of the Floodplain or Variance Application to determine if the proposal will increase the BFE in the Floodplain more than 0.5 feet other than the Engineer's statement that the project "will be constructed in general conformance...."
Special Considerations for variance approval:

(1) If the new construction or substantial improvements on a lot of one-half acres or less is contiguous to and surrounded by lots of existing structures constructed below the base flood elevation, a variance may be approved. However, as lot sizes increase beyond one-half acre additional technical justification may be required; and (44 CFR 60.6(a))

Applicant: Yes.

Staff: The proposed site is approximately .41 acres. The lots to the West and North are owned by the Applicant(s) and do not have residential structures. One contains a new garage that is below BFE but must be floodproofed and cannot be used for residential purposes. The lot to the Northwest has no structure due to the fire. The lot to the East contains a nonconforming residential dwelling placed/constructed around 1981 below BFE. The lot to the South contains no residential structure. The Variance Application requires attached documentation showing the contours and lowest floor elevations of surrounding property when the adjoining and contiguous lots are pre-FIRM below the BFE. No documentation was provided.

(2) Historic Structures – variances may be issued for the repair or rehabilitation of historic structures upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and the variance is the minimum relief necessary to preserve the historic character and design of the structure. (44 CFR 60.6(a))

Applicant: No.

Staff: No existing structure exist on the property due to the fire and the previous home was not a recognized historic structure.

Recommendation:

If the Commission finds that these variance criteria can all be met through additional testimony and/or material provided during the public hearing, and/or conditioning, the Floodplain Administrator recommends approval of the variance with conditions of approval. Otherwise, the Floodplain Administrator suggests tabling the matter to request Applicants provide additional information, such as the Elevation Certificate, or alternatively deny the variance due to one or more of the variance criteria not being met as discussed in the Staff Report.

Motions:

The following motions are provided for the Board’s consideration:

1. “I move that the Board adopt the Staff Report and Findings of Fact, testimony, and public comments, and approve the Applicant’s requested Variance from Cascade County Floodplain Regulation § 9.3(1) to allow the enclosure of the proposed residential structure below the Base Flood Elevation on Parcel #2005900 with the following conditions:
1. Wet flood proofing must be completed in accordance with the requirements set forth in CCFR § 9.5(1) including restricting the use of the enclosed space to use as parking, loading, and storage of equipment or materials that are not appreciably affected by floodwater.

2. A Nonconversion Agreement must be executed prior to the issuance of any Floodplain Permit preventing any residential use in the enclosure below the Base Flood Elevation.

3. All utilities devices (including electricity and plumbing) must be installed 2 feet above the Base Flood Elevation. A utility chase is allowed (including utility insulation) that is made of flood resistant materials, not large enough for a human to enter.

4. Updated Design Plan must be submitted demonstrating compliance with these conditions, including but not limited to, showing the enclosed space will be made of flood resistant materials (no gypsum board), flood vent locations, removing the laundry appliances, and showing where the utility chase is going to be located.

5. An Elevation Certificate based on “Construction Designs” must be submitted showing elevations for this project, flood vent data and supporting flood vent certification report(s) if certified engineered flood vents are used.

6. The Engineer’s Certification must address the hydrostatic pressures and hydrodynamic forces as it pertains to the proposed internal walls. If the Engineer determines that in order to equalize pressure and force of any internal wall flood vents are required, the Applicants shall install the necessary flood vents on the internal walls in addition to the outer walls and submit updated Design Plans and Elevation Certificate reflecting those changes.

7. This variance approval is not an approval of pending Floodplain Permit Application #2022-005.

or

2. "I move that the Board deny the Applicant’s requested Variance from CCFR Section 9.3(1) be denied upon a finding that one or more of the variance criteria listed in CCFR Section 11.3 have not been met.

Additional FEMA requirements:

If this variance is granted, Cascade County must notify the Applicants in writing over the signature of a community official that:

(i) the issuance of a variance to construct a structure below the base flood level may result in increased premium rates for flood insurance up to amounts as high as $25 for $100 of insurance coverage and

(ii) such construction below the base flood level increases risks to life and property.
Flood-Resistant Materials:

- Concrete, concrete block or glazed brick
- Clay, concrete or ceramic tile
- Galvanized or stainless steel nails, hurricane clips and connectors (in areas subject to saltwater flooding)
- Indoor-outdoor carpeting with synthetic backing (do not fasten down)
- Vinyl, terrazzo, rubber or vinyl floor covering with waterproof adhesives.
- Metal doors and window frames.
- Polyester-epoxy paint (do not use mildew-resistant paint indoors, especially on cribs, playpens or toys because it contains an ingredient that is toxic)
- Stone, slate or cast stone (with waterproof mortar)
- Mastic, silicone or polyurethane formed-in-place flooring. Styrofoam insulation
- Water-resistant glue
- Pressure treated (.40 CCA minimum) or naturally decay resistant lumber, marine grade plywood

Figure 5-14: Flood-resistant materials

Attachments:
1) Floodplain Variance Application (FP 2022-013)
2) Floodplain Permit Application (FP 2022-005)
3) NFIP Technical Bulletin 1 / March 2020: "Requirements for Flood Openings in Foundation Walls and Walls of Enclosures"
4) Copy of Floodplain Permit (FP #2016-012) for previous house
5) Letter from previous Floodplain Administrator re previous house dated 11/29/17 (with file memo)
6) Site Visit Photos dated 11/15/17
7) Site Visit Photos dated 08/28/18
8) Comment

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1 Requirements for Flood Openings in Foundation Walls and Walls of Enclosures (fema.gov)
FLOODPLAIN VARIANCE APPLICATION
CASCADE COUNTY FLOODPLAIN REGULATIONS

A variance is a grant of relief given by the Board of Cascade County Commissioners from the terms of the specific standards required in the Cascade County Floodplain Regulations. The issuance of the variance is for floodplain management purposes only. Insurance premium rates are determined by the Federal government according to actuarial risk and are not modified by the granting of a variance. ANY VARIANCE GRANTED BY THE BOARD OF COUNTY COMMISSIONERS MUST BE CONSISTENT WITH THE CASCADE COUNTY FLOODPLAIN REGULATIONS.

SECTION 1: Applicant and Property Information

Applicant Name: Greg Mackenstad
Applicant Address: 76 Eaton Ave
Email: gregmackenstad@gmail.com
Phone: 406-799-2167

Property Owner Name: Greg Elizabeth Mackenstad
Property Owner Address: 76 Eaton Ave Great Falls MT 59405
Phone: 406-799-2167

Legal Description and Address of Property: Eaton Suburban Addition 5 20 1 T20N R1 Block 1 Lot 60

SECTION 2: Variance Requested

Cite the Section of the Cascade County Floodplain Regulations from which a variance is sought:

CCFR, Section 9, Particularly 9.3 - Section 9.3.1

Explain why a variance is needed for the proposed development:

To reconstruct, build a perm foundation consisting of four (4) cement walls (see concrete details in provided drawings) "not a basement", the foundation serves as "that in order to build a home (1st Flo) above BFE. When elevation cent is above 1st Floor" will be 3.1' above BFE.

SECTION 3: Application for Variance

Completed the Joint Permit Application and Variance Application Worksheet to address the submittal requirements of the Cascade County Floodplain Regulations.

Joint Permit Application
Variance Application Worksheet

An Applicant receiving a variance to build a structure not meeting the minimum standards of the regulations, especially if the lowest floor is constructed below the base flood level, may result in increased premium rates for flood insurance. Construction below the base flood level increases risk to life and property. (44 CFR § 60.6(a)(5).

APPLICANT'S SIGNATURE ___________________________ DATE 6-11-2022

Any person or person aggrieved by the decision may appeal such decision in the courts of competent jurisdiction. MCA § 76-5-209(1).
Section 4: Affected Landowners

List the names, addresses, and telephone numbers of all property owners adjacent to the parcel(s) referenced in this Application. Attach additional sheets as necessary.

<table>
<thead>
<tr>
<th>Name &amp; Address</th>
<th>Telephone No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rod &amp; Lea Kelly Quigley</td>
<td>72 Easton Ave 406-781-4661</td>
</tr>
<tr>
<td>Michael &amp; Heather Kubas</td>
<td>6 Eaton Ave 406-781-0193</td>
</tr>
</tbody>
</table>

Official Use Only – Record of Variance Action

Completed Variance Application submitted on: 

Fee Paid: $ __________________ Application No.: ____________________

Public Notice Given: Variance Hearing Held on:

The Board of County Commissioners has made a determination that the variance [ ] is or [ ] is not the minimum allowance necessary, considering the flood hazard, to afford relief from these regulations and [ ] meets or [ ] does not meet the criteria in the regulations for approval.

In accordance with the criteria and guidelines of the Cascade County Floodplain Regulations, the Board of Cascade County Commissioners hereby [ ] approves or [ ] denies the request for variance.

Special Provision of the Variance Approval: ____________________________

Chair, Board of Cascade County Commissioners

Date
**VARIANCE APPLICATION WORKSHEET**

**PLEASE NOTE:** Your statements and supporting data and information, including a completed Montana Joint Application or Floodplain Permit Application, will be used to evaluate your variance request. If these questions are not answered, the variance may be denied due to insufficient information to support it. The following will be used as a guide to evaluate your petition. Additional information may be requested.

1. Will the structure or proposed use reside on a parcel or lot of 0.5 acres or less?
   - YES
   - NO

   *If the new construction or substantial improvements on a lot one-half acres or less is contiguous to and surrounded by lots of existing structures constructed below the base flood level, a variance may be approved. However, as lot sizes increase beyond one-half acres, additional technical justification may be required.*

2. Are the surrounding properties pre-1997 (pre-FIRM)?
   - YES
   - NO

3. Is the lowest floor of pre-1997 (pre-FIRM) structures on the adjoining and contiguous lots below the Base Flood Elevation?
   - YES
   - NO

   *Attach documentation which shows the contours and lowest floor elevations of surrounding property.*

4. Is the proposed work on a recognized historic structure?
   - YES
   - NO

   *If yes, will the improvements maintain the historic integrity of the structure and not preclude the structure’s continued designation as a historic structure AND the variance is the minimum necessary to preserve the historic character and design of the structure?*

5. Explain how the proposed work is the minimum necessary, considering the flood hazard, to afford relief?
   
   *I need home to live in.*

6. Does the project show good and sufficient cause for the variance? Financial hardship is not a good and sufficient cause. Describe the exceptional hardship.

   *Yes the rebuilding of our house does show good and sufficient cause. We need our home built back so we have a place to live.*

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Page 3 of 6
7. Is the basement and/or the lowest floor elevation of the residential structure below the Base Flood Elevation? If yes, please describe.

[ ] YES  [ ] NO

8. If the crawl space(s) or enclosures are proposed, they must meet the requirement of Section 9 of the Cascade County Floodplain Regulations. Explain why the minimum building standard cannot be met.

The foundation base elevation is 33.51.7 (51ab)

9. Describe your analysis or supporting information that supports that a granting of this variance will not result in: (1) increased flood heights to the existing buildings; (2) additional threats to public safety; (3) extraordinary public expense; (4) create nuisances; (5) cause fraud on or victimization of the public; or (6) conflict with other existing local laws and/or ordinances.

There would be no public threats, nuisances to any body by building my home back to the way it was prior to the 12-1-27 fire. (4) No extraordinary public expense would occur due to the foundation being 33.51.7 above flood level. (5) No overhead openings which can be last a few in even flooded to allow water to pass through.

10. Describe how the structure is adequately flood proofed.

A 6x7 overhead opening which can be left open if ever flooded to allow water to pass through.

11. Describe why reasonable alternative locations outside the floodplain are not available or possible.

No place to build. Also property was in existence and is of sentimental value. There has been a house at 166 Eaton Ave for over 50 years.

12. Describe the data or information showing that there is no danger to life and property by erosion damage or water that may be backed up or diverted by the obstruction or use.

I have submitted all of the data and figures in being permit and info received.

13. Describe your supporting information that demonstrates there will not be a danger of materials being swept onto other lands to the injury of others.

The openings in basement level would be sufficient for water to pass through in a high water event as there are no bodies of water near this structure.
14. Describe how the construction or alteration of the obstruction or use is designed in such a manner to lessen danger.

Adding openings in bottom level would lessen obstruction to the flow of water.

15. Describe the permanence of the obstruction or use.

The bottom level is concrete (reinforced).

16. Describe the impacts of the obstruction or use as they affect the anticipated development of the surrounding area in the foreseeable future.

There would be no impact in the surrounding areas.

17. Describe how the failure to comply with the floodway regulations results in an exceptional hardship to the Applicant. The event of arson has caused extreme hardship due to the loss of property. It was not self-created. This is my only option to rebuild my home. This is the exact concrete footprint that was previously approved on permit FPA016-012 frame which burned was only 5 years old.

18. Describe how granting the variance would not adversely affect existing properties or structures.

Home would not affect existing properties in the event of flood because it is built 8 ft off the ground with openings in the concrete.

19. Describe the impacts to the Base Flood Elevation of the Floodway and/or Floodplain. Provide supporting data and analysis that the variance will not increase the Base Flood Elevation of the Floodway by more than 0.00 and/or increase the Floodplain 0.5 feet or less.

The home is built on a 8 ft concrete wall with openings in concrete floors to allow water to pass through.

20. Describe the estimated cost and damage of the proposed facility and its contents to flood damage and the effect of such damage on the owner.

The base flood elevation of home is solid concrete. The cost is approximately $30,000.
17. Exceptional hardship has been unfairly burdened by the general rules to obtain permits to rebuild. The previous permit FP2016-012 was approved. If this variance is not granted it creates further unnecessary hardship resulting from the application placed before us.

We the Mackenstads and the residents of Gibson flats did not self-create this extreme hardship. If granted this variance will achieve some level of justice to those that burned our homes.

The Exceptional hardship is in fact the loss of multiple homes.
21. Describe the importance of the services to be provided by the facility to the community.

This is a private home, no services are provided by facility to the community.

22. Describe the public services, including fire and rescue, that may or may not be provided during various flood events.

This home will be elevated 8 ft above ground and would not be effected by flood events.

23. If this facility is located on the waterfront, describe the necessity for that location.

No waterfront or streams in area or nearby. This is a private home.

24. Describe the safety and access of emergency vehicles to the property during times of various flood events.

County roads, streets and private road access property.

Notarized Certification

I hereby certify that the facts, statements, and information presented within this Floodplain Variance Application and Variance Application Worksheet are true and correct to the best of my knowledge and belief. I hereby understand and certify that any misrepresentation or omissions of any information required as part of this Floodplain Variance Application may result in my Application being delayed or not approved by Cascade County.

[Signature]

DATE: 06/13/2023

State of Montana
County of Cascade

This instrument was signed or acknowledged before me on 06/13/2023 by Dale Gregory Mackeystal.

[Notary Signature]

[Affix seal/stamp to the left or below]
B. PROJECT SITE INFORMATION

1. NAME OF STREAM or WATER BODY at project location
   Project Address/Location: Eaton Nearest Town Great Falls
   County/C Geocode: Eaton Suburb ADO AM 526, 120, 120, 104E, 106N, 800, 200, Lot 000
   SW 1/4 of the SW 1/4 of, Section Township Range
   Latitude Longitude Refer to section B1 in the instructions.

2. Is the proposed activity within SAGE GROUSE areas designated as general, connected, or core habitat?
   Yes ☐ No ☑ Attach consultation letter if required. Refer to section B2 in the instructions.

3. Is this a STATE NAVIGABLE WATERWAY? The state owns beds of certain navigable waterways.
   Yes ☐ No ☑ If yes, send a copy of this application to the appropriate DNRC land office. Refer to section B3 in the instructions.

4. WHAT IS THE CURRENT CONDITION of the proposed project site? Describe the existing bank condition, bank slope, height, nearby structures, and wetlands. What vegetation is present? Refer to section B4 in the instructions.
   ☑ N/A

C. PROPOSED PROJECT OR ACTIVITY INFORMATION

1. TYPE OF PROJECT (check all that apply) Refer to section C1 in the instructions.
   ☐ Agricultural and Irrigation Projects: Diversions, Headgates, Flumes, Riparian fencing, Ditches, etc.
   ☐ Buildings/Structures: Accessory Structures, Manufactured Homes, Residential or Commercial Buildings, etc.
   ☐ Channel/Bank Projects: Stabilization, Restoration, Alteration, Dredging, Fish Habitat, Vegetation or Tree Removal, or any other work that modifies existing channels or banks.
   ☐ Crossings/Roads: Bridge, Culvert, Fords, Road Work, Temporary Access, or any project that crosses over or under a stream or channel.
   ☐ Mining Projects: All mining related activity, including; Placer Mining, Aggregate Mining, etc.
   ☐ Recreation related Projects: Boat Ramps, Docks, Marinas, etc.
   ☐ Other Projects: Cistern, Debris Removal, Excavation/Pit/Pond, Placement of Fill, drilling or directional boring, Utilities, Wetland Alteration. Other project type not listed here
   ☐

2. IS THIS APPLICATION FOR an annual maintenance permit? ☐ Yes ☑ No
   (If yes attach annual plan of operation to this application) – Refer to section C2 in the instructions.

3. WHY IS THIS PROJECT NECESSARY? STATE THE PURPOSE OR GOAL of the proposed project. Refer to section C3 in the instructions.
   Rebuild Home lost to Gribou Flats Fire 12-1-2021

4. PROVIDE A BRIEF DESCRIPTION of the proposed project plan and how it will be accomplished. Refer to section C4 in the instructions.
   Rebuild Home After Fire
D. CONSTRUCTION DETAILS

1. PROPOSED CONSTRUCTION DATES. Include a project timeline. Start date Finish date How long will it take to complete the project? Is any portion of the work already completed? Yes ☐ No ☐ (If yes, describe previously completed work.) Refer to section D1 in the instructions.

2. PROJECT DIMENSIONS. Describe length and width of the project. Refer to section D2 in the instructions.

\[ 24 \times 36 \text{ Home Feet Feet} \]

3. EQUIPMENT. List all equipment that will be used for this project. How will the equipment be used on the bank and/or in the water? Note: All equipment used in the water must be clean, drained and dry. Refer to section D3 in the instructions.

4. MATERIALS. Provide the total quantity and source of materials proposed to be used or removed. Note: This may be modified during the permitting process therefore it is recommended you do not purchase materials until all permits are issued. List soil/fill type, cubic yards and source, culvert size, rip-rap size, any other materials to be used or removed on the project. Refer to section D4 in the instructions.

E. REQUIRED ATTACHMENTS

1. PLANS AND/OR DRAWINGS of the proposed project. Include:
   - Plan/Aerial view
   - an elevation or cross section view
   - dimensions of the project (height, width, depth in feet)
   - location of storage or stockpile materials dimensions and location of fill or excavation sites
   - drainage facilities
   - location of existing/proposed structures, such as buildings, utilities, roads, or bridges
   - an arrow indicating north
   - Site photos

2. ATTACH A VICINITY MAP OR A SKETCH which includes: The water body where the project is located, roads, tributaries, other landmarks. Place an “X” on the project location. Provide written directions to the site. This is a plan view (looking at the project from above).

3. ATTACH ANNUAL PLAN OF OPERATION if requesting a Maintenance 310 Permit.

4. ATTACH AQUATIC RESOURCE MAP. Document the location and boundary of all waters of the U.S. in the project vicinity, including wetlands and other special aquatic sites. Show the location of the ordinary high-water mark of streams or waterbodies. if requesting a Section 404 or Section 10 Permit. Ordinary high-water mark delineation included on plan or drawings and/or a separate wetland delineation.
9. List all applicable local, state, and federal permits and indicate whether they were issued, waived, denied, or pending. Note: All required local, state, and federal permits, or proof of waiver must be issued prior to the issuance of a floodplain permit. Refer to section F9 in the instructions.

10. List the NAMES AND ADDRESSES OF LANDOWNERS adjacent to the project site. This includes properties adjacent to and across from the project site. (Some floodplain communities require certified adjoining landowner lists).

   NAME OF Adjacent Landowner:
   NAME OF Adjacent Landowner:
   NAME OF Adjacent Landowner:
   NAME OF Adjacent Landowner:

11. Floodplain Map Number

   Refer to section F11 in the instructions.

12. Does this project comply with local planning or zoning regulations? Refer to section F12 in the instructions.
   ☑ Yes  ☐ No
G. SIGNATURES/AUTHORIZATIONS

Some agencies require original signatures. After completing the form, make the required number of copies and then sign each copy. Send the copies with original signatures and additional information required directly to each applicable agency.

The statements contained in this application are true and correct. The applicant possess’ the authority to undertake the work described herein or is acting as the duly authorized agent of the landowner. The applicant understands that the granting of a permit does not include landowner permission to access land or construct a project. Inspections of the project site after notice by inspection authorities are hereby authorized. Refer to section G in the instructions.

APPLICANT (Person responsible for project):
Print Name:
Signature of Applicant Date

LANDOWNER:
Print Name:
Signature of Landowner Date

*CONTRACTOR’S PRIMARY CONTACT (if applicable):
Print Name:
Signature of Contractor/Agent Date

*Contact agency to determine if contractor signature is required.
### SECTION A - PROPERTY INFORMATION

**A1. Building Owner's Name**
Dale Gregory and Elizabeth Mackenstadt

**A2. Building Street Address (Including Apt. Unit, Suite, and/or Box No.) or R.O. Route and Box No.**
76 Eaton Avenue

**City**
Great Falls

**State**
Montana

**ZIP Code**
59405

**A3. Property Description (Lot and Block Numbers, Tax Parcel Number, Legal Description, etc.)**
Eaton Suburban Additon Amended S20 T20N R4E Block 1 Lot 6D

**A4. Building Use (e.g., Residential, Non-Residential, Addition, Accessory, etc.)**
Residential

**A5. Latitude/Longitude: Lat. Lon.**
47°28'7.94040" N 111°14'54.82077" W

**A6. Attach at least 2 photographs of the building if the Certificate is being used to obtain flood insurance.**

**A7. Building Diagram Number**
N/A

**A8. For a building with a crawl space or enclosure(s):**

| a) Square footage of crawlspace or enclosure(s) | N/A sq ft |
| b) Number of permanent flood openings in the crawlspace or enclosure(s) within 1.0 foot above adjacent grade | 0 |
| c) Total net area of flood openings in A8.b | 0 sq in |
| d) Engineered flood openings? | Yes | No |

**A9. For a building with an attached garage:**

| a) Square footage of attached garage | N/A sq ft |
| b) Number of permanent flood openings in the attached garage within 1.0 foot above adjacent grade | 0 |
| c) Total net area of flood openings in A9.b | 0 sq in |
| d) Engineered flood openings? | Yes | No |

### SECTION B - FLOOD INSURANCE RATE MAP (FIRM) INFORMATION

**B1. NFIP Community Name & Community Number**
Cascade County, Montana

**B2. County Name**
Cascade

**B3. State**
MT

**B4. Map/Panel Number**
30013C626E

**B5. Suffix**

**B6. FIRM Index Date**
March 19, 2013

**B7. FIRM Panel Effective/Revised Date**
March 19, 2013

**B8. Flood Zone(s)**
AE

**B9. Base Flood Elevation(s) (Zone AO use base flood depth)**
3355

**B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in Item B9:**

| □ FIS Profile | □ FIRM | □ Community Determined | □ Other/Source: |

**B11. Indicate elevation datum used for BFE in Item B9:**

| □ NGVD 1929 | X NAVD 1988 | □ Other/Source: |

**B12. Is the building located in a Coastal Barrier Resources System (CBRS) area or Otherwise Protected Area (OPA)?**

| □ Yes | X No |

**Designation Date:**

### SECTION C - BUILDING ELEVATION INFORMATION (SURVEY REQUIRED)

**C1. Building elevations are based on:**

| □ Construction Drawings* | □ Building Under Construction* | □ Finished Construction |

*A new Elevation Certificate will be required when construction of the building is complete.

**C2. Elevations - Zones A1-A30, AE, AH, A (with BFE), VE, V1-V30, V (with BFE), AR, AR/A, AR/EA, AR/A1-A30, AR/AH, AR/AO. Complete Items C2.a–h below according to the building diagram specified in Item A7. in Puerto Rico only, enter meters.**

**Benchmark Utilized:** OPUS

**Vertical Datum:** NAVD 1988

**Indicate elevation datum used for the elevations in items a) through h) below:**

| □ NGVD 1929 | X NAVD 1988 | □ Other/Source: |

**Datum used for building elevations must be the same as that used for the BFE.**

| a) Top of bottom floor (including basement, crawlspace, or enclosure floor) | N/A | □ feet | □ meters |
| b) Top of the next higher floor | N/A | □ feet | □ meters |
| c) Bottom of the lowest horizontal structural member (V Zones only) | N/A | □ feet | □ meters |
| d) Attached garage (top of slab) | N/A | □ feet | □ meters |
| e) Lowest elevation of machinery or equipment servicing the building (Describe type of equipment and location in Comments) | 3350 | □ feet | □ meters |
| f) Lowest adjacent (finished) grade next to building (LAG) | 3350 | □ feet | □ meters |
| g) Highest adjacent (finished) grade next to building (HAG) | 3350 | □ feet | □ meters |
| h) Lowest adjacent grade at lowest elevation of deck or stairs, including structural support | 3350 | □ feet | □ meters |

### SECTION D - SURVEYOR, ENGINEER, OR ARCHITECT CERTIFICATION

This certification is to be signed and sealed by a land surveyor, engineer, or architect authorized by law to certify elevation information. I certify that the information on this Certificate represents my best efforts to interpret the data available. I understand that any false statement may be punishable by fine or imprisonment under 18 U.S. Code, Section 1001.

| □ Check here if comments are provided on back of form. |
| □ Check here if attachments. |

**Certifier's Name**
Dale E. Schaeffer

**License Number**
5206ES

**Company Name**
Schaeffer Engineering & Surveying

**Address**
1708 22nd Avenue South

**City**
Great Falls

**State**
MT

**ZIP Code**
59405

**Telephone**
406-761-5402

**Date**
May 5, 2010

Replaces all previous editions.
SECTION D – SURVEYOR, ENGINEER, OR ARCHITECT CERTIFICATION (CONTINUED)

Comments

Vacant Lot no existing buildings

Signature 5/5/2016

SECTION E – BUILDING ELEVATION INFORMATION (SURVEY NOT REQUIRED) FOR ZONE AO AND ZONE A (WITHOUT BFE)

For Zones AO and A (without BFE), complete items E1–E5. If the Certificate is intended to support a LOMA or LOMR-F request, complete Sections A, B, and C. For items E1–E4, use natural grade, if available. Check the measurement used. In Puerto Rico only, enter meters.

E1. Provide elevation information for the following and check the appropriate boxes to show whether the elevation is above or below the highest adjacent grade (HAG) and the lowest adjacent grade (LAG).
   a) Top of bottom floor (including basement, crawl space, or enclosure) is __________ feet __________ meters above or below the HAG.
   b) Top of bottom floor (including basement, crawl space, or enclosure) is __________ feet __________ meters above or below the LAG.

E2. For Building Diagrams 6–9 with permanent flood openings provided in Section A Items 8 and/or 9 (see pages 8–9 of Instructions), the next higher floor (elevation C2.b in the diagrams) of the building is __________ feet __________ meters above or below the HAG.

E3. Attached garage (top of slab) is __________ feet __________ meters above or below the HAG.

E4. Top of platform of machinery and/or equipment servicing the building is __________ feet __________ meters above or below the HAG.

E5. Zone AO only: If no flood depth number is available, is the top of the bottom floor elevated in accordance with the community’s floodplain management ordinance? ☐ Yes ☐ No ☐ Unknown. The local official must certify this information in Section G.

SECTION F – PROPERTY OWNER (OR OWNER’S REPRESENTATIVE) CERTIFICATION

The property owner or owner’s authorized representative who completes Sections A, B, and E for Zone A (without a FEMA-issued or community-issued BFE) or Zone AO must sign here. The statements in Sections A, B, and E are correct to the best of my knowledge.

Property Owner or Owner’s Authorized Representative’s Name

Address

City

State

ZIP Code

Signature

Date

Telephone

Comments

☐ Check here if attachments.

SECTION G – COMMUNITY INFORMATION (OPTIONAL)

The local official who is authorized by law or ordinance to administer the community’s floodplain management ordinance can complete Sections A, B, C (or E), and G of this Elevation Certificate. Complete the applicable item(s) and sign below. Check the measurement used in items G6–G10. In Puerto Rico only, enter meters.

G1. ☐ The information in Section C was taken from other documentation that has been signed and sealed by a licensed surveyor, engineer, or architect who is authorized by law to certify elevation information. (Indicate the source and date of the elevation data in the Comments area below.)

G2. ☐ A community official completed Section E for a building located in Zone A (without a FEMA-issued or community-issued BFE) or Zone AO.

G3. ☐ The following information (Items G4–G10) is provided for community floodplain management purposes.

G4. Permit Number

G5. Date Permit Issued

G6. Date Certificate Of Compliance/Occupancy Issued

G7. This permit has been issued for:
   ☐ New Construction ☐ Substantial Improvement

G8. Elevation of as-built lowest floor (including basement) of the building: __________ feet __________ meters Datum

G9. BFE or (in Zone AO) depth of flooding at the building site: __________ feet __________ meters Datum

G10. Community’s design flood elevation:

Local Official’s Name

Title

Community Name

Telephone

Signature

Date

Comments

☐ Check here if attachments.

FEMA Form 086-D-33 (Revised 7/12)

Replaces all previous editions.
ELEVATION CERTIFICATE, page 3

BUILDING PHOTOGRAPHS
See Instructions for Item A6.

| IMPORTANT: In these spaces, copy the corresponding information from Section A. |
| FOR INSURANCE COMPANY USE |
| Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or PO. Route and Box No. |
| Policy Number: |
| City |
| State |
| ZIP Code |
| Company NAIC Number: |

76 Eaton Avenue
City: Great Falls
State: Montana
ZIP Code: 59405

If using the Elevation Certificate to obtain NFIP flood insurance, affix at least 2 building photographs below according to the instructions for Item A6. Identify all photographs with date taken, “Front View” and “Rear View”; and, if required, “Right Side View” and “Left Side View.” When applicable, photographs must show the foundation with representative examples of the flood openings or vents, as indicated in Section A8. If submitting more photographs than will fit on this page, use the Continuation Page.

South View
Date Taken: 5/4/2016

North View
Date Taken: 5/4/2016
If submitting more photographs than will fit on the preceding page, affix the additional photographs below. Identify all photographs with:
date taken: "Front View" and "Rear View"; and, if required, "Right Side View" and "Left Side View." When applicable, photographs must
show the foundation with representative examples of the flood openings or vents, as indicated in Section A8.

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<td>West View</td>
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From: "opus" <opus@ngs.noaa.gov>
Date: Thursday, May 05, 2016 4:38 PM
To: <schaeffer_engineering@msn.com>
Subject: OPUS solution: 06571240.dat OP1462487853860

FILE: 06571240.dat OP1462487853860

NGS OPUS SOLUTION REPORT
================================

All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: http://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: schaeffer_engineering@msn.com  DATE: May 05, 2016
RINEX FILE: 06571240x.16o  TIME: 22:38:19 UTC

SOFTWARE: page5 1209.04 master53.pl 160321  START: 2016/05/03 23:27:00
EPHEMERIS: igr18952.eph [rapid]  STOP: 2016/05/04 03:52:00
NAV FILE: brdc1240.16n  OBS USED: 6360 / 8503 : 75%
ANT NAME: TRM33429.00+GP NONE  # FIXED AMB: 72 / 83 : 87%
ARP HEIGHT: 1.8  OVERALL RMS: 0.022(m)


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<th>Z</th>
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<td>0.005(m)</td>
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<td>47 28 7.95924</td>
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<td>248 45 5.11796</td>
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<td>W LON</td>
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<td>EL HGT</td>
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| ORTHO HGT | 1021.363(m) | 0.011(m) | [NAVD88 (Computed using GEOID12B)]

UTM COORDINATES  STATE PLANE COORDINATES

UTM (Zone 12)  SPC (2500 MT)
Northing (Y) [meters]  5257300.275  359143.846
Easting (X) [meters]   491268.937  468266.133
Convergence [degrees]  -0.18316790  -1.27907996
Point Scale 0.99960431 0.99942431
Combined Factor 0.99944652 0.99926654

US NATIONAL GRID DESIGNATOR: 12TVT8126857300(NAD 83)

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NEAREST NGS PUBLISHED CONTROL POINT
SS1447 GREAT FALLS HIGHLAND CEM SPIPE N472754.708 W1111615.027 1728.7

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.
Freedom Flood Vent - Bi-Directional Flood Vent to Reduce Foundation Damage and Flood Risk, FEMA Compliant, ICC-ES Certified for 250 sq. ft. - Black, Wall Mounted (16" Wide x 8" high x 2" deep)

**Cost:** $99.99

Get $50 off instantly; Pay $39.99 $99.99 upon approval for the Amazon Prime Store Card. No annual fee.

**Color:** Black

**Room Type:** Garage, Basement

**Material:** Polycarbonate

**Mounting Type:** Wall Mount

**Color:** Black

**Brand:** Freedom Flood Vent

About this item

- Freedom Flood Vents are Made in the USA, FEMA Compliant and ICC-ES Certified (ESR-4332) for 250 sq. ft. of flood protection per vent. These engineered flood vents meet the ASTM D2565-99 and ASTM D6110-18 Standards for impact and weathering. They are rigorously tested to ensure the plastic can withstand extreme temperatures and resist damage from impact.

- Our foundation flood vent is surface mounted over the foundation opening and is usable in crawl spaces, garages, & full height enclosures. They are easily installed for new construction or can be retrofitted with HurriBond adhesive or an equivalent fastener.

- Bi-directional flood vent feature allows for the free entry and exit of flood water, relieving hydrostatic pressure to help prevent foundation damage and
Septic Pumper's Report

Septic Tank Owner: [Handwritten name]
Tank Address: 76 Edcon Ave
Date Pumped: 2-18-72
Capacity in Gallons: 1000
Material: Concrete
Compartments: Single
Construction: One Piece
Baffles: Inlet: Concrete PVC Tees
Hydraulically Failed: Yes
Damp-Proofed: Yes
Correct Liquid Level: Yes
Effluent Filter: Yes
Riser: Yes
Clean Out Size: 4" or Larger Size
Depth of Tank: Above 3'
Depth of Sludge:
Time Since Last Pumped: 3 years

Questions and Diagram:
Location of tank in relation to house.

System appears to be in good working condition

M.J. Peet
Septic Tank Cleaning
1360 13th Ave SW
Great Falls, MT 59404
406-453-4234

Signature: [Handwritten name]
Pumping Company: [Handwritten name]
Date: 2-18-72
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<td>1- Rosa Lea &amp; Kelly O'Neil</td>
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<td>Residential</td>
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<tr>
<td>2- Michael P &amp; Heather Kubas</td>
<td>60 Eaton Avenue, Great Falls, MT 59405</td>
<td>Residential</td>
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<td>3905 18th Ave S, Great Falls, MT 59405</td>
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<td>3- Northwest Equip</td>
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<td>Commercial</td>
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<td>40 Tedford Grant</td>
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</table>
I, Dale E. Schaeffer, a Professional Engineer licensed to practice in the State of Montana, hereby certify that the proposed residence on the property shown on the attached Site Plan will be constructed in general conformance with the Cascade County Floodplain Regulations adopted March 12, 2013.

A. An encroachment analysis (where required) – Not required

B. Adequacy of structural elevations – The structural elevations provided by Architect MM Design are attached and appear adequate.

C. Determination of the base flood elevation – Determined from FEMA FIRM Panel #30013C0626E and the Flood Insurance Study for the area. Base Flood Elevation is 3355.0. Proposed finished lower floor construction elevation is approximately 3351.0 after preparation of the site by the addition of compacted soil and gravel and a concrete slab set on footings.

D. Flood-proofing, wet proofing, dry proofing – Four (4) engineered flood vents (ICC-ES CERTIFIED (esr-4332)) will be installed within two (2) foot above grade. Construction materials will be pressure treated 2 X 6’s set 24 inches on center. Power outlets will be installed 2 feet above the Base Flood Elevation along with any heating equipment.

E. Design and construction to withstand the flood depths – A concrete monolithic floor 6 inches thick is proposed on 18” X 8” footings. Walls are pressure treated wood 2 X 6’s installed 24” on centers Framing and bracing plans are attached.

F. Hydrodynamic and hydrostatic pressures, velocities, impact, buoyancy, and uplift forces associated with the base flood elevation – The building will be constructed on 16” X 8” concrete footings. The upper floor is further supported by columns set on footings. Since the location is located on the southern fringe of the Floodplain, hydrodynamic and hydrostatic pressure would result mostly from backwater pressure which would be relieved by 4 engineered Flood Vents and little or no velocity forces would be expected. The Flood Vents are designed to minimize these pressures. Debris-induced loads present the highest level of unpredictability and danger to the building. The proposed 6-inch thick concrete floor anchored to a 16” X *” footing will significantly reduce any buoyancy or uplift forces. One stairway is proposed for the building.

This certification is not intended to constitute a warranty or guarantee of performance expressed or implied.

[Signature]
Signature of Professional Engineer

[Date]
3/17/2022
Cascade County
Floodplain Permit

Cascade County Planning Department
Susan Conell, Floodplain Manager
121 4th St. N, Suite 2 H/l
Great Falls, MT 59401
Ph: (406) 454-6905
Fax: (406) 454-6919

Permit #: FP2016-012

Name of Applicant: Gregory & Elizabeth Mackenstadt

Address of Applicant: 29 Eaton Avenue, Great Falls, MT 59405

Name of Landowner(s) (if different from applicant):

Phone# (Work): Phone # (Home): 433-4322  Phone # (Cell): 799-2167

Name of Stream: Sand Coulee Creek

Location of Proposed Project: 76 Eaton Avenue
Sec 20, T20N, R4E

Description of Proposed Project: Shop, Garage with small living quarters

Projected Starting Date: 06/13/2016  Projected Date of Completion: 06/13/2017

THE APPLICANT CERTIFIES THAT THE STATEMENTS MADE ON THE APPLICATION, INCLUDING ANY ADDITIONAL INFORMATION OR DATA SUBMITTED ARE, TO THE BEST OF THE APPLICANT'S KNOWLEDGE, TRUE AND CORRECT. IF ANY INFORMATION PROVIDED BY THE APPLICANT IS INCORRECT, THIS PERMIT MAY BE VOIDED. THIS PERMIT GRANTS THE FLOODPLAIN MANAGER OR HIS DESIGNEE PERMISSION TO ENTER THE PROPERTY TO INSPECT FOR COMPLIANCE OR CONDITIONS SET FORTH BY THIS PERMIT.

Notes
L-C #132-2016

Susan Conell
Floodplain Manager
FINDINGS OF FACT AND ORDER:
IN THE MATTER OF THE APPLICATION GREGORY MACKENSTADT FOR A FLOODPLAIN PERMIT TO ELEVATE AN EXISTING RESIDENTIAL LOT AT 76 EATON AVENUE, GREAT FALLS, MT 59405. THE PROPERTY IS A PRE-EXISTING RESIDENTIAL USE WHICH IS LOCATED IN THE REGULATORY 100-YEAR FLOODPLAIN OF THE SAND COULEE CREEK.

I. FINDINGS OF FACT

1. Section 76-5-101, et seq., MCA establishes the minimum requirements for county floodplain management regulations.

2. The Cascade County Floodplain Regulation (CCFR) Ordinance was adopted March 19, 2013 (Ordinance #13-19).

3. The purpose of the Cascade County Floodplain Regulations are:
   A. The CCFR are intended to promote the public health, safety, and general welfare. To that end, the CCFR shall be implemented for the purposes stated in the enabling statute, for the purposes stated in the Ordinance adopting the CCFR, and for the purposes described herein, including but not limited to the purposes described in the subsections below.
   B. The CCFR are also intended to:
      1. Protect human life and health;
      2. Minimize expenditure of public money for costly flood control projects;
      3. Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
      4. Minimize prolonged business and public service interruptions;
      5. Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets and bridges;
      6. Help maintain a stable tax base by providing for the sound use and development of flood-prone areas in such a manner as to minimize future flood disruptions; and to
      7. Ensure compliance with the minimum standards for the continued participation in the National Flood Insurance Program for the benefit of the residents.

4. Description of Proposed Project: On April 12, 2016, the Floodplain Administrator’s staff received information about a rv parked at 76 Eaton Avenue. Planning staff sent a certified letter to the Mackenstadt’s to inform them of a zoning and floodplain violation. Mr. Mackenstadt responded by meeting with planning and health department staff on April 15, 2016 and applying for a Location Conformance Permit and Joint Floodplain Permit to construct a garage with apartment on the second floor at 76 Eaton Avenue (see Firmette, below).
5. **Record:** The Floodplain Administrator’s decision is based on the following information:

A. Violation letter sent from planning staff to Mackenstadt’s, April 12, 2016.

B. Floodplain permit application packet completed by Greg Mackenstadt for a Location Conformance permit and Floodplain Permit, received April 15, 2016.


D. Notice of floodplain permit application mailing sent to surrounding property owners, May 10, 2016.

E. Legal ad published in *Great Falls Tribune*, Friday, May 13 2016.

F. Floodplain Administrator visited site, Friday, May 20, 2016.
3. The main power service lines must have automatically operated electrical disconnect equipment or manually operated electrical disconnect equipment located at an accessible remote location outside the floodplain or two feet above the Base Flood Elevation; and
4. All electrical wiring systems installed below the base flood elevation must be suitable for continuous submergence and may not contain fibrous components.
   A. Per regulations, the lowest livable floor and all critical infrastructure must be elevated two feet above Base Flood Elevation.

HEATING AND COOLING SYSTEMS (Section 9.2.9.1-4 CCFR)
1. Be installed with float operated automatic control valves so that fuel supply is automatically shut off when flood waters reach the floor level where located;
2. Have manually operated gate valves installed in gas supply lines. The gate valves must be operable from a location above the Base Flood Elevation;
3. Be installed in accordance with the provisions of Electrical Systems Flood proofing; and
4. Have furnaces and cooling units and ductwork installed at least two (2) feet above the Base Flood Elevation.
   A. Per regulations, the lowest livable floor and all critical infrastructure must be elevated two feet above Base Flood Elevation.

PLUMBING SYSTEMS (Section 9.2.9.1-4 CCFR)
8. 1. Sewer lines, except those to be buried and sealed, must have check valves installed to prevent sewage backup into permitted structures; and
9. 2. All toilets, stools, sinks, urinals, vaults, and drains must be located so the lowest point of possible entry is at least two (2) feet above the Base Flood Elevation.
   A. Per regulations, the lowest livable floor and all critical infrastructure must be elevated two feet above Base Flood Elevation.

FLOOD PROOFING REQUIREMENTS (9.3),
1. The lowest floor elevation (including basement) including electrical, heating, duct work, ventilation, plumbing, and air conditioning equipment and other services is two (2) feet above the Base Flood Elevation. Elevating may be either suitable fill, stem walls, pilings or other acceptable means;
2. Crawl space must be designed so that the crawl space floor is at or above the Base Flood Elevation. Crawl spaces having an inside dimension of more than five (5) feet from the ground to the living floor level must meet the requirements in this section for a basement;
3. Where existing streets, utilities, lot dimensions, or additions onto existing structures make strict compliance with these provisions impossible, a lesser amount of fill or alternative flood proofing measures may be permitted only by variance approval.
   A. The historic residential use of Eaton Avenue demonstrate this location to be a non-conforming historic floodplain use. The site plan and verbal communication with Mr. Mackenstadt indicate his knowledge of floodplain regulations.

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Jim Ekberg, Deputy Director
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II. ORDER

1. Based on the record, the Floodplain Administrator finds and orders as follows: The requested uses are in conformance with the provisions of the Floodplain Regulations, and since the requested use (to build a garage and one bedroom apartment) will be able to meet applicable criteria set up within the Cascade County Floodplain Regulations, it is hereby ordered that Greg Mackenstadt’s floodplain permit application is approved subject to the conditions listed below. Said permit shall be valid for one calendar year from the date of issuance and shall become null and void if conditions are not appropriately satisfied, or if work is done beyond the size or scope authorized.

A. This approval authorizes the following activities, subject to the conditions of approval described below:

i. To elevate place seven feet (7') of compacted fill to create a building pad for a new residential structure. The elevation of the lowest adjacent grade is 3,350' NAVD 1988, any residential structure must be placed two (2') above the Base Flood Elevation (3,355') or 3,357' NAVD 1988.

ii. To elevate the highest livable floor and all critical infrastructure two feet over Base Flood Elevation (3,355' NAVD 1988).

2. This permit is conditioned upon the following:

A. Said permit shall become null and void if conditions are not appropriately satisfied, or if work is done beyond the scope authorized herein.

B. This permit shall be valid until June 9, 2017. Prior to the expiration date of the permit, the applicant may submit a written request to extend the duration of the permit.

C. Development of the project shall comply with all applicable local, state, and federal rules and regulations. The applicant is responsible for obtaining all necessary permits from appropriate regulatory agencies prior to commencing work. If any permits are required from other regulatory agencies, the applicant shall provide documentation to the Floodplain Administrator to verify that all required permits have been obtained.

D. Development of the project shall comply with all applicable standards under the Cascade County Floodplain Regulations.

E. Upon completion of the project, any excess material shall be removed from the regulatory 100-year floodplain.

F. All utilities to be installed below two feet (2') above Base Flood Elevation (3,357' NAVD 1988).
G. Neighboring property owners meet with County planners and sanitarians concerning the proposed project, state that in the 1950s the original developer of the Eaton Suburban Addition used 55 gallon drums for septic tanks. Asked if the Mackenstadt’s still used steel drums for septic tank. May 17, 2016.
   i. The Eaton Suburban Addition subdivision and a majority of residences were constructed prior to FIRM maps or current county regulations.
   ii. While the property did originally use a 55 gallon steel drum as a septic tank, Mackenstadt had replaced it with a con
   iii. Greg Mackenstadt inherited the property from his mother and has lived on Eaton Ave his entire life.
   iv. Since the parcel has been used continuously since the Mackenstadt’s family was born and raised on the property, since residential uses in the location pre-date FIRM Panels and Floodplain regulations, it is an approved pre-existing use.

H. Cascade County sanitarians request & receive a complete septic tank pumpers report for the un-permitted existing septic system at the location, it is in functioning order.

I. Cascade County Floodplain Administrator issues floodplain permit, June 9, 2016.

6. Location of Proposed Project: The proposed project is located approximately a mile southeast of the incorporated town of Great Falls. The area is in the Sand Coulee Creek regulated floodplain, it is over one mile from the creek. It is in Section 20, Township 20 North, Range 4 East, P.M.M., Cascade County, Montana.

7. Applicability of Cascade County Floodplain Regulations to Proposed Project: The proposed project is located within Zone AE floodplain according to FEMA Flood Insurance Rate Map Panel # 30013C062E, part of the FEMA Flood Insurance Study, Cascade County, Montana, March 19, 2013. According to the study, the entire .41 acre parcel is located in the 100 year regulated floodplain.

8. Legal Notice: Legal notice of the subject floodplain permit was published in the Great Falls Tribune on May 13, 2016. Notice was also sent to adjoining land owners via certified mail on May 10, 2016. A number of neighbors stopped by the Planning office to inquire about the project to inquire about the process to see if they can also build structures.

9. Compliance with Cascade County Floodplain Regulations (Taken from Section 9.2.8.1-4, 9.2.9.1-4, 9.2.10.1-2, 9.2.11.1-7, 9.3.1-3, CCFR):

   **ELECTRICAL SYSTEMS (Section 9.2.8.1-4 CCFR)**
   - 1. All incoming power service equipment including all metering equipment, control centers, transformers, distribution and lighting panels, and all other stationary equipment must be located at least two feet above Base Flood Elevation.
   - 2. Portable and movable electrical equipment may be placed below the elevation of the Base Flood Elevation, provided that the equipment can be disconnected by a single plug and socket assembly of a submersible type.
G. To have a Certified Land Surveyor submit a post construction elevation certificate to confirm lowest livable floor is at 3,357' NAVD 1988.

H. To stop living in the recreational vehicle and begin construction of the garage with apartment.

III. POST-PROJECT CONDITIONS

1. Within thirty (30) days of completion of the project the applicant shall notify the Floodplain Administrator and provide an opportunity to schedule an on-site inspection.

2. Within thirty (30) days of completion of the project the applicant shall provide a written statement and photographic documentation of the completed project demonstrating that the project has been accomplished in accordance with the Cascade County Floodplain Regulations, and in accordance with the design plans submitted with the application for the permit activity. Work that may be conducted in the floodplain is limited in size and scope to the work described in the application.

IV. APPEALS OF DECISIONS MADE BY THE FLOODPLAIN ADMINISTRATOR

An aggrieved person may appeal any decision of the Floodplain Administrator to the Cascade County Commission by filing a notice of appeal no more than 30 days after the date of the decision. An appeal shall allege the Floodplain Administrator’s Decision was an erroneous interpretation or application of these regulations or relevant State or Federal laws. The notice of appeal shall be in writing and be served in person or by mail upon the Floodplain Administrator. The appellant shall have an additional 30 days after providing a notice of appeal to submit a formal Appeal request which shall set forth the Decision appealed form, document the basis for the appeal and be accompanied by the appropriate application fee. The Commission shall hold a public hearing on the Appeal, and shall take testimony and enter findings of fact and conclusions and shall make such findings and conclusions available to the appellant within thirty (30) days.

APPROVED

DATED THIS 13TH DAY OF JUNE, 2016

SUSAN N. CONELL, CFM
November 29, 2017

Gregory and Elizabeth Mackenstadt
29 Eaton Ave
Great Falls, MT 59405

RE: Floodplain Permit Application #16-12 EXPIRATION NOTICE
Geo Code: 3016-20-4-01-06
Parcel #: 2005900

Dear Landowner:

On November 24, 2017, a routine review of existing conditional floodplain permits revealed that your floodplain permit #16-12 has expired. The project completion date was June 13, 2017. Prior to that date you could have notified this office that you needed additional time. At this point, you will have to re-apply to continue with the existing project. Also, there are some additional questions on your floor plan. With your new floodplain application, you will need another Elevation Certificate, "Building under Construction" completed as there are some questions on whether the structure meets the required Base Flood Elevation plus two feet for all residential structures. Until you have filed a new application you are hereby notified to cease and desist any further construction activity located at 29 Eaton Avenue in Great Falls.

You are hereby noticed to cease and desist construction activity on your property immediately, you must obtain a new floodplain permit and provide a copy of a Elevation Certificate for "Building under Construction" as well as a timeline on what steps you have taken and when you will have completed the steps.

The Cascade County Planning Division requests your cooperation in assuring compliance with the County's Floodplain Regulations. Please contact the Planning Division immediately at (406) 454-6905 so we can work on resolving this matter. Failure to contact the Planning Division by December 8, 2017 will result in this matter being forwarded to the County Attorney's Office.

Thank you for your cooperation.

Susan Conell
Planner

Cc: Cascade County Attorney's Office – Civil Division
Sandy Johnson - Environmental Health Manager, City County Health Department

[Contact information for various departments and individuals]
Memo

To: FILE
From: Conell, Susan N.
CC: 
Date: December 1, 2017
Re: GREG Mackenstadt

Comments: Greg came in the office in response to my request for a new floodplain permit. He showed me a copy of his renewed location conformance permit. He said it has the reference to the floodplain permit right on it which it does. I told him that I would renew from that date on his fp permit as well then since he did come in and renew the l/c. I asked him for a copy which will go in the floodplain file as well. I shared my concern with the height of the bottom floor of the structure. He said he was 7 feet and 7" at the bottom of the flooring. I said I hope so because he will have to provide an elevation certificate when completed. He was fine with that.
Good morning,

I am writing in support Greg Mackenstadt’s variance request. I am comfortable with his garage under the BFE because it is constructed out of concrete. I understand his main floor will exceed the requirements. Please reach out to me with any questions or if my information wrong.

Thank you,

MIKE KUBAS | 406.781.0193
60 Eaton Ave
Requirements for Flood Openings in Foundation Walls and Walls of Enclosures

Below Elevated Buildings in Special Flood Hazard Areas
In Accordance with the National Flood Insurance Program

NFIP Technical Bulletin 1 / March 2020
Comments on the Technical Bulletins should be directed to:

Department of Homeland Security / Federal Emergency Management Agency
Federal Insurance and Mitigation Administration (FIMA) Risk Management Directorate
Building Science Branch
400 C Street, S.W., Sixth Floor
Washington, DC 20472-3020


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Figure 3. Bill Bryant, Anne Arundel County, Maryland
Figure 17. North Carolina Emergency Management/T. Riddle

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## Acronyms

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<td>ASCE</td>
<td>American Society of Civil Engineers</td>
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<td>BFE</td>
<td>base flood elevation</td>
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<td>CFR</td>
<td>Code of Federal Regulations</td>
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<td>International Residential Code®</td>
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<td>LiMWA</td>
<td>Limit of Moderate Wave Action</td>
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<td>NFIP</td>
<td>National Flood Insurance Program</td>
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<td>NFPA</td>
<td>National Fire Protection Association</td>
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<tr>
<td>SEI</td>
<td>Structural Engineering Institute</td>
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<tr>
<td>SFHA</td>
<td>Special Flood Hazard Area</td>
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1 Introduction

This Technical Bulletin explains the National Flood Insurance Program (NFIP) requirements for flood openings in foundation walls and walls of enclosures below elevated buildings in Special Flood Hazard Areas (SFHAs) that are designated as Zone A (A, AE, A1-30, AH, and AO) on Flood Insurance Rate Maps (FIRMs). The flood opening requirements are intended to equalize hydrostatic forces (loads or pressure caused by standing or slow-moving water) on walls, thus preventing damage to or collapse of the building (see Figure 1). The requirements are not intended to reduce flood damage caused by hydrodynamic loads associated with fast-moving water (e.g., faster than 10 feet per second), wave impacts, or debris impacts.

![Diagram showing equalizing flood forces](image)

**Figure 1:** Equalizing flood forces (hydrostatic loads) on exterior walls

This Technical Bulletin includes the following:

- Examples of foundation walls and enclosure walls that require openings. Figure 2 illustrates typical enclosures with flood openings in Zone A: a crawl space foundation wall, a non-load-bearing wood-framed wall surrounding an enclosed area under a piling- or column-supported building, and a concrete or masonry load-bearing foundation wall surrounding an enclosed area. Other types of enclosures or situations may require the advice of a registered design professional.

- Information on installing flood openings, including the minimum number and minimum height above grade, and examples of installations.
- Guidance on prescriptive (non-engineered) and engineered flood openings. Non-engineered openings do not have moving parts and may be used to meet the NFIP prescriptive requirement for 1 square inch of net open area for every square foot of enclosed area. Engineered openings may be used if designed and certified by a registered design professional as meeting certain performance characteristics.

- Description of how flood openings affect NFIP flood insurance premiums.

- Guidance on documenting building elevations and flood openings using the NFIP Elevation Certificate (FEMA Form 086-0-33) (FEMA, 2015).

![Figure 2: Typical enclosures with flood openings in Zone A](image)

Questions about enclosure and flood opening requirements should be directed to the appropriate local official, NFIP State Coordinating Office, or Federal Emergency Management Agency (FEMA) Regional Office.

**NFIP TECHNICAL BULLETIN 0**

NFIP Technical Bulletin 0, *User’s Guide to Technical Bulletins*, should be used as a reference in conjunction with this Technical Bulletin. Technical Bulletin 0 describes the purpose and use of the Technical Bulletins, includes common concepts and terms, lists useful resources, and includes a crosswalk of the sections of the NFIP regulations identifying the Technical Bulletin that addresses each section of the regulations and a subject index.

Readers are cautioned that the definitions of some of the terms that are used in the Technical Bulletins are not the same when used by the NFIP for the purpose of rating flood insurance policies.
NFIP TERMS USED IN THIS TECHNICAL BULLETIN

- **Basement:** Area of a building that has its floor subgrade (below ground level) on all sides. NFIP regulations do not allow basements to extend below the base flood elevation (BFE) except in dry-floodproofed, non-residential buildings.

- **Enclosed area (enclosure):** An area below an elevated building that is enclosed by walls on all sides.

- **Lowest floor:** Lowest floor of the lowest enclosed area of a building, including basement. An unfinished or flood-resistant enclosure that is used solely for parking of vehicles, building access, or storage is not the lowest floor, provided the enclosure is built in compliance with applicable requirements.

- **Net open area:** Permanently open area of a non-engineered flood opening.

- **Special Flood Hazard Area (SFHA):** Area subject to flooding by the base flood (1-percent-annual-chance flood) and shown on Flood Insurance Rate Maps (FIRMs) as Zone A or Zone V.

- **Zone A:** Flood zones shown on FIRMs as Zone A, AE, A1-30, AH, AO, A99, and AR.

- **Zone V:** Flood zones shown on FIRMs as Zone V, VE, V1-30, and VO.

2 National Flood Insurance Program Regulations

An important NFIP objective is protecting buildings constructed in SFHAs from damage caused by flooding. The SFHA, composed of Zones A and V, is the areal extent of the base flood shown on Flood Insurance Rate Maps (FIRMs) prepared by FEMA. The base flood is the flood that has a 1 percent chance of being equaled or exceeded in any given year (commonly called the "100-year" flood).

The NFIP floodplain management regulations include minimum building design criteria that apply to:

- New construction

- Work determined to be Substantial Improvements, including improvements, alterations, and additions

- Repair of buildings determined to have incurred Substantial Damage

A defining characteristic of the NFIP regulations applicable in Zone A is the requirement for the lowest floor (including basement) to be elevated to or above the BFE. Non-residential buildings in Zone A must be elevated or dry floodproofed. The requirements in Zone V, not addressed in this Technical Bulletin, also specify building elevation, foundation, and enclosure requirements.

Enclosed areas (enclosures) are permitted below elevated buildings if the enclosed areas meet requirements, including limitations on use (parking of vehicles, building access, or storage), use of flood damage-resistant materials, and installation of flood openings that allow automatic entry and exit of floodwater (i.e., free inflow and outflow in both directions) to equalize the hydrostatic flood loads.
The NFIP regulations for enclosures and flood openings are codified in Title 44 of the Code of Federal Regulations (CFR) Part 60. Specific to NFIP Technical Bulletin 1, 44 CFR § 60.3(c)(5) states that a community shall:

Require, for all new construction and substantial improvements, that fully enclosed areas below the lowest floor that are usable solely for parking of vehicles, building access or storage in an area other than a basement and which are subject to flooding 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 meet or exceed the following minimum criteria: 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. Openings may be equipped with screens, louvers, valves, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.

**NFIP REQUIREMENTS AND HIGHER REGULATORY STANDARDS**

**State or Local Requirements.** State or local requirements that are more restrictive or stringent than the minimum requirements of the NFIP take precedence. The Technical Bulletins and other FEMA publications provide guidance on the minimum NFIP requirements and describe best practices. Design professionals, builders, and property owners should contact local officials to determine whether more restrictive requirements apply to buildings or sites in question. All other applicable requirements of state or local building codes must also be met for buildings in flood hazard areas.

**Substantial Improvement and Substantial Damage.** As part of issuing permits, local officials must review not only proposals for new construction but also for work on existing buildings to determine whether the work constitutes Substantial Improvement or repair of Substantial Damage. If the work is determined to constitute Substantial Improvement or repair of Substantial Damage, the buildings must be brought into compliance with the NFIP requirements for new construction. Some communities modify the definitions of Substantial Improvement and/or Substantial Damage to be more restrictive than the NFIP minimum requirements. For more information on Substantial Improvement and Substantial Damage, see FEMA P-758, Substantial Improvement/Substantial Damage Desk Reference (2010), and FEMA 213, Answers to Questions About Substantially Improved/Substantially Damaged Buildings (2018).

**Elevation Above Minimum NFIP Requirements.** Some communities require that buildings be elevated above the NFIP minimum requirement. The additional elevation is called freeboard. Design professionals, builders, and property owners should check with local officials to determine whether a community has freeboard requirements. References to building elevations in this Technical Bulletin should be construed as references to the community’s elevation requirement where freeboard is required.

**Legal Nonconforming Buildings.** Owners of older, legal nonconforming buildings that are elevated with enclosures below the BFE may wish to retrofit the enclosures to conform to current requirements for enclosures, even when the enclosure is below grade on all sides. Lower NFIP flood insurance rates may apply if retrofit enclosures have flood openings that meet the requirements in this Technical Bulletin and other requirements for enclosures (e.g., limited use, flood damage-resistant materials, elevated utilities).
3 Building Codes and Standards

In addition to complying with the NFIP requirements, all new construction, Substantial Improvements, and repair of Substantial Damage must comply with the applicable building codes and standards adopted by states and communities.

The International Codes® (I-Codes®), published by the International Code Council® (ICC®), are a family of codes that includes the International Residential Code® (IRC®), International Building Code® (IBC®), International Existing Building Code® (IEBC®), and codes that govern the installation of mechanical, plumbing, fuel gas service, and other aspects of building construction. FEMA has deemed that the latest published editions of the I-Codes meet or exceed NFIP requirements for buildings and structures in flood hazard areas. Excerpts of the flood provisions of the I-Codes are available on FEMA’s Building Code Resource webpage (https://www.fema.gov/building-code-resources).

3.1 International Residential Code

The IRC applies to one- and two-family dwellings and townhomes not more than three stories above grade plane. The IRC requirements related to flood openings, summarized in Table 1, are similar to but generally exceed NFIP requirements.

Table 1 refers to selected requirements of the 2018 IRC and notes changes from the 2015 and 2012 editions; subsequent editions of the IRC should include comparable requirements.

IRC COMMENTARY

The ICC publishes companion commentary for the IRC. Although not regulatory, the commentary provides guidance that is useful in complying with, interpreting, and enforcing the requirements of the code.
Table 1: Comparison of Selected 2018 IRC and NFIP Flood Opening Requirements

<table>
<thead>
<tr>
<th>Topic</th>
<th>Summary of Selected 2018 IRC Requirements and Changes from 2015 and 2012 Editions</th>
<th>Comparison with NFIP Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flood openings</td>
<td>Section R322.2.2(2) Enclosed area below design flood elevation. Requires enclosed areas below the design flood elevation, including crawlspaces, to have flood openings (non-engineered or engineered) that meet listed criteria and that are installed in accordance with R322.2.2.1. The enclosed area is measured on the exterior of the enclosure. The listed criteria are equivalent to non-engineered and engineered openings, with the addition of a minimum size (not less than 3 inches in any direction in the plane of the wall). Change from 2015 to 2018 IRC; No change. Change from 2012 to 2015 IRC; No change.</td>
<td>Equivalent to NFIP 44 CFR § 60.3(c)(5) but with more specificity: measurement of enclosed area and minimum dimensions of opening.</td>
</tr>
<tr>
<td>Installation of flood openings</td>
<td>Section R322.2.2.1 Installation of openings. Specifies the following for the installation of flood openings: • At least two openings on different sides of an enclosure are required, and if more than one enclosed area is present, each must have openings on exterior walls. • The bottom of each opening must be not more than 1 foot above the higher of the final interior grade (or floor) and the finished exterior grade immediately under each opening. • Openings are permitted to be installed in doors and windows. Change from 2015 to 2018 IRC; No change. Change from 2012 to 2015 IRC; Installation requirements moved to new section.</td>
<td>More specificity than NFIP 44 CFR § 60.3(c)(5): openings on different sides, openings installed above higher of interior and exterior grade or floor, and openings installed in doors.</td>
</tr>
<tr>
<td>Breakaway walls</td>
<td>Section R322.3.5 Walls below design flood elevation. Requires walls below elevated dwellings in Coastal High Hazard Areas (Zone V) and Coastal A Zones that are intended to break away under flood loads to have flood openings that meet the requirements of Section R322.2.2(2). Change from 2015 to 2018 IRC; Section number was R322.3.4. Change from 2012 to 2015 IRC; New requirement in Coastal High Hazard Areas (Zone V) and Coastal A Zones if delineated.</td>
<td>Exceeds NFIP 44 CFR § 60.3(c)(5): openings in breakaway walls and Zone V requirements applied in Coastal A Zones if delineated.</td>
</tr>
</tbody>
</table>

3.2 International Building Code and ASCE 24

The flood provisions of the latest published editions of the IBC meet or exceed NFIP requirements for buildings, largely through reference to the standard ASCE 24, Flood Resistant Design and Construction, developed by the American Society of Civil Engineers (ASCE). The IBC applies to all applicable buildings and structures. While primarily used for buildings and structures other than dwellings within the scope of the IRC, the IBC may be used to design dwellings. ASCE 24 requirements for flood openings, summarized in Table 2, are similar to but generally exceed and are more specific than NFIP requirements. Table 2 refers to selected requirements of the 2018 IBC and ASCE 24-14 (noting changes from 2015 and 2012 IBC and ASCE 24-05); subsequent editions of the IBC and ASCE 24 should include comparable requirements.

**IBC AND ASCE 24 COMMENTARIES**

The ICC publishes companion commentary for the IBC, and ASCE publishes companion commentary for ASCE 24. Although not regulatory, the commentaries provide guidance that is useful in complying with, interpreting, and enforcing the requirements.
Table 2: Comparison of Selected 2018 IBC and ASCE 24-14 Flood Opening Requirements with NFIP Requirements

<table>
<thead>
<tr>
<th>Topic</th>
<th>Summary of Selected 2018 IBC/ASCE 24-14 Requirements and Changes from 2015 and 2012 IBC/ASCE 24-05</th>
<th>Comparison with NFIP Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certification of engineered openings</td>
<td><strong>Section 1612.4(1.2).</strong> Requires submission of a certification statement that the design provides for equalization of hydrostatic flood forces in accordance with ASCE 24, Section 2.7.2.2 (for engineered openings), if flood openings do not meet the requirements of ASCE 24, Section 2.7.2.1 (for non-engineered openings). Change from 2015 to 2018 IBC: Section number was 1612.5. Change from 2012 to 2015 IBC: No change.</td>
<td>Equivalent to NFIP 44 CFR § 60.3(c)(9).</td>
</tr>
<tr>
<td>Breakaway walls</td>
<td><strong>ASCE 24 Section 2.7.1.1.</strong> Requires openings in breakaway walls. Change from ASCE 24-05: New requirement for openings in breakaway walls in Coastal High Hazard Areas and Coastal A Zones.</td>
<td>Exceeds NFIP 44 CFR § 60.3(e)(5) by requiring openings in breakaway walls.</td>
</tr>
<tr>
<td>Non-engineered openings</td>
<td><strong>ASCE 24 Section 2.7.2.1.</strong> Specifies non-engineered openings, requires enclosed areas to be measured on the exterior, specifies minimum size (not less than 3 inches in any direction in the plane of the wall), and requires that the presence of louvers, blades, screens, faceplates or other covers, and devices be accounted for in determining net open area. Change from ASCE 24-05: Specifies measurement of enclosed areas to determine square footage. Clarifies that the presence of louvers, blades, screens, faceplates, and devices must be accounted for in the measurement of net open area of flood openings.</td>
<td>Equivalent to NFIP 44 CFR § 60.3(c)(5) but with more specificity: measurement of enclosure area, minimum dimension of openings, and measurement of net open area.</td>
</tr>
<tr>
<td>Engineered openings</td>
<td><strong>ASCE 24 Section 2.7.2.2.</strong> Specifies engineered openings with emphasis on performance accounting for the presence of louvers, blades, screens, grilles, faceplates or other covers, and devices and ensuring that the difference between exterior and interior flood levels does not exceed 1 foot, with guidance related to the rate of rise and fall in excess of (or less than) 5 feet per hour. Specifies minimum size (not less than 3 inches in any direction in the plane of the wall). Provides the formula for calculating the total net area of required engineered openings. Change from ASCE 24-05: Greater emphasis on performance and the effects of louvers, blades, screens, grilles, faceplates, and devices and revises the table of coefficients of discharge</td>
<td>Equivalent to NFIP 44 CFR § 60.3(c)(5) but with more specificity: minimum rate of rise and fall, minimum dimension of openings, and formula for engineered openings.</td>
</tr>
<tr>
<td>Installation of flood openings</td>
<td><strong>ASCE 24 Section 2.7.3.</strong> Specifies the following for the installation of openings: • At least two openings in at least two walls of each enclosed area • The bottom of each opening not more than 1 foot above the higher of the final interior grade or floor and the finished exterior grade immediately under each opening • Openings in doors and windows permitted Change from ASCE 24-05: Consolidates installation requirements, which apply to both non-engineered and engineered openings, and clarifies that the position is relative to the higher of the interior and exterior grade or floor.</td>
<td>Equivalent to NFIP 44 CFR § 60.3(c)(5) but with more specificity: openings on different sides, bottom of openings above higher of interior and exterior grade or flood, and openings in doors and windows.</td>
</tr>
</tbody>
</table>
4 NFIP Flood Insurance Implications

Careful attention to compliance with NFIP requirements for enclosures below elevated lowest floors and flood openings is important during the design, plan review, construction, and inspection of buildings in SFHAs. Compliance influences vulnerability to flood damage and also the cost of NFIP flood insurance policies. The presence of enclosures may result in higher NFIP flood insurance premiums. If flood openings are not compliant, the floor of a crawlspace or the floor of an enclosure will be deemed the lowest floor for insurance rating purposes, which may result in higher NFIP flood insurance premiums, especially if the floor of the crawlspace or enclosure is more than 1 foot below the BFE.

5 Documenting Building Elevations and Flood Openings Using the NFIP Elevation Certificate

Communities are required to obtain the following from permit holders for buildings in SFHAs: the surveyed elevation of lowest floors of new buildings and buildings that have been Substantially Improved or repaired after incurring Substantial Damage. The elevations may be provided on the NFIP Elevation Certificate or in other formats.

The NFIP Elevation Certificate is designed to facilitate the collection of information that will help local officials evaluate compliance with floodplain management requirements and to provide the information necessary for the proper rating of NFIP flood insurance policies. For guidance on completing the certificate, see NFIP Elevation Certificate and Instructions (FEMA, 2015) and FEMA 467-1, Floodplain Management Bulletin: Elevation Certificate (FEMA, 2004).

The required information includes the following characteristics of crawlspace, enclosures, and attached garages:

- Square footage of the enclosed area, measured on the outside of the enclosure walls
- Number of permanent flood openings within 1.0 foot above adjacent grade
- Total net open area of flood openings
- Whether engineered openings are used

According to the NFIP Elevation Certificate instructions, when an enclosed area has no flood openings or if all flood openings (non-engineered
or engineered) are higher than 1.0 foot above the adjacent grade, "N/A" (not applicable) should be entered for both the number of flood openings within 1.0 foot above adjacent grade and total net open area of flood openings. If the bottoms of some flood openings are within 1.0 foot above the adjacent grade, only the number and net open area of those openings should be recorded (openings that are higher than 1.0 foot are not included).

The certificate does not require users to determine whether any portion of a flood opening is above the BFE. However, for compliance purposes, see Section 8.3.6 of this Technical Bulletin for guidance on flood openings that extend above the BFE, which can occur in areas with shallow flooding. In these areas, even if the bottom of an opening is less than 1.0 foot above grade, a portion of the opening may extend above the BFE.

The NFIP Elevation Certificate has space for comments. Comments must be entered when engineered openings are used. Section 9.3.2 of this Technical Bulletin describes the documentation that is required for engineered openings and that must be attached to the certificate.

6 Use of Enclosed Areas Below Elevated Buildings

The NFIP regulations specify that enclosed areas under elevated buildings in SFHAs may be allowed if the enclosed areas are used solely for:

- Parking of vehicles (attached garages or parking areas below elevated buildings)
- Building access (stairwells, foyers)
- Storage (recommended to be limited to storage of low-value items)

The NFIP regulations do not list crawlspaces and under-floor spaces as allowable uses of enclosed areas. However, buildings in Zone A may be elevated using perimeter foundation walls that create these enclosed areas. Crawlspaces and under-floor spaces provide access to under-floor utilities such as pipes, ductwork, and electric conduits.

DRY FLOODPROOFED BUILDINGS

The only buildings with enclosed areas that are not required to have flood openings are non-residential buildings that are engineered to be dry floodproofed. For information on dry floodproofing, see FEMA P-936, "Floodproofing Non-Residential Buildings" (FEMA, 2013), and NFIP Technical Bulletin 3, "Non-Residential Floodproofing – Requirements and Certification." FEMA has granted exceptions to a small number of communities to allow engineered, dry-floodproofed basements in specific circumstances.
A compliant enclosed area below the BFE can be rendered non-compliant by installing features that are inconsistent with the limitations on uses. Examples of features that are not allowed below the BFE are:

- Appliances
- Heating and air conditioning equipment
- Ventilation
- Ductwork
- Plumbing fixtures
- Materials that are not flood damage-resistant materials
- More than the minimum electric service required to address life-safety and electric code requirements for vehicle parking, building access, or storage

## 7 Foundation Walls and Enclosure Walls that Require Flood Openings

The NFIP regulations require that enclosed areas below the lowest floors of elevated buildings in Zone A have flood openings to equalize the hydrostatic flood forces (loads) on the enclosure walls. This requirement applies whether the walls are crawlspace, load-bearing, or non-load-bearing walls.

Examples of foundation and enclosure walls that require openings are listed below and described in Sections 7.1 through 7.9.

- Solid perimeter foundation walls (crawlspace and under-floor spaces)
- Solid perimeter foundation walls (below-grade crawlspace)
- Garages attached to elevated buildings
- Enclosed areas under buildings elevated on open foundations
- Enclosed areas with breakaway walls under buildings elevated on open foundations
- Above-grade (elevated) enclosed areas
- Two-level enclosed areas
- Solid perimeter foundation walls on which manufactured homes are installed
- Accessory structures (detached garages and storage sheds)
7.1 Solid Perimeter Foundation Walls (Crawlspace
d and Under-Floor Spaces)

The crawlspace or under-floor space that is created when a building is elevated on a solid perimeter foundation wall that is below the BFE (see Figure 2) must meet all of the requirements for enclosed areas, including flood openings. If brick veneer, siding, or other material covers the wall, the openings in the wall must penetrate into the enclosed area. A crawlspace access door does not qualify as a flood opening unless the door has an opening installed in it or otherwise meets the performance requirement to allow automatic entry and exit of floodwater.

Section 8.2 of this Technical Bulletin explains that the bottom of each opening must be no higher than 1 foot above the higher of the finished interior grade (or floor) or the finished exterior grade immediately under the opening. Therefore, the expected finished exterior grade and the final interior grade (or floor) of a crawlspace must be known before the location of the openings in a perimeter foundation wall can be determined.

Building codes may require ventilation of under-floor spaces. Ventilation openings are typically positioned near the top of the foundation wall to facilitate air flow. In most cases, ventilation openings are too far above grade to satisfy flood opening requirements.

In SFHAs where BFEs are several feet above grade or when owners want enough head room in an under-floor space to allow for parking of vehicles and storage, solid perimeter foundation walls may be used to create a full-height, under-floor space (see Figure 3). The walls surrounding an under-floor space must meet all flood-opening requirements.

Figure 3: Full-height, solid perimeter walls surrounding a garage and storage area with flood openings (only three openings are shown)
Full-height, under-floor spaces must also meet all other NFIP requirements, which will minimize the likelihood of future conversion to uses other than the allowed uses (parking of vehicles, building access, or storage). Features that are inconsistent with the allowed uses are not permitted (see Section 6).

A backfilled stem wall foundation (also called chain wall, raised-slab-on-grade, and slab-on-stem-wall-with-fill) can look like a solid perimeter foundation wall from the outside, but a backfilled stem wall foundation is backfilled with compacted structural fill, concrete, or gravel that supports the floor slab (see Figure 4). Because stem wall foundations are backfilled, flood openings are not required and should not be installed.

7.2 Solid Perimeter Foundation Walls (Below-Grade Crawlspaces)

The NFIP regulations do not allow buildings in SFHAs to have basements (areas below grade on all sides) except for engineered, non-residential buildings in Zone A that are designed and certified to be dry floodproofed. Therefore, crawlspaces that are below grade on all sides are not allowed because they are basements. An exception is available only in SFHAs with shallow flooding and then only if specific requirements and limitations are met. For more information,

According to Technical Bulletin 11, below-grade crawlspaces may be allowed if the foundation wall height is less than 4 feet from the bottom of the floor joist/truss to the top of the footing or interior grade/floor (whichever is higher). The top of the footing or interior grade/floor must be no more than 2 feet below grade (see Figure 5). Flood openings are required in the foundation walls surrounding below-grade crawlspaces and, as noted in Section 7.1, ventilation may be required. Because below-grade crawlspaces may contribute to increased humidity and mold growth, Technical Bulletin 11 requires that below-grade crawlspaces have adequate drainage systems to minimize moisture damage.

Although crawlspaces that meet the limitations in Technical Bulletin 11 are not considered basements for floodplain management purposes, they are considered basements for NFIP flood insurance purposes, and premiums will be higher if the grade inside a crawlspace is below the exterior grade on all sides.

### 7.3 Garages Attached to Elevated Buildings

Many buildings, especially homes, have an attached garage that extends laterally from the building and may or may not have living space above it. The floor of a garage that is attached to a building in an SFHA is allowed to be below the BFE if the garage meets all of the requirements for an enclosed area below the BFE. The use of the garage space must be limited to parking of vehicles, building access, or storage.

Flood openings are required in the exterior walls of garages in Zone A. Openings may be installed in garage doors (see Figure 6). However, because garage doors are likely to be replaced over the life of a building and subsequent owners may inadvertently replace garage doors without openings, flood openings should be installed in garage doors only when there is insufficient wall area in which to install the required number of openings.

Garage doors themselves do not meet the requirements for openings because human intervention would be needed to open garage doors when flooding is expected. Human intervention is inconsistent with the requirement that openings allow for the automatic entry and exit of floodwater. Garage doors with mechanisms that open the doors when water is detected do not meet the requirements because electric service cannot be guaranteed even if a backup power source is provided. Similarly, gaps that may be present between the garage door and the door jamb or walls do not guarantee automatic entry and exit of floodwater and do not count toward the net open area requirement.
7.4 Enclosed Areas Under Buildings Elevated on Open Foundations

A building that is elevated on an open foundation (e.g., piers, posts, columns, pilings) in Zone A may have enclosed areas below the elevated floor (see Figure 7). Sometimes, only part of the footprint is enclosed, such as for a stairwell or storage room. All of the requirements for enclosed areas apply. Requirements include openings, elevated utilities, flood damage-resistant materials, and limitations on use (parking of vehicles, building access, or storage).

Skirting used to enclose areas under manufactured homes or other elevated buildings is typically made of weather-resistant material and extends from the bottom of the floor system down to grade. Rigid vinyl and aluminum skirting must have flood openings. Flood openings are not required when flexible skirting is used, but flexible skirting may be pushed against foundations if floodwater rises rapidly, in which case open lattice may be more appropriate. Unattached skirting can become dislodged during flooding and generate damaging debris.

Figure 6: Engineered openings in garage doors

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) INSTALLATION STANDARD AND SKIRTING

NFPA 225, Model Manufactured Home Installation Standard (NFPA, 2017), specifies that the installation of skirting does not trigger the requirement for flood openings if the skirting does not provide structural support and would collapse under wind and water loads that are less than those expected during the base flood event without causing structural damage to the elevated home or foundation.
For floodplain management and NFIP flood insurance purposes, utility chases designed to protect utility lines from freezing are not considered enclosures. Utility chases must be small and not allow access for a person to enter the space (access panels for servicing the lines are appropriate).

Because a utility chase is not considered an enclosure, it does not have to have flood openings (but flood openings may be provided). The utility chase must be constructed of flood damage-resistant materials below the BFE, and the enclosed utility lines must meet the requirement to be watertight and capable of withstanding flood loads (hydrostatic, hydrodynamic, wave).

7.5 Enclosed Areas with Breakaway Walls Under Buildings Elevated on Open Foundations

Open foundations (e.g., piers, posts, columns, pilings) are recommended in riverine SFHAs where flow velocities are expected to exceed 10 feet per second and in coastal areas where breaking wave heights during base flood conditions are expected to be between 1.5 and 3 feet (called Coastal A Zones). Buildings in these areas may be exposed to significant hydrodynamic loads, debris impact, and scour, any of which could be sufficient to damage typical perimeter foundation walls and enclosure walls even when there are flood openings.
Many Flood Insurance Rate Maps (FIRMs) for coastal communities that have been revised since 2009 show a Limit of Moderate Wave Action (LiMWA), which delineates the inland extent of the 1.5-foot wave. In Coastal A Zones, identified as Zone A on FIRMs, FEMA recommends that walls surrounding enclosed areas be designed as breakaway walls. To comply with the NFIP requirements, flood openings are required in breakaway walls in Zone A.

The NFIP regulations require that enclosures below elevated buildings in SFHAs identified as Zone V meet the same requirements for enclosures in Zone A, except that (1) walls must be non-supporting breakaway walls, open lattice-work, or insect screening and (2) flood openings are not required (see NFIP Technical Bulletin 9, Design and Construction Guidance for Breakaway Walls). The guidance in Technical Bulletin 9 should be used when flood openings are installed in breakaway walls to minimize wall failure under flooding that occurs more frequently than the base flood.

### 7.6 Above-Grade (Elevated) Enclosed Areas

In flood hazard areas that experience frequent flooding, some owners construct enclosures with floor systems that are elevated above grade, not in contact with the ground, but still below the BFE (see Figure 8). Placing the enclosure floor above grade minimizes the potential for damage to the enclosure and contents during frequent, low-level flood events.

Above-grade enclosures must meet all requirements applicable to enclosures (flood openings, flood damage-resistant materials, and used only for storage or building access). The floor system of above-grade enclosures may be independently supported on piers or posts, or enclosures may be structurally attached to the building’s column or piling foundation. Although the floors of above-grade enclosures are not the lowest floor for floodplain management purposes, the enclosure floors are the lowest floor for NFIP flood insurance rating purposes.

One or more floor grates should be installed in the enclosure floor to reduce the potential for structural damage. Damage could result from buoyancy loads on the enclosure floors before water enters through the flood openings installed in walls. Openings in floors also allow enclosures to drain completely, reducing the potential for damage caused by the added weight of water.
**ABOVE-GRADE ENCLOSURES AND NFIP FLOOD INSURANCE**

NFIP flood insurance policies for elevated buildings with above-grade enclosures are rated assuming the above-grade enclosure is the lowest floor (i.e., the floor of the enclosure instead of the floor of the elevated building). See the “Lowest Floor Guide” section of the NFIP Flood Insurance Manual (FEMA, 2019). Above-grade enclosures can result in higher NFIP flood insurance premiums than enclosures with floors that are at-grade or close to grade. Owners should ask their insurance companies to submit requests to the NFIP for a special rating for buildings with above-grade enclosures.

**7.7 Two-Level Enclosed Areas**

In flood hazard areas where the BFE is more than one story above the ground, some owners want to build two-level enclosures (see Figure 9). For compliance purposes, to avoid the second-level enclosure from being identified as the lowest floor, both enclosure levels must meet all of the requirements for enclosed areas, including openings, elevated utilities, flood damage-resistant materials, and limitations on use (parking of vehicles, building access, or storage). To facilitate drainage from the upper level of the enclosure, an opening with a grate should be installed in the floor.
Two-level enclosures are unusual and warrant consideration of flood loads based on site-specific flood conditions. Local officials may require that buildings with two-level enclosures be designed and certified by a registered design professional rather than rely on non-engineered foundations and enclosure configurations.

**TWO-LEVEL ENCLOSURES AND NFIP FLOOD INSURANCE**

Designers and owners should be aware that a building with a two-level enclosure, even if allowed by permit, will have a higher NFIP flood insurance premium than if the building has a one-level enclosure. Even if a two-level enclosure complies with building codes and floodplain management requirements for enclosures, the upper floor of the two-level enclosure will be deemed the lowest floor for insurance rating purposes (the lowest floor for flood insurance purposes is the first floor elevated above ground). Owners should ask their insurance companies to submit requests to the NFIP for a special rating for buildings with two-level enclosures.

### 7.8  Solid Perimeter Foundation Walls on which Manufactured Homes Are Installed

Manufactured homes may be installed on solid perimeter foundation walls that enclose the space below the homes (see Figure 10). Even if not part of a home's load-bearing support system, a solid perimeter foundation wall is required to have openings; otherwise, hydrostatic loads may damage the wall, which could lead to damage of the home's supporting foundation and anchor system.
7.9 Accessory Structures

Communities participating in the NFIP are required to regulate all development in SFHAs, including detached garages, detached storage buildings, and small storage sheds. Accessory structures may be elevated in accordance with the requirements for elevated buildings or dry floodproofed.

When communities have FEMA-approved limitations on the size of accessory structures or when communities grant variances for non-elevated accessory structures, the structures may be allowed without elevation provided the structures are wet floodproofed (see NFIP Technical Bulletin 7, *Wet Floodproofing Requirements for Certain Buildings Located in Special Flood Hazard Areas*). Alternatively, communities without FEMA-approved size limits may consider granting variances for non-elevated accessory structures in accordance with FEMA policies and guidance.

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**ADDITIONAL ACCESSORY STRUCTURE CONSIDERATIONS**

Some communities have FEMA-approved regulations that specify limitations on the size of accessory structures that are allowed in SFHAs without having to comply with elevation requirements. Other considerations for accessory structures are set forth in FEMA policies and guidance.

Local officials should consult NFIP State Coordinators or FEMA Regional Offices for additional guidance and for appropriate size limits and language to include in local regulations.
Wet-floodproofed accessory structures must comply with the following measures:

- Use is limited to parking of vehicles and storage
- Utilities are elevated
- Materials below the BFE are flood damage-resistant materials
- Flood opening requirements are satisfied
- Structures are anchored to resist flotation, collapse, or lateral movement under flood conditions

A best practice is to require Non-Conversion Agreements when non-elevated accessory structures are allowed. These agreements, when recorded with property deeds, inform future owners about the limitations and the wet-floodproofing measures. Accessory structures that are allowed to be wet floodproofed must not be used for any habitable or other prohibited purpose.

8 Requirements and Guidance for Installation of Flood Openings

The NFIP regulations specify installation requirements for all flood openings, whether non-engineered or engineered. See Section 9 of this Technical Bulletin for information on non-engineered and engineered flood openings. Installation requirements specify the minimum number of openings and the maximum height of openings above grade. The requirements and guidance on installation are provided in Sections 8.1 through 8.3.

8.1 Location and Minimum Number of Flood Openings

Every enclosed area is required to have at least two flood openings on exterior walls. Flood openings should be installed in at least two sides of each enclosed area to decrease the chance that all openings will be blocked by floating debris and to allow for more even filling and drainage of enclosed areas than if openings are installed on only one side. FEMA recommends that openings be distributed around the perimeter of enclosed areas unless there is clear justification for putting all of the openings on only one or two sides, such as in townhouses with limited exterior walls (see Section 8.3.4) and buildings set into sloping sites (see Section 8.3.2). If openings are not distributed around the perimeter, an imbalance in flood loads could result in damage to or collapse of walls.

Figure 11 shows a foundation plan with multiple enclosures and openings in the perimeter wall of each enclosed area. Note that the number of openings shown is for illustration purposes only; the total number of openings and the adequacy of the net open area of the openings depend on the type of opening and whether air-vent devices or engineered openings are installed.
In some situations, openings in interior walls or partitions are necessary to ensure that floodwater can reach all enclosed areas and minimize unbalanced hydrostatic loads on interior and exterior walls. When openings are used in interior walls, the total number of openings and their net open area should be based on the size of the enclosed area, but openings in interior walls are not counted toward the required total opening requirement based on the exterior measurement of the enclosed area. To maintain safe fire separation, flood openings should not be placed in the wall separating a garage from living spaces and crawlspaces unless devices used as flood openings that are designed to satisfy fire-separation requirements are used.

8.2 Height of Flood Openings Above Grade or Floor

The bottom of each flood opening must be positioned no higher than 1 foot above the higher of the final (finished) interior or exterior grade or the floor that is immediately under each opening so water will begin to flow through the opening when water rises just above the bottom of the opening. The purpose of this requirement is to satisfy the performance expectation that the difference in water levels between the interior and exterior will not exceed 1 foot as floodwater begins to rise and as it recedes from the site. To reduce the amount of water trapped inside, a good practice is to install some openings closer to grade than the maximum 1 foot allowed. See Section 8.3.6 for information on openings that extend above the BFE in areas with shallow flooding.

When interior and exterior grades are different, the higher of (1) the finished exterior grade immediately under each opening and (2) the final interior grade or floor is used to determine

ENCLOSURES BELOW GRADE ON ALL SIDES ARE BASEMENTS

An enclosure that is below grade on all sides is a basement regardless of whether the interior grade or floor is below grade because backfill, topsoil, or landscaping materials were added or because the footing trenches inside the perimeter foundation walls are not completely backfilled. Basements do not comply with the minimum NFIP requirements. In addition, the presence of such below-grade enclosures will result in higher NFIP flood insurance premiums.
the position of flood openings. The following should be considered when determining which grade or floor to use:

- **Finished exterior grade.** Care should be taken when placing backfill, topsoil, or landscaping materials around the outside of enclosures, especially solid perimeter foundation walls. If the finished exterior grade is higher than the interior grade on all sides of the building, the enclosed area will be a basement as defined by the NFIP.

- **Final interior grade or floor.** The trench that is excavated to construct footings and foundation walls must be backfilled completely; otherwise, a basement will be created. If the interior grade or floor is higher than the exterior grade, the openings must be no higher than 1 foot above the interior grade or floor.

### 8.3 Examples of Flood Opening Installations

The following examples of flood opening installations are described in Sections 8.3.1 through 8.3.6:

- Interior grade or floor higher than the exterior grade
- Sloping sites
- Buildings with large enclosed areas
- Townhouses with limited exterior walls
- Buildings with multiple enclosures
- Openings in areas with shallow flooding

#### 8.3.1 Interior Grade or Floor Higher than the Exterior Grade

This section describes enclosures in which the interior grade or floor is higher than the exterior grade. As water rises against the outside of the foundation, the interior fill or slab resists the hydrostatic load. When water rises above the interior grade or slab, the lateral load will become unbalanced and therefore must be equalized with openings that allow water to automatically enter and exit.

Figure 12 is an example of a framed enclosure below a manufactured home that is elevated on columns. As indicated by the driveway on the left, the interior slab is higher than the exterior grade along the side of the building. The flood openings are within 1 foot of the interior floor surface. Here, the full-height enclosed area is used for parking of vehicles and storage.

Figure 12: Manufactured home installed on columns above a full-height, framed garage (note elevation of thick driveway slab on left; the flood openings are within 1 foot of interior floor surface)
When viewed from the outside, an enclosure with the interior grade or floor higher than the exterior grade may appear non-compliant with the installation requirements for openings because the openings appear to be too high above the exterior grade. Therefore, the final documentation of as-built elevations should note the difference in interior and exterior grades. For example, if the NFIP Elevation Certificate is used, the comments should indicate whether the openings are (or are not) within 1 foot of the higher of the two grades and should explain that the interior grade or floor is higher than the exterior grade. Without the explanation, NFIP flood insurance premiums may be higher than necessary.

8.3.2 Sloping Sites

Buildings on solid perimeter foundation walls set into sloping sites present a special situation for the installation of flood openings. Careful attention must be paid to the following:

- The interior grade or floor along the lowest side of the building must be at or above the exterior grade across the entire length of the lowest side, and there must be positive surface drainage away from the building; otherwise, the enclosure will be considered a basement as defined by the NFIP.

- The bottom of each opening must be no higher than 1 foot above the exterior or interior grade immediately below the opening, whichever is higher (see Figure 13).

- For flood openings to perform their intended function, they should be below the BFE.

![Figure 13: Flood openings in enclosure walls on a sloping site](image)
• Interior partitions and load-bearing walls must have openings to allow water to readily reach every enclosed area (see Section 8.3.5 for information on buildings with multiple enclosures).

8.3.3 Buildings with Large Enclosed Areas

Some buildings, especially commercial and industrial buildings, have large under-floor spaces, crawlspaces, or enclosures. Flood openings may be stacked or grouped (see Figure 14), or large-dimension openings may be used, provided all of the requirements for openings are satisfied. Vertically stacked or closely spaced openings function together as one opening, and the bottom of the lowest opening must be no higher than 1 foot above the exterior grade or interior grade, whichever is higher.

![Figure 14: Flood openings that are stacked and closely grouped to satisfy the required total net open area](image)

8.3.4 Townhouses with Limited Exterior Walls

Townhouses are single-family dwelling units constructed in groups of three or more attached units in which each unit extends from foundation to roof with exterior walls on at least two sides. Flood openings are required for townhouses in SFHAs that are constructed with solid perimeter foundation walls or solid walls surrounding enclosed areas under the elevated portion of the building.

Because interior townhouse units have less linear exterior wall length than end units, meeting all of the requirements for flood openings can be a challenge, especially the requirement for adequate opening area and the requirement that each enclosed area have openings. If openings cannot be provided in at least two exterior walls of each enclosed area, the NFIP allows all openings to be installed in one wall.
The design of interior townhouse units can satisfy the guidance that openings should be located on different sides of each enclosed area if interior partitions and walls have openings to connect enclosed spaces from front to back. Figure 15 shows suggested locations for openings. Note that the number of openings in Figure 15 is for illustration purposes only; the total number of openings and the adequacy of the opening area depend on the type of opening and whether non-engineered or engineered openings are installed. Fire-safety limitations generally preclude openings in the walls that separate townhouse units.

Providing adequate openings in enclosures below elevated townhouse units, other than end units, may be even more challenging if a multi-unit building is set into a sloping site. In this case, it may be appropriate to consider an open foundation or a backfilled stem wall foundation that does not require openings.

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**Figure 15: Suggested flood openings in enclosures under elevated townhouses (number of openings for illustration purposes only)**

### 8.3.5 Buildings with Multiple Enclosures

Every enclosed area is required to meet the requirements for enclosures, including the requirement for flood openings in exterior walls. Figure 11 in Section 8.1 shows a home foundation plan with multiple enclosures. In some situations, openings in interior walls or partitions may be necessary to ensure that floodwater can reach all areas to minimize unbalanced hydrostatic loads on load-bearing interior walls and exterior walls (see middle townhouse in Figure 15 in Section 8.3.4). When openings are used in
interior walls, the total number of openings in exterior walls and the total opening area should be based on the size of the entire enclosed area. Openings in interior walls do not count toward the total opening requirements based on the exterior measurement of the enclosed area.

8.3.6 Flood Openings in Areas with Shallow Flooding

Some FIRMs show mapped SFHAs where the depth of floodwater above grade will be shallow (2 feet or less during the base flood). Shallow flooding occurs toward the landward boundary of SFHAs and in areas identified as being subject to sheet flow or ponding. The NFIP regulations require flood openings in enclosures even if the depth of flooding is only 1 foot and the difference in water depth between the inside and outside of enclosures is 1 foot or less.

Depending on the depth of floodwater in areas with shallow flooding, flood openings may extend above the BFE if the bottom of the opening is no higher than 1 foot above the higher of the final interior grade or floor and the finished exterior grade of the crawlspace or enclosure. When flood openings extend above the BFE, alternatives to satisfy the requirements include:

- Raise the floor of the enclosure to be at or above the BFE, perhaps by using a thicker slab, resulting in no need for openings. Although this alternative satisfies the construction requirement, for NFIP flood insurance rating purposes, the top of the slab is the elevation of the lowest floor, not the next higher floor (see the text box “Interior Grade or Floor above BFE” in Section 8.3.1).

- Install openings as close to grade (or floor) as possible to maximize the open area available for inflow and outflow of floodwater (see Figure 16). The total net open area of the openings must be based on the enclosed area even if some portion of the opening is above the BFE.

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**NFIP ELEVATION CERTIFICATE AND SHALLOW FLOODING**

The NFIP Elevation Certificate requires users to input the number of flood openings within 1.0 foot above the adjacent grade or floor. The certificate does not require users to determine how much of a flood opening is above or below the BFE.

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![Figure 16: Bottom of the flood opening positioned as close as possible to grade (or floor) when any portion of the opening extends above the BFE](image-url)
9 Non-Engineered Flood Openings and Engineered Flood Openings

The NFIP regulations, described in previous sections, identify options for providing sufficient size and number of flood openings to allow for the automatic (free) entry and exit of floodwater. This section describes how the automatic entry and exit of floodwater can be accomplished by the use of:

- Non-engineered openings that meet the prescriptive requirement to provide 1 square inch of net open area for each square foot of enclosed area, where the enclosed area is measured on the exterior of the enclosure walls. Section 9.2 describes a variety of options that can serve as non-engineered openings.
- Engineered openings for which Evaluation Reports are issued by the ICC Evaluation Service (ICC-ES), a subsidiary of the ICC, or equivalent reports issued by other product certification organizations.
- Engineered openings designed and certified by a registered design professional for a specific building and site-specific conditions.

All of the following requirements for installation apply regardless of whether engineered openings or non-engineered openings are used to satisfy the NFIP requirements (also see Section 8):

- Each enclosed area must have a minimum of two openings. When multiple enclosed areas are present, each area must have openings in its exterior walls. Section 8.3.5 describes connecting multiple areas by installing openings in interior walls or partitions to ensure that floodwater can reach all enclosed areas.
- The bottom of each opening must be no more than 1 foot above the higher of the final interior grade or floor or the finished exterior grade immediately under the opening.
- Insect screens, grates, grilles, fixed louvers, blades, faceplates, or other devices, if any, must not block the automatic flow of floodwater into and out of the enclosed area.

Section 9.1 provides a list of measures that are not acceptable as flood openings.
9.1 Measures Not Acceptable as Flood Openings

FEMA has determined that the following measures do not satisfy the requirements for flood openings:

- Standard foundation air-ventilation devices that can be closed manually unless they are permanently disabled in the open position because otherwise, they do not allow for the automatic entry and exit of floodwater (see Figure 17).

- Standard foundation air-ventilation devices that have detachable solid covers intended to be manually installed over the vent because they do not allow for the automatic entry and exit of floodwater when the cover is in place.

- Standard foundation air-ventilation devices that are designed to open and close based on temperature unless they are also designed to allow for the automatic entry and exit of floodwater.

- Devices with covers or panels that are intended to displace when floodwaters rise on only one side of a wall because they do not satisfy the requirement for automatic entry and exit of floodwater in both directions.

- Windows below the BFE because the automatic entry and exit of floodwater cannot be satisfied by the expectation that windows will break under rising floodwater.

- Garage doors without openings because human intervention is required to open garage doors when flooding is expected. Gaps between the garage door and the door jamb or walls do not count toward the net open area requirement.

![Figure 17: Standard air vent that is unacceptable as a flood opening because it is not disabled in the open position](image)

9.2 Non-Engineered Flood Openings

Flood openings without moving parts are non-engineered openings, while those with moving parts should be certified as engineered openings (see Section 9.3). Non-engineered openings are used to provide 1 square inch of net open area for each square foot of enclosed area. The size of an enclosed
area in square feet should be measured on the exterior of the enclosure walls. A variety of non-engineered opening options are available.

"Net open area" refers to the permanently open area of a non-engineered opening. The NFIP regulations indicate that flood openings may be equipped with "coverings or devices" if they permit the automatic (free) entry and exit of floodwater in both directions.

The measurement of the net open area must take into consideration any solid obstructions such as grilles, fixed blades and louvers, or faceplates. Methods used by the ventilation industry to account for such obstructions when determining net open area for air flow may be used. Figure 18 shows a typical standard air-vent faceplate and measurements of the net open area. Figure 19 shows a typical ventilation louver with fixed blades and indicates how the net open area is determined.

Some manufacturers of standard air vents stamp the number of square inches the device provides for air flow into the frame of the device or may note the number in the packaging. The measurement accounts for

**MEASUREMENT MUST ACCOUNT FOR OBSTRUCTIONS**

Section C2.7.2.1 of the ASCE 24 commentary emphasizes that the measurement of net open area is not based on the dimensions of the opening (void) in the wall. The measurement must account for any portion of the void that is obstructed or covered in any way (other than by screening).

**Figure 18:** Example of non-engineered opening: Typical standard air vent faceplate providing 42 square inches of net open area if disabled in the open position; measurement of net open area uses a slot width of 0.5 inch times the slot height of 6.5 inch times the total number of slots

**Figure 19:** Example of non-engineered opening: Typical standard air vent with fixed, angled blades providing approximately 44 square inches of net open area; measurement of net open area uses slot width of 13 inches times the sum of the spaces between the blades
the presence of fixed blades, insect screens, and other obstructions. The same number of square inches should be used for the net open area calculation when these devices are installed as non-engineered openings. If not indicated by the manufacturer, the net open area must be measured. Guidance on measuring the net opening area may be available from manufacturers or other sources.

To qualify as non-engineered flood openings that permit the automatic entry and exit of floodwater:

- Standard air vents must not have solid covers (detachable or integrated with the vent) that are intended to be manually installed.
- Typical air-vent devices that are designed to be opened and closed manually must be disabled permanently in the open position.
- Air-vent devices that are designed to open and close based on temperature must also be designed to allow the automatic entry and exit of floodwater.

Insect screens that do not block the entry and exit of floodwater are allowed and do not affect the determination of the net open area. Communities that administer the IBC or IRC should note the requirement to cover ventilation openings for crawlspaces and under-floor spaces. The codes provide a list of acceptable covering materials.

The IBC and IRC commentaries note that some covering materials for ventilation openings may reduce the gross open area of the vent by as much as 50 percent. Although the net open area is not reduced by screens, in areas where floodwater is expected to carry debris such as grass clippings and leaves, insect screens tend to clog (see Figure 20).

Engineers, architects, and local officials may determine that a different type of opening is appropriate or that more than the minimum number of flood openings is required to increase the likelihood that openings will perform as expected during flooding, even if some of them become clogged with debris.

**AREAS LIKELY TO HAVE DEBRIS AND SEDIMENT**

Section C2.7.2.1 of the ASCE 24 commentary suggests using caution in selecting or specifying openings with louvers, blades, screens, or faceplates that may be blocked by debris and sediment. In areas where experience indicates that floodborne debris and sediment are likely, ASCE 24 recommends avoiding the use of openings with components that have been shown to become blocked or clogged.

Figure 20: Typical air vents with insect screens blocked by flood debris
Examples of non-engineered openings are described below and shown in Figures 21 through 24.

- Figure 21 shows typical standard air-ventilation devices that are intended for crawlspace foundation walls. If installed as flood openings, they must be disabled permanently in the open position to satisfy the requirement for automatic entry and exit of floodwater.

- Figure 22 shows decorative masonry units and decorative brickwork with closely spaced, open holes. Only the net open area of each hole is counted.

- Figure 23 shows standard concrete blocks that are turned sideways and have insect screening. The voids in the blocks are measured to determine the net open area.

- Figure 24 shows a foundation in which a hole was created when the concrete was poured. The horizontal dimension should be greater than the vertical dimension to facilitate flow-through. A wood frame covered with insect screening is inserted into the hole. The framed void is measured to determine the net open area. A similar situation results when a block is omitted from perimeter foundation walls constructed of concrete masonry units, resulting in a void the size of the omitted block.

**MINIMUM DIMENSION SPECIFIED BY I-CODES**

The IRC and IBC (by reference to ASCE 24) require that openings be not less than 3 inches in any direction in the plane of the wall. This requirement applies to the opening in the wall, excluding any device that may be inserted.

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**Figure 21:** Examples of typical air vents in crawlspace foundation walls used as flood openings with varying net open areas

- Grate
- Fixed blades
- Faceplate or grille
- Decorative faceplate
Figure 22: Decorative masonry units and closely spaced holes in brickwork; the area of each hole counts toward the total net open area.

Figure 23: Concrete blocks turned sideways with insect screening; a typical 8- by 16-inch block provides approximately 60 square inches of net open area.
9.3 Engineered Flood Openings

Engineered flood openings, which have moving parts, must be designed and certified by registered design professionals as engineered flood openings (see Section 9.2 for openings without moving parts). The certification must specifically address the performance required by the NFIP regulations. Devices with moving parts should be certified as engineered openings. In general, engineered openings remain closed until flood conditions trigger the movable parts to allow floodwater and debris to freely and automatically enter or exit. This section describes the design and performance requirements and the certification and documentation requirements for engineered openings.

9.3.1 Design and Performance Requirements

The design and performance criteria for engineered openings are in ASCE 24, Section 2.7.2.2. Section C2.7.2.2 of the ASCE 24 commentary provides additional information on engineered openings and the best means to test expected performance.
The equation from ASCE 24, shown in Figure 25, is used to determine the total net area of engineered openings required for a given total enclosed area, based on some of the characteristics of the openings. The calculated minimum net area of engineered openings may be called the "coverage" or "rated" area.

\[ A_o = 0.033 \left[ \frac{1}{c} \right] R A_e \]

Where:  
\( A_o \) = total net area of openings required (in\(^2\))  
\( 0.033 \) = coefficient corresponding to a factor of safety of 5.0 (in\(^2\) • hr/ft\(^3\))  
\( c \) = opening coefficient (non-dimensional; see ASCE 24, Table 2-2)  
\( R \) = worst case rate of rise and fall (ft/hr)  
\( A_e \) = total enclosed area (ft\(^2\))

Figure 25: Equation used to determine total net area of engineered openings (ASCE 24-14; used with permission)

The equation includes a coefficient (0.033) that corresponds to a factor of safety of 5, which is consistent with design practices related to the protection of life and property. The ASCE 24 commentary provides additional background on the derivation of the equation.

Design and performance criteria for engineered openings specified in ASCE 24 include all of the following:

- Performance must allow for the automatic entry and exit of floodwater. The ASCE 24 commentary notes that the certification requires consideration of a number of factors that represent expected base flood conditions and not simply application of the equation. (Flood conditions in different areas can vary widely; in some areas, the onset of flooding may be rapid while in other areas, flood conditions may develop over much longer periods.)

- Performance must account for the presence of obstructions such as louvers, blades, screens, grilles, faceplates, and devices that are part of the engineered opening assembly itself. In accordance with ASCE 24, Table 2-2 (see Table 3 of this Technical Bulletin), the opening coefficient of discharge \( c \) is 0.20 for openings of all shapes if partially obstructed during design flood conditions by "louvers, blades, screens, grilles, faceplates, or other covers or devices [that] are present during the design flood," as opposed to blocked by debris.

ASCE 24 EMPHASIS ON PERFORMANCE AND CERTIFICATION

Engineered opening requirements changed between the 2005 and 2014 editions of ASCE 24. The 2014 edition places more emphasis on evidence of performance and consideration of factors that represent expected flood conditions. Section C2.7.2.2 of the ASCE 24-14 commentary notes that the best means to certify performance is to test engineered openings under conditions that mimic a range of rates of rise and fall, including rates many times the minimum rate of 5 feet per hour.

Documentation of performance under faster rates of rise and fall provides building designers and local officials with sufficient information on which to base decisions regarding whether to increase the number or size of openings to account for faster rates. The ASCE 24 commentary also notes that testing should be done with water containing debris typical of flooding around buildings (e.g., leaves, grass clippings, small branches, trash).
(The coefficient of discharge, also called an orifice coefficient, is selected to characterize the shape of the portion of an engineered opening through which water flows.)

**Table 3: Flood Opening Coefficient of Discharge**

<table>
<thead>
<tr>
<th>Opening Shape and Condition</th>
<th>c</th>
</tr>
</thead>
<tbody>
<tr>
<td>All shapes, partially obstructed during design flood</td>
<td>0.20</td>
</tr>
<tr>
<td>Circular, unobstructed during design flood</td>
<td>0.60</td>
</tr>
<tr>
<td>Rectangular, long axis horizontal, short axis vertical, unobstructed during design flood</td>
<td>0.40</td>
</tr>
<tr>
<td>Square, unobstructed during design flood</td>
<td>0.35</td>
</tr>
<tr>
<td>Rectangular, short axis horizontal, long axis vertical, unobstructed during design flood</td>
<td>0.25</td>
</tr>
<tr>
<td>Other shapes, unobstructed during design flood</td>
<td>0.30</td>
</tr>
</tbody>
</table>

Source: ASCE 24-14, Table 2-2 (used with permission)

1. Different coefficients of discharge shall be permitted: (1) where a designer has performed detailed, opening-specific calculations, a coefficient of discharge up to 10% different than given in Table 2-2 shall be permitted; or (2) where laboratory testing or numerical modeling of flow through the opening has been conducted, the resulting coefficient of discharge shall be permitted. In no case shall a coefficient of discharge >0.60 be permitted.

2. Openings shall be classified as partially obstructed if louvers, blades, screens, grilles, faceplates, or other covers or devices are present during the design flood.

3. When the horizontal dimension is twice or more the vertical dimension, use 0.4; as the dimensions approach a square, interpolate from 0.4 to 0.35.

4. When the horizontal dimension is half or less the vertical dimension, use 0.25; as the dimensions approach a square, interpolate from 0.25 to 0.35.

- Performance must account for the potential for debris blockage even if there are no louvers, blades, screens, grilles, faceplates, or other devices, preferably by allowing typical floodborne debris to pass through.

- Performance must ensure that the difference between the exterior and interior water levels will not exceed 1 foot. (Because the minimum requirement allows the bottom of openings to be no more than 1 foot above the higher of the finished interior grade [or floor] or exterior grade, a difference of no more than 1 foot is maintained when water begins to pass through as it crests the bottom of the opening frame.)

- The minimum dimension of an opening in a wall must not be less than 3 inches in any direction in the plane of the wall.

- Reliable data on the rates of rise and fall at specific locations are usually not readily available. Therefore, engineered openings must be designed and must function based on the assumption that the minimum rate of rise and fall will be 5 feet per hour. Reinforcing the importance of testing for

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**FLOODWATER RATE OF RISE AND FALL**

Section C2.7.2.2 of the ASCE 24 commentary notes that a rate of rise of 5 feet per hour, only 1 inch per minute, is not representative of many flood hazard areas and advises building designers to be cautious about relying entirely on that rate. Faster rates of rise and fall are likely in watersheds where rainfall runoff accumulates rapidly and in many areas that are subject to storm surge flooding. ASCE 24 advises that information on rates of rise may be available from stream and tide gauges; federal, state, and local sources; and video documentation of past flood events.
faster rates of rise and fall, building designers must increase the specified total net area of engineered openings when site-specific data or analyses of anticipated flood conditions indicate that more rapid rates of rise and fall are likely.

9.3.2 Documentation of Engineered Openings for Compliance

Engineered openings should be accepted by local officials when the designs are certified and the certifications are submitted as part of permit applications. Acceptable documentation of certification are the certification reports (i.e., ICC-ES Evaluation Reports or equivalent reports from other product certification organizations) and individual certifications for specific buildings (see Section 9.3.4).

Copies of the certifications must be kept in the community’s permanent permit files. Community retention of these documents is important not only to demonstrate compliance but also in the event that future building owners do not receive copies of the certifications when they buy buildings. Owners must submit certifications with applications for NFIP flood insurance policies.

9.3.3 Engineered Openings with Certification Reports

The ICC-ES and other product certification organizations develop criteria for acceptance of a variety of building products, construction methods, and materials. Each organization issues certification reports after technical evaluation of documentation that is submitted by manufacturers. Documentation typically includes technical design reports, certifications, and testing results to demonstrate performance and compliance with codes and standards. Certification reports provide evidence that products comply with specific building codes and standards. Designers, builders, and local officials who rely on these reports must determine whether the reports identify the editions of the building codes and ASCE 24 that are applicable to individual projects. If applicable editions of the codes and standard are not identified, the certification report should not be used.

Documentation submitted by manufacturers to obtain an ICC-ES Evaluation Report or equivalent certification report for engineered openings must be supported by certifications describing the performance of the openings and the name, title, address, type of license, license number, the state in which the license was issued, and the signature and seal of the certifying registered
design professional. The certification reports must include a description of installation requirements or limitations that, if not followed, would void the certification. FEMA considers the following documentation important:

- Statement certifying that the openings, when properly installed, are designed to automatically equalize hydrostatic flood loads on exterior walls by allowing the automatic entry and exit of floodwater in accordance with the design and performance requirements in ASCE 24.
- Statement certifying that the performance accounts for the presence of louvers, blades, screens, grilles, faceplates, or devices with consideration of the potential for debris blockage when these features are present.
- Description of the measurement of the actual net area of the engineered opening that is being certified and identification of the opening coefficient of discharge, which is the variable \( c \) in the formula in ASCE 24 (see Figure 25 and Table 3 of this Technical Bulletin). The coefficient of discharge is selected by the designer based on the shape and dimensions of the opening and whether the engineered opening has features such as louvers, blades, screens, grilles, faceplates, or devices that partially obstruct flow during conditions of flooding.
- The range of flood characteristics tested for which the certification is valid, specifically the rates of rise and fall of floodwater, which is the variable \( R \) in the formula in ASCE 24 (see Figure 25), and whether there are any limitations based on rates of rise and fall that are faster than 5 feet per hour. Given the ASCE 24 performance expectations, engineered openings must function during conditions of the minimum 5 feet per hour rate of rise and fall.

### 9.3.4 Engineered Openings Individually Certified for Specific Buildings

Engineered openings that do not have ICC-ES Evaluation Reports or equivalent certification reports must be individually certified as meeting the design requirements described in Section 9.3.1 of this Technical Bulletin and for acceptability in specific buildings based on site-specific conditions. The formula in Section 9.3.1 includes the variable \( R \), which is the worst-case rate of rise and fall at a specific location. ASCE 24 allows the assumption of a minimum rate of rise and fall of 5 feet per hour only in the absence of reliable data on site-specific rates of rise and fall. Building designers who specify engineered openings that are individually certified should consult local officials regarding observations of past rates of rise and fall during conditions of flooding.

Generic certifications for manufactured products place the burden on users (who may not be design professionals) to determine whether a specific location is subject to rates of rise and fall greater than 5 feet per hour. For this reason, generic "fill-in-the-blank" certifications are not acceptable when a manufactured product is used for a specific building unless the builder or design professional for that building, or the local official, determines that the rates of rise and fall at the specific location are no faster than 5 feet per hour. Alternatively, the builder or design professional may submit documentation that there are no reliable data for site-specific rates of

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**INDIVIDUAL CERTIFICATION FOR SPECIFIC BUILDINGS MUST ADDRESS SEVERAL FACTORS**

Section C2.7.2.2 of the ASCE 24 commentary indicates that "certification requires more than simply applying the equation ... it requires consideration of a number of factors that represent expected base flood conditions." The commentary also notes that engineered openings should be tested unless uniquely designed for a specific location.
rise and fall, in which case the local official may concur that the rates may be assumed to be no faster than 5 feet per hour.

When engineered openings that have been individually certified for specific buildings are used, the permit application must include a certification that is signed and sealed by the registered design professional, who must be licensed to practice in the state in which the building is located. In addition, the submitted plans must identify the location for the openings and specify installation instructions.

The original certification for engineered openings prepared for specific buildings must include the design professional’s name, title, address, signature, type of license, license number, the state in which the license was issued, and the signature and applied seal of the certifying registered design professional. The original certification must identify the physical location of the building in which the engineered openings will be installed.

This Technical Bulletin relies on the ASCE 24 requirements for engineered openings as the accepted standard of practice. The certification must include a description of installation requirements or limitations that, if not followed, will void the certification. In addition to the design and certification criteria listed in Section 9.3.1, the certification must include the following:

- Statement certifying that the openings, when properly installed, are designed to automatically equalize hydrostatic flood loads on exterior walls by allowing the automatic entry and exit of floodwater in accordance with the design and performance requirements in ASCE 24.
- Statement certifying that the performance accounts for the presence of louvers, blades, screens, grilles, faceplates, or devices with consideration of the potential for debris blockage when these features are present.
- Description of the measurement of the actual net area of the engineered opening and identification of the opening coefficient of discharge, which is the variable $c$ in the formula in ASCE 24 (see Figure 25 and Table 3 of this Technical Bulletin). The coefficient of discharge is selected by the designer based on the shape and dimensions of the opening and whether the engineered opening has features such as louvers, blades, covers, screens, grilles, faceplates, or other elements that partially obstruct flow during conditions of flooding.
- Determination of the rate of rise and fall of floodwater at the site and a statement certifying that the openings are designed for that rate of rise and fall or a statement that the opening is designed for a minimum rate of rise and fall of 5 feet per hour because reliable data on site-specific rates of rise and fall are not available.
9.3.5  NFIP Elevation Certificate and Documentation of Engineered Openings for Flood Insurance

When engineered openings are used, the NFIP Elevation Certificate must be completed carefully. The question “Engineered flood openings?” must be answered with “Yes” (see A8.d and A9.d in Figure 26). The engineered opening documentation must be attached to the NFIP Elevation Certificate. Insurers and insurance agents must ask property owners to provide the documentation as part of applications for NFIP flood insurance policies. The following are acceptable forms of documentation:

- For engineered openings with ICC-ES Evaluation Reports or equivalent reports from other product certification organizations, a copy of the report that identifies the manufacturer’s model number and specifies the number of such openings that are required for a specified square footage of enclosed area.

- For engineered openings individually certified for installation in a specific building, a certification that is signed and sealed by a registered design professional who is licensed in the state where the building is located, and that addresses the statements described in Section 9.3.4.

To complete the NFIP Elevation Certificate with information required for proper rating of NFIP flood insurance policies for buildings with engineered openings, Item A8.c, “Total net area of flood openings in A8.b,” must be filled in with the total coverage or rated area of engineered openings. The total coverage or rated area is the number of engineered openings identified in Item A8.b multiplied by the “coverage” area, “rated” area, or “enclosed area coverage” identified in the ICC-ES Evaluation Report, equivalent report, or individual certifications. When engineered openings are used in attached garages, Item A9.c must be completed in the same manner. The coverage or rated area usually is given in square feet of enclosed area for which an engineered opening can provide automatic inflow and outflow of floodwater, which is, in effect, equivalent to the performance that would be provided by that number of square inches of non-engineered openings.

Also, in Section D, “Check here if attachments” must be selected, and a copy of the certification report must be attached to the NFIP Elevation Certificate (see Figure 26). Notes must be added in the Section D comment section to identify the manufacturer and the manufacturer’s model number of the engineered opening.
A8. For a building with a crawlspace or enclosure(s):
   a) Square footage of crawlspace or enclosure(s) \(1,675\) sq ft
   b) Number of permanent flood openings in the crawlspace or enclosure(s) within 1.0 foot above adjacent grade 9
   c) Total net area of flood openings in A8.b \(1,800\) sq in
   d) Engineered flood openings? Yes

A9. For a building with an attached garage:
   a) Square footage of attached garage \(350\) sq ft
   b) Number of permanent flood openings in the attached garage within 1.0 foot above adjacent grade \(400\) sq in
   c) Total net area of flood openings in A9.b
   d) Engineered flood openings? Yes

Comments (including type of equipment and location, per C2(e), if applicable):

10 References

This section lists the references cited in this Technical Bulletin. Additional resources related to NFIP requirements are provided in Technical Bulletin 0.


ICC (International Code Council). International Codes. Available at https://codes.iccsafe.org/category/1-Codes:
- 2012 International Building Code
- 2012 International Residential Code
- 2015 International Building Code
- 2015 International Residential Code
- 2018 International Building Code
- 2018 International Residential Code

Additional Information
Provided July 22, 2022
Site Visit Photos

By: Charity Yonker, Planning Director
Cascade County
SITE VISIT 7-22-2022
76 EATON AVENUE
MACKENSTADT
SITE VISIT 7-22-2022
76 EATON AVENUE
MACKENSTADT
Additional Information
Provided July 22, 2022

By: Elizabeth Mackenstadt
# Elevation Certificate

Important: Follow the instructions on pages 1-9.

Copy all pages of this Elevation Certificate and all attachments for (1) community official, (2) insurance agent/company, and (3) building owner.

## Section A - Property Information

<table>
<thead>
<tr>
<th>A1. Building Owner's Name</th>
<th>Dale Gregory and Elizabeth Mackenstede</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2. Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No.</td>
<td>76 Eaton Avenue</td>
</tr>
<tr>
<td>City</td>
<td>Great Falls</td>
</tr>
<tr>
<td>State</td>
<td>Montana</td>
</tr>
<tr>
<td>ZIP Code</td>
<td>59405</td>
</tr>
</tbody>
</table>

### A3. Property Description (Lot and Block Numbers, Tax Parcel Number, Legal Description, etc.)

Eaton Suburban Addition Amended Plat Block 1 Lot 6D Section 20, T20N, R4E

### A4. Building Use (e.g., Residential, Non-Residential, Addition, Accessory, etc.)

Residential

### A5. Latitude/Longitude:

- Lat: 47°28'07.87485" N
- Long: 111°14'54.0437" W

Horizontal Datum: NAD 1927

### A6. Attach at least 2 photographs of the building if the Certificate is being used to obtain flood insurance.

### A7. Building Diagram Number

1A

### A8. For a building with a crawlspace or enclosure(s):

- a) Square footage of crawlspace or enclosure(s) 912.00 sq ft
- b) Number of permanent flood openings in the crawlspace or enclosure(s) within 1.0 foot above adjacent grade
- c) Total net area of flood openings in A8.b 0 sq in
- d) Engineered flood openings? ☑ Yes ☐ No

### A9. For a building with an attached garage:

- a) Square footage of attached garage sq ft
- b) Number of permanent flood openings in the attached garage within 1.0 foot above adjacent grade
- c) Total net area of flood openings in A9.b sq in
- d) Engineered flood openings? ☑ Yes ☐ No

## Section B - Flood Insurance Rate Map (FIRM) Information

<table>
<thead>
<tr>
<th>B1. NFIP Community Name &amp; Community Number</th>
<th>Cascade County 300006</th>
</tr>
</thead>
<tbody>
<tr>
<td>B2. County Name</td>
<td>Cascade County</td>
</tr>
<tr>
<td>B3. State</td>
<td>Montana</td>
</tr>
</tbody>
</table>

### B4. Map/Panel Number

| 30013C0609 |

### B5. Suffix

| E |

### B6. FIRM Index Date

| 03-19-2013 |

### B7. FIRM Panel Effective/Revised Date

| 03-19-2013 |

### B8. Flood Zone(s)

| AE |

### B9. Base Flood Elevation(s)

| (Zone AO, use Base Flood Depth) | 3355 |

### B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in Item B9:

- ☑ FIS Profile
- ☑ FIRM
- ☑ Community Determined
- ☐ Other/Source: 

### B11. Indicate elevation datum used for BFE in Item B9:

- ☑ NGVD 1929
- ☑ NAVD 1988
- ☑ Other/Source: 

### B12. Is the building located in a Coastal Barrier Resources System (CBRS) area or Otherwise Protected Area (OPA)?

- ☑ Yes
- ☐ No

Designation Date: 

- ☑ CBRS
- ☐ OPA

FEMA Form 086-0-33 (12/19) replaces all previous editions.
### ELEVATION CERTIFICATE

**SECTION A - BUILDING INFORMATION**
- **Building Address:** 78 East Avenue, Great Falls, MT 59405
- **Building Name:**
- **Building Use:**
- **Building Height:**
- **Building Storys:**
- **Building Elevation:**

**SECTION B - SURVEY INFORMATION**
- **Surveyor Name:** Dale E. Schaeffer
- **Surveyor Address:** 1708 22nd Avenue South, Great Falls, MT 59404
- **Surveyor Phone:** (406) 761-5402
- **Surveyor Email:**
- **Surveyor Certification:**
- **Surveyor License:** MT-0836E

**SECTION C - BUILDING ELEVATION INFORMATION**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Top of the building</td>
</tr>
<tr>
<td>B.</td>
<td>Top of the roof</td>
</tr>
<tr>
<td>C.</td>
<td>Top of the highest horizontal structural member</td>
</tr>
<tr>
<td>D.</td>
<td>Lowest point of the foundation</td>
</tr>
<tr>
<td>E.</td>
<td>Lowest floor level</td>
</tr>
<tr>
<td>F.</td>
<td>Lowest point of the highest structure</td>
</tr>
</tbody>
</table>

**SECTION D - BAR CODE INFORMATION**

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>Montana</td>
</tr>
<tr>
<td>City</td>
<td>Great Falls</td>
</tr>
<tr>
<td>ZIP Code</td>
<td>59405</td>
</tr>
<tr>
<td>State</td>
<td>Montana</td>
</tr>
<tr>
<td>City</td>
<td>Great Falls</td>
</tr>
<tr>
<td>ZIP Code</td>
<td>59405</td>
</tr>
</tbody>
</table>

**SIGNATURE**

Dale E. Schaeffer

**DATE**

07-06-2022

**FEMA Form 695-0-33 (12/19)**

*Replaces all previous editions*
## ELEVATION CERTIFICATE

**Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No.**

76 Eaton Avenue

**City**

Great Falls

**State**

Montana

**ZIP Code**

59405

**Company NAIC Number**


### FOR INSURANCE COMPANY USE

**Policy Number:**


### SECTION E – BUILDING ELEVATION INFORMATION (SURVEY NOT REQUIRED) FOR ZONE AO AND ZONE A (WITHOUT BFE)

For Zones AO and A (without BFE), complete Items E1–E5. If the Certificate is intended to support a LOMA or LOMR-F request, complete Sections A, B, and C. For Items E1–E4, use natural grade, if available. Check the measurement used. In Puerto Rico only, enter meters.

**E1.** Provide elevation information for the following and check the appropriate boxes to show whether the elevation is above or below the highest adjacent grade (HAG) and the lowest adjacent grade (LAG).

- **a)** Top of bottom floor (including basement, crawlspace, or enclosure) is

- **b)** Top of bottom floor (including basement, crawlspace, or enclosure) is

**E2.** For Building Diagrams 6–9 with permanent flood openings provided in Section A Items 8 and/or 9 (see pages 1–2 of Instructions), the next higher floor (elevation C2.b in the diagrams) of the building is

**E3.** Attached garage (top of slab) is

**E4.** Top of platform of machinery and/or equipment servicing the building is

**E5.** Zone AO only: If no flood depth number is available, is the top of the bottom floor elevated in accordance with the community’s floodplain management ordinance?  

- Yes
- No
- Unknown

The local official must certify this information in Section G.

### SECTION F – PROPERTY OWNER (OR OWNER’S REPRESENTATIVE) CERTIFICATION

The property owner or owner’s authorized representative who completes Sections A, B, and E for Zone A (without a FEMA-issued or community-issued BFE) or Zone AO must sign here. The statements in Sections A, B, and E are correct to the best of my knowledge.

**Property Owner or Owner’s Authorized Representative’s Name**

**Address**


**City**


**State**


**ZIP Code**


**Signature**


**Date**


**Telephone**


**Comments**


☐ Check here if attachments.
The local official who is authorized by law or ordinance to administer the community's floodplain management ordinance can complete Sections A, B, C (or E), and G of this Elevation Certificate. Complete the applicable item(s) and sign below. Check the measurement used in Items G8-G10. In Puerto Rico only, enter meters.

G1. ☐ The information in Section C was taken from other documentation that has been signed and sealed by a licensed surveyor, engineer, or architect who is authorized by law to certify elevation information. (Indicate the source and date of the elevation data in the Comments area below.)

G2. ☐ A community official completed Section E for a building located in Zone A (without a FEMA-issued or community-issued BFE) or Zone AO.

G3. ☐ The following information (Items G4-G10) is provided for community floodplain management purposes.

<table>
<thead>
<tr>
<th>G4. Permit Number</th>
<th>G5. Date Permit Issued</th>
<th>G6. Date Certificate of Compliance/Occupancy Issued</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

G7. ☐ This permit has been issued for: ☐ New Construction ☐ Substantial Improvement

G8. Elevation of as-built lowest floor (including basement) of the building: _____ feet _____ meters Datum _____

G9. BFE or (in Zone AO) depth of flooding at the building site: _____ feet _____ meters Datum _____

G10. Community's design flood elevation: _____ feet _____ meters Datum _____

Local Official's Name: ________________________________
Title: _________________________________________

Community Name: ____________________________
Telephone: ____________________________

Signature: ________________________________
Date: ________________________________

Comments (including type of equipment and location, per C2(e), if applicable):

☐ Check here if attachments.
ELEVATION CERTIFICATE

See Instructions for Item A6.

IMPORTANT: In these spaces, copy the corresponding information from Section A.

Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No.

76 Eaton Avenue

<table>
<thead>
<tr>
<th>City</th>
<th>State</th>
<th>ZIP Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Great Falls</td>
<td>Montana</td>
<td>59405</td>
</tr>
</tbody>
</table>

If using the Elevation Certificate to obtain NFIP flood insurance, affix at least 2 building photographs below according to the instructions for Item A6. Identify all photographs with date taken, “Front View” and “Rear View”, and, if required, “Right Side View” and “Left Side View.” When applicable, photographs must show the foundation with representative examples of the flood openings or vents, as indicated in Section A8. If submitting more photographs than will fit on this page, use the Continuation Page.

**Photo One Caption**: North View Photo Taken 7-8-2022

**Photo Two Caption**: South View Photo Taken 7-8-2022
If submitting more photographs than will fit on the preceding page, affix the additional photographs below. Identify all photographs with date taken: "Front View" and "Rear View"; and, if required, "Right Side View" and "Left Side View." When applicable, photographs must show the foundation with representative examples of the flood openings or vents as indicated in Section A8.

<table>
<thead>
<tr>
<th>Photo Three Caption</th>
<th>West View Photo Taken 7-8-2022</th>
<th>Clear Photo Three</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photo Four Caption</td>
<td>East View Photo Taken 7-8-2022</td>
<td>Clear Photo Four</td>
</tr>
</tbody>
</table>
FLOODPLAIN VARIANCE APPLICATION
CASCADE COUNTY FLOODPLAIN REGULATIONS

A variance is a grant of relief given by the Board of Cascade County Commissioners from the terms of the specific standards required in the Cascade County Floodplain Regulations. The issuance of the variance is for floodplain management purposes only. Insurance premium rates are determined by the Federal government according to actuarial risk and are not modified by the granting of a variance. ANY VARIANCE GRANTED BY THE BOARD OF COUNTY COMMISSIONERS MUST BE CONSISTENT WITH THE CASCADE COUNTY FLOODPLAIN REGULATIONS.

SECTION 1: Applicant and Property Information

Applicant Name: [Redacted]
Applicant Address: 26 Eaton Ave
Property Owner Name: [Redacted]
Property Owner Address: 26 Eaton Ave Great Falls, MT 59405
Legal Description and Address of Property: [Redacted]

SECTION 2: Variance Requested

Cite the Section of the Cascade County Floodplain Regulations from which a variance is sought:

C. CFR. Section 9, Particularly 9.3 - Section 9.3.1.

Explain why a variance is needed for the proposed development:

To Reconstruct/Build A Perv Foundation Consisting of Four (4) Cement Walls (See Attached Details In Provided Drawings) "Not A Basement", The Foundation Serves As That In Order To Build A Home (1st Flr) Above BFE. When Elevation Cent Is Done "1st Flr" Will Be 3' Flr Above BFE.

SECTION 3: Application for Variance

Completed the Joint Permit Application and Variance Application Worksheet to address the submittal requirements of the Cascade County Floodplain Regulations:

☐ Joint Permit Application
☐ Variance Application Worksheet

An Applicant receiving a variance to build a structure not meeting the minimum standards of the regulations, especially if the lowest floor is constructed below the base flood level, may result in increased premium rates for flood insurance. Construction Below the Base Flood Level Increases Risk to Life and Property (44 CFR 60.6(a)(5))

[Applicant's Signature]

DATE: 6-11-22

Any person or person aggrieved by the decision may appeal such decision in the courts of competent jurisdiction. MCA § 26-5-209(1)

Page 1 of 6
Section 4: Affected Landowners

List the names, addresses, and telephone numbers of all property owners adjacent to the parcel(s) referenced in this Application. Attach additional sheets as necessary.

Name & Address:  
Michael & Helene Kelly

Telephone No.:  
720 200 788 720 780

OFFICIAL USE ONLY – RECORD OF VARIANCE ACTION

Completed Variance Application submitted on:  
Application No.:  
Public Notice Given:  
Variance Hearing Held on:

The Board of County Commissioners has made a determination that the variance [ ] is or [ ] is not the minimum allowance necessary, considering the flood hazard, to afford relief from these regulations and [ ] meets or [ ] does not meet the criteria in the regulations for approval.

In accordance with the criteria and guidelines of the Cascade County Floodplain Regulations, the Board of Cascade County Commissioners hereby [ ] approves or [ ] denies the request for variance.

Special Provision of the Variance Approval:

CHAIR, BOARD OF CASCADE COUNTY COMMISSIONERS  
Date
VARIANCE APPLICATION WORKSHEET

PLEASE NOTE: Your statements and supporting data and information, including a completed Montana Joint Application or Floodplain Permit Application, will be used to evaluate your variance request. If these questions are not answered, the variance may be denied due to insufficient information to support it. The following will be used as a guide to evaluate your petition. Additional information may be requested.

1. Will the structure or proposed use reside on a parcel or lot of 0.5 acres or less?
   ☐ YES ☐ NO
   *If the new construction or substantial improvements on a lot one-half acres or less is contiguous to and surrounded by lots of existing structures constructed below the base flood level, a variance may be approved. However, as lot sizes increase beyond one-half acres, additional technical justification may be required.*

2. Are the surrounding properties pre-1997 (pre-FIRM)?
   ☐ YES ☐ NO

3. Is the lowest floor of pre-1997 (pre-FIRM) structures on the adjoining and contiguous lots below the Base Flood Elevation?
   ☐ YES ☐ NO
   Attach documentation which shows the contours and lowest floor elevations of surrounding property.

4. Is the proposed work on a recognized historic structure?
   ☐ YES ☐ NO
   If yes, will the improvements maintain the historic integrity of the structure and not preclude the structure's continued designation as a historic structure AND the variance is the minimum necessary to preserve the historic character and design of the structure?

5. Explain how the proposed work is the minimum necessary, considering the flood hazard, to afford relief?
   I need home to live.

6. Does the project show good and sufficient cause for the variance? Financial hardship is not a good and sufficient cause. Describe the exceptional hardship.
   Yes the rebuilding of our house does show good and sufficient cause. We need our home built back so we have a place to live.
7. Is the basement and/or the lowest floor elevation of the residential structure below the Base Flood Elevation? If yes, please describe.

YES

8. If the crawl space(s) or enclosures are proposed, they must meet the requirement of Section 9 of the Cascade County Floodplain Regulations. Explain why the minimum building standard cannot be met.

9. Describe your analysis or supporting information that supports that a granting of this variance will not result in: (1) increased flood heights to the existing buildings; (2) additional threats to public safety; (3) extraordinary public expense; (4) create nuisances; (5) cause fraud or victimization of the public; or (6) conflict with other existing local laws and/or ordinances.

10. Describe how the structure is adequately flood proofed.

11. Describe why reasonable alternative locations outside the floodplain are not available or possible.

12. Describe the data or information showing that there is no danger to life and property by erosion damage or water that may be backed up or diverted by the obstruction or use.

13. Describe your supporting information that demonstrates there will not be a danger of materials being swept onto other lands to the injury of others.

Page 4 of 6
14. Describe how the construction or alteration of the obstruction or use is designed in such a manner to lessen danger

[Handwritten text]

15. Describe the permanence of the obstruction or use

[Handwritten text]

16. Describe the impacts of the obstruction or use as they affect the anticipated development of the surrounding area in the foreseeable future.

[Handwritten text]

17. Describe how the failure to comply with the floodplain regulations results in an exceptional hardship to the Applicant. The event of personal injury has caused extreme hardship due to the loss of property, if it was not self-created.

[Handwritten text]

18. Describe how granting the variance would not adversely affect existing properties or structures.

[Handwritten text]

19. Describe the impacts to the Base Flood Elevation of the Floodway and/or Floodplain. Provide supporting data and analysis that the variance will not increase the Base Flood Elevation of the Floodway by more than 0.00 and/or increase the floodplain 25 feet or less.

[Handwritten text]

20. Describe the estimated cost and damage of the proposed facility and its contents to flood damage and the effect of such damage on the owner.

[Handwritten text]
17. Exceptional hardship has been unfairly burdened by the general rules to obtain permits to rebuild. The previous permit FP2016-012 was approved. If this variance is not granted it creates further unnecessary hardship resulting from the application placed before us. We the Mckenstaeds and the residents of Gibson Flats did not self-create this extreme hardship. If granted this variance will achieve some level of justice to those that burned our homes.

The Exceptional hardship is in fact the loss of multiple homes.
21. Describe the importance of the services to be provided by the facility to the community.

This is a private home. No services are provided by the facility to the community.

22. Describe the public services, including fire and rescue, that may or may not be provided during various flood events.

This home will be elevated 6 ft. Above general level and not be affected by flood events.

23. If this facility is located on the waterfront, describe the vicinity for that location.

In the area or nearby. This is a private home.

24. Describe the safety and access of emergency vehicles to the property during times of various flood events.

In the area, there is a paved road.

Notarized Certification

I hereby certify that the facts, statements, and information presented within this Floodplain Variance Application and Variance Application Worksheet are true and correct to the best of my knowledge and belief. I hereby understand and certify that any misrepresentation or omissions of any information required as part of this Floodplain Variance Application may result in my Application being delayed or not approved by Cascade County.

SIGNATURE OF APPLICANT

SIGNATURE(S) OF OWNER

(Must be Notarized)

SIGNATURE(S) OF OWNER

(Must be Notarized)

*Agent(s) must provide documentation that they are legally representing the property owner.

*Variance approval does not nullify the responsibility of the property owner to meet any other laws, regulations, ordinances, restrictions, and covenants that are on that property.

*A record of all actions involving a Floodplain Permit and Variance, including the findings and decision must be submitted to the DNRC Floodplain Program and FEMA Region VIII.
Please see the attached materials that were just received submitted by the Mackenstadts for the Commission meeting.

A site visit was just completed today as well. I will send those pictures in a separate email so not to confuse what they provided.

Thanks,

Charity N. Yonker
Planning Director
Cascade County Planning Department
121 4th Street North, Suite 2H/1
Great Falls, MT 59401
Phone: (406) 454-6905
Fax: (406) 454-6919

Disclosure: This email is public information subject to public records disclosure laws which has been created or received on an electronic mail system in the course of county business and includes any electronic record attachment(s), unless otherwise protected from disclosure under the laws of the State.

-----Original Message-----
From: MACKENSTADT, ELIZABETH J GS-06 USAF AFGSC 341 LRS/CSS <elizabeth.mackenstadt@us.af.mil>
Sent: Friday, July 22, 2022 1:58 PM
To: Yonker, Charity N. <cnyonker@cascadecountymt.gov>; Angland, Kevin M. <kangland@cascadecountymt.gov>
Cc: 'gmackpac@msn.com' <gmackpac@msn.com>; mackenstadtde@gmail.com; MACKENSTADT, ELIZABETH J GS-06 USAF AFGSC 341 LRS/CSS <elizabeth.mackenstadt@us.af.mil>
Subject: RE: Summary Update of On-going Floodplain Projects/76 EATON AVE/Variance Amendment

To all it may concern: Charity Yonker and Kevin Angland,

This email is to serve several purposes. The first being to ensure that you the Planner Director/Floodplain Administrator and the Planner are working off the same plans, and that this elevation certificate/design plans and the variance application above is being submitted to the commissions for the upcoming meeting on the 26th. The variance application above itself did not change but I deleted the old plans and attached the new plans dated JULY 22 separately. I would like confirmation that you have received the Elevation Certificate the Design Plans and the application submitted and they are the final documents to be considered at the upcoming meeting with the commissioners.

I would also like to address your comments from below on the variance since you are carrying it to the Commissioners.
Yonker: Specifically "the project entails enclosing the space underneath the house that now becomes part of the residential structure when the requirement is that the lowest floor and utilities are 2 feet above the base flood elevation. To be in compliance with the regulations without this variance, does not allow that area to be enclosed or (utilities/appliances to be located in this area.) If you want to amend your variance application, you just need to resubmit it to me.

My Answer: The new plans and elevation certificate will show that a portion of the lowest level, we call it a "foundation" of 76 Eaton Avenue is above BFE. That portion above BFE is where duct work, utilities for the top portion of the house will be located. Do I need to amend the variance to request allowance of (utilities to be located in this area) since the variance is already a request to build a structure not meeting the minimum standards of the regulations?

Yonker: If you have questions about process for the Commission meeting for the variance, I can answer those questions.

My Answer: I previously asked Mr. Angland, Can you send us the agenda for the upcoming meeting with the commissioners prior to the date? Non provided, since you stated above that you can answer this please provide the agenda?

Yonker: It is very likely I will be recommending denial of that variance because it fails to meet one or more of the criterial listed in Section 11.3 of the CCFR.

My Answer: Please tell me which criteria in 11.3 1-15, that this request does not meet?

1-There is good and sufficient cause; 44 CFR 60.6(a) (3) WHERE CAN I FIND THE CFR?
2-Failure to grant the variance would result in exceptional hardship to the application (44 CFR 60.3 (a)(3)) & ARM 36.15.218 (b)) WHERE CAN I FIND THE CFR AND THE ARM?
3-There are no basements or residential dwelling that has the lowest floor elevation below the Base Flood Elevation. There is no basement in the plans of our house. A basement is below ground by CCFR definitions. There is not "dwelling" in the foundation of our planned home.
4-The lowest floor or crawl spaces are no more than two (2) feet below the exterior lowest adjacent grade and must have an inside dimension for the interior ground to the bottom of the living floor of less than five (5) feet. The crawl spaces must meet the dry flood proofing requirements in Section 8.5.2. PLEASE EXPLAIN THIS IN FURTHER DETAIL! The plans attached show the portion of the foundation above BFE which is where utilities will be located.
5-Granting of a variance will not result in increased flood heights to existing insurable buildings, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public, or conflict with other existing local laws or ordinance; (44 CFR 60.6 (a)(3) & (ARM 36.15.218(a)). WHERE CAN I FIND CFR AND ARM?
6-The proposed use is adequately flood proofed; (ARM 6.15.218(c)) WHERE CAN I FIND ARM?
7-The variance is the minimum necessary, considering the flood hazard, to afford relief; (44CFR 60.6(a)(4). WHERE CAN I FIND CFR?
8-Reasonable alternative locations are not available; (MCA 76-5-406(3) & ARM 36.15.218 (d)) WHERE CAN I FIND MCA AND ARM?
9-There is no danger to life and property by water that may be backed up or diverted by the obstruction of use; (MCA 76-5-406(1)) WHERE CAN I FIND MCA?
10-There is no danger that the obstruction or use will be swept downstream to the injury of others; (MCA 76-5-406(2)) WHERE CAN I FIND MCA?
11-Incorporates measures in the construction or alteration of the obstruction or use that lessens the danger; (MCA 76-5-406(4)) WHERE CAN I FIND MCA?
12-The permanence of the obstruction or use; (MCA 76-5-406(5))). WHERE CAN I FIND MCA?
13-There is no adverse effect to anticipated development in the foreseeable future of the area that may be affected the they obstruction or use. (44 CFR 60.6 ((3), MCA 76-5-406 (6) & ARM 36.15.218)). WHERE CAN I FIND CFR, MCA AND ARM?
14-There is no adverse affect to existing properties or structures; and
15- Any increase to the Base Flood Elevation in a Floodway has been approved by FEMA for flood insurance purposes and any increase to the Base Flood Elevation in the Floodway or Floodplain of more than 0.5 feet is an alteration of the Regulated Flood Hazard Area has been duly amended pursuant to Section 4. (44 CFR 60.6(a)(1)) WHERE CAN I FIND CFR.

Yonker: Living in the floodplain, there is a mandatory flood insurance requirement and with the proposed design, you may wish to speak to your flood insurance agent to discuss the rate. As I understand it, this design will trigger a submit-for-rate policy. Better to figure this out now when there is still time to modify the design plans.
My Answer: Thank you for the suggestion, we are well aware of the requirements and costs associated with flood insurance as well as "who, what, when, where and why" it is required. Any design, would trigger a submit for rate policy if any portion of that design were being financed. Based on that there is no need to modify our design plans.

Yonker: Greg also requested a meeting before the variance hearing with me yesterday. I need to know what the purpose of this meeting for. Many questions I can answer in an email and does not require a formal meeting.
My Answer: Greg told you in person the purpose of the meeting was to get all of our ducks in a row before the hearing. And also per assumption per the Cascade County website https://us-east-2.protection.sophos.com/?d=cascadecountytm.gov&u=aHR0cHM6Ly93d3cuY2FzY2FkZWVudW50eW10Lmdvdj8yNDUvUGxhbm5pbmc=&i=NUU3Mjg4MDBmZjhiMmExNg02MTU5NTky&t=RTVFSkRRWl4QVFZDF0aVUrYZ3J4Mnovo3Zh6UWFGMFNjNnVoeWV4LzFODQ=-&h=1c754038b08a4a5da6cdd742ba958809, You can visit the Planning staff at the Planning Department's office. If you would like to meet with office staff to discuss an application or receive direct assistance from a planner or the mapping technician, please schedule an appointment. From this point forward we will request all in person meetings via email, and will try to request them in advance to work around any planner.

Yonker: For substance, you can amend the application, and/or get someone to assist you like your engineer, but I am not going to discuss substance of your requested variance as it should already be in the variance application and any other discussion about the variance is why there is going to be a hearing on the matter. The variance process and criteria are provided and available in the CCFRR which is available online for your review; Floodplain-Regulations-PDF

My Answer: We (Greg and I) will continue to ask questions, about the process and interpretation of the things we do not understand. I am not a paralegal so much of the processes and verbiage I do not understand.

Please let me know at your earliest opportunity that you have received this information and that it is /will be the final submitted to the commissioners for consideration at the meeting. Also please provide answers to my question throughout the email so that we can address them further.

All other comments in previous email, about "application" and 80 Eaton Ave will be addressed separately.

Elizabeth Mackenstadt
Unit Program Coordinator
341st Logistics Readiness Squadron
Malmstrom AFB, 59402
DSN: 731-7029

Be Mission Ready Airmen
Be A Learning Organization
Be Better Tomorrow Than You Are Today

Controlled by: Air Force
ELEVATION CERTIFICATE

Important: Follow the instructions on pages 1–9.

Copy all pages of this Elevation Certificate and all attachments for (1) community official, (2) insurance agent/company, and (3) building owner.

SECTION A – PROPERTY INFORMATION

<table>
<thead>
<tr>
<th>A1. Building Owner's Name</th>
<th>Policy Number:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dale Gregory and Elizabeth Mackenstadt</td>
<td></td>
</tr>
</tbody>
</table>

| A2. Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. | Company NAIC Number: |
| 76 Eaton Avenue |                                      |

| A3. Property Description (Lot and Block Numbers, Tax Parcel Number, Legal Description, etc.) | Residential |
| Eaton Suburban Addition Amended Plat Block 1 Lot 6D Section 20, T20N, R4E |                         |

| A4. Building Use (e.g., Residential, Non-Residential, Addition, Accessory, etc.) | Horizontal Datum: |
| - Residential | NAD 1927  NAD 1983 |

| A5. Latitude/Longitude: | Residential |
| - Lat. 47°28'07.87485" N | Long. 111°14'54.0437" W | Residential |

| A6. Attach at least 2 photographs of the building if the Certificate is being used to obtain flood insurance. | Residential |

| A7. Building Diagram Number | Residential |
| 1A | Residential |

| A8. For a building with a crawlspace or enclosure(s): | Residential |
| a) Square footage of crawlspace or enclosure(s) | 912.00 sq ft | Residential |
| b) Number of permanent flood openings in the crawlspace or enclosure(s) within 1.0 foot above adjacent grade | | Residential |
| c) Total net area of flood openings in A6.b | 0 sq in | Residential |
| d) Engineered flood openings? | Yes ☑️ No ☐ | Residential |

| A9. For a building with an attached garage: | Residential |
| a) Square footage of attached garage | | Residential |
| b) Number of permanent flood openings in the attached garage within 1.0 foot above adjacent grade | | Residential |
| c) Total net area of flood openings in A9.b | | Residential |
| d) Engineered flood openings? | Yes ☑️ No ☐ | Residential |

SECTION B – Flood Insurance Rate Map (FIRM) INFORMATION

| B1. NFIP Community Name & Community Number | B2. County Name | B3. State |
| Cascade County 300008 | Cascade County | Montana |

| B4. Map/Panel Number | B5. Suffix | B6. FIRM Index Date | B7. FIRM Panel Effective/Revised Date | B8. Flood Zone(s) | B9. Base Flood Elevation(s) (Zone AO, use Base Flood Depth) |
| 30013C0626 | E | 03-19-2013 | 03-19-2013 | AE | 3355.0 |

| B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in Item B9: | Residential |
| ☐ FIS Profile ☑️ FIRM ☐ Community Determined ☐ Other/Source: | Residential |

| B11. Indicate elevation datum used for BFE in Item B9: | Residential |
| ☐ NGVD 1929 ☑️ NAVD 1988 ☐ Other/Source: | Residential |

| B12. Is the building located in a Coastal Barrier Resources System (CBRS) area or Otherwise Protected Area (OPA)? | Residential |
| ☐ Yes ☑️ No ☐ CBRS ☑️ OPA | Residential |
SECTION C – BUILDING ELEVATION INFORMATION (SURVEY REQUIRED)

C1. Building elevations are based on: □ Construction Drawings* □ Building Under Construction* □ Finished Construction

* A new Elevation Certificate will be required when construction of the building is complete.


Complete Items C2.a–h below according to the building diagram specified in Item A7. In Puerto Rico only, enter meters.

Benchmark Utilized: OPUS Vertical Datum: NAVD 1988

Indicate elevation datum used for the elevations in items a) through h) below.

□ NGVD 1929 □ NAVD 1988 □ Other/Source:

Datum used for building elevations must be the same as that used for the BFE.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Elevation (meters)</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Top of bottom floor (including basement, crawlspace, or enclosure floor)</td>
<td>3350.4</td>
<td>feet</td>
</tr>
<tr>
<td>b)</td>
<td>Top of the next higher floor</td>
<td>3359.6</td>
<td>feet</td>
</tr>
<tr>
<td>c)</td>
<td>Bottom of the lowest horizontal structural member (V Zones only)</td>
<td>N/A</td>
<td>feet</td>
</tr>
<tr>
<td>d)</td>
<td>Attached garage (top of slab)</td>
<td>N/A</td>
<td>feet</td>
</tr>
<tr>
<td>e)</td>
<td>Lowest elevation of machinery or equipment servicing the building (Describe type of equipment and location in Comments)</td>
<td>3359.6</td>
<td>feet</td>
</tr>
<tr>
<td>f)</td>
<td>Lowest adjacent (finished) grade next to building (LAG)</td>
<td>3350.1</td>
<td>feet</td>
</tr>
<tr>
<td>g)</td>
<td>Highest adjacent (finished) grade next to building (HAG)</td>
<td>3350.4</td>
<td>feet</td>
</tr>
<tr>
<td>h)</td>
<td>Lowest adjacent grade at lowest elevation of deck or stairs, including structural support</td>
<td>3350.1</td>
<td>feet</td>
</tr>
</tbody>
</table>

SECTION D – SURVEYOR, ENGINEER, OR ARCHITECT CERTIFICATION

This certification is to be signed and sealed by a licensed land surveyor, engineer, or architect authorized by law to certify elevation information. I certify that the information on this Certificate represents my best efforts to interpret the data available. I understand that any false statement may be punishable by fine or imprisonment under 18 U.S. Code, Section 1001.

Were latitude and longitude in Section A provided by a licensed land surveyor? □ Yes □ No □ Check here if attachments.

Certifier's Name
Dale E. Schaeffer

License Number
52906ES

Title
Professional Engineer & Land Surveyor

Company Name
Schaeffer Engineering Engineering and Land Surveying

Address
1708 22nd Avenue South

City
Great Falls

State
Montana

ZIP Code
59405

Signature

Date
07-09-2022

Telephone
(406) 761-5402

Comments (including type of equipment and location, per C2(e), if applicable)
Furnace, Hot Water Heater, Air Conditioner, Washer/Dryer

Copy all pages of this Elevation Certificate and all attachments for (1) community official, (2) insurance agent/company, and (3) building owner.
ELEVATION CERTIFICATE

IMPORTANT: In these spaces, copy the corresponding information from Section A.

Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No.
76 Eaton Avenue

City
Great Falls

State
Montana

ZIP Code
59405

FOR INSURANCE COMPANY USE
Policy Number:

Company NAIC Number

SECTION E - BUILDING ELEVATION INFORMATION (SURVEY NOT REQUIRED)
FOR ZONE AO AND ZONE A (WITHOUT BFE)

For Zones AO and A (without BFE), complete Items E1–E5. If the Certificate is intended to support a LOMA or LOMR-F request, complete Sections A, B, and C. For Items E1–E4, use natural grade, if available. Check the measurement used. In Puerto Rico only, enter meters.

E1. Provide elevation information for the following and check the appropriate boxes to show whether the elevation is above or below the highest adjacent grade (HAG) and the lowest adjacent grade (LAG).
   a) Top of bottom floor (including basement, crawlspace, or enclosure) is
   ____________ feet ____________ meters □ above or □ below the HAG.
   b) Top of bottom floor (including basement, crawlspace, or enclosure) is
   ____________ feet ____________ meters □ above or □ below the LAG.

E2. For Building Diagrams 6–9 with permanent flood openings provided in Section A Items 8 and/or 9 (see pages 1–2 of Instructions), the next higher floor (elevation C2.b in the diagrams) of the building is
   ____________ feet ____________ meters □ above or □ below the HAG.

E3. Attached garage (top of slab) is
   ____________ feet ____________ meters □ above or □ below the HAG.

E4. Top of platform of machinery and/or equipment servicing the building is
   ____________ feet ____________ meters □ above or □ below the HAG.

E5. Zone AO only: If no flood depth number is available, is the top of the bottom floor elevated in accordance with the community's floodplain management ordinance? □ Yes □ No □ Unknown. The local official must certify this information in Section G.

SECTION F - PROPERTY OWNER (OR OWNER'S REPRESENTATIVE) CERTIFICATION

The property owner or owner's authorized representative who completes Sections A, B, and E for Zone A (without a FEMA-issued or community-issued BFE) or Zone AO must sign here. The statements in Sections A, B, and E are correct to the best of my knowledge.

Property Owner or Owner's Authorized Representative's Name

Address

City

State

ZIP Code

Signature

Date

Telephone

Comments

☐ Check here if attachments.

FEMA Form 086-0-33 (12/19) Replaces all previous editions. Form Page 3 of 6
**ELEVATION CERTIFICATE**

**IMPORTANT:** In these spaces, copy the corresponding information from Section A.

<table>
<thead>
<tr>
<th>Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No.</th>
<th>City</th>
<th>State</th>
<th>ZIP Code</th>
<th>FOR INSURANCE COMPANY USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>78 Eaton Avenue</td>
<td>Great Falls</td>
<td>Montana</td>
<td>59405</td>
<td>Policy Number:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Company NAIC Number</th>
</tr>
</thead>
</table>

**SECTION G – COMMUNITY INFORMATION (OPTIONAL)**

The local official who is authorized by law or ordinance to administer the community's floodplain management ordinance can complete Sections A, B, C (or E), and G of this Elevation Certificate. Complete the applicable item(s) and sign below. Check the measurement used in Items G8–G10. In Puerto Rico only, enter meters.

G1. ☐ The information in Section C was taken from other documentation that has been signed and sealed by a licensed surveyor, engineer, or architect who is authorized by law to certify elevation information. (Indicate the source and date of the elevation data in the Comments area below.)

G2. ☐ A community official completed Section E for a building located in Zone A (without a FEMA-issued or community-issued BFE) or Zone AO.

G3. ☐ The following information (Items G4–G10) is provided for community floodplain management purposes.

<table>
<thead>
<tr>
<th>G4. Permit Number</th>
<th>G5. Date Permit Issued</th>
<th>G6. Date Certificate of Compliance/Occupancy Issued</th>
</tr>
</thead>
</table>

| G7. This permit has been issued for: | ☐ New Construction | ☐ Substantial Improvement |

| G8. Elevation of as-built lowest floor (including basement) of the building: | ☐ feet | ☐ meters | Datum |

| G9. BFE or (in Zone AO) depth of flooding at the building site: | ☐ feet | ☐ meters | Datum |

| G10. Community's design flood elevation: | ☐ feet | ☐ meters | Datum |

<table>
<thead>
<tr>
<th>Local Official's Name</th>
<th>Title</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Community Name</th>
<th>Telephone</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
</table>

| Comments (including type of equipment and location, per C2(e), if applicable) |

☐ Check here if attachments.

FEMA Form 086-0-33 (12/19) Replaces all previous editions. Form Page 4 of 6
I, Dale E. Schaeffer, a Professional Engineer licensed to practice in the State of Montana, hereby certify that the proposed Residence on the property shown on the attached Site Plan will be constructed in general conformance with the Cascade County Floodplain Regulations adopted March 12, 2013.

A. An encroachment analysis (where required) – Not required
B. Adequacy of structural elevations – The structural elevations provided by Architect MM Design are attached and appear adequate.
C. Determination of the base flood elevation – Determined from FEMA FIRM Panel #30013C0626E and the Flood Insurance Study for the area. Base Flood Elevation is 3355.0. Proposed finished lower floor construction elevation is approximately 3350.4 after preparation of the site by the addition of compacted soil and gravel and a concrete slab set on footings. The next higher floor will be constructed on 8 inch concrete walls 8.0 feet high with 18 inch floor joists.
D. Flood-proofing, wet proofing, dry proofing – Construction materials will be pressure treated 2 X 6’s set 24 inches on center. Power outlets will be installed 2 feet above the Base Flood Elevation along with any heating equipment.
E. Design and construction to withstand the flood depths – A concrete monolithic floor 6 inches thick is proposed on 18” X 8” footings with 8 inch, 8.0 foot concrete walls. Residence walls are pressure treated wood 2 X 6’s installed 24” on centers. Framing and bracing plans are attached.
F. Hydrodynamic and hydrostatic pressures, velocities, impact, buoyancy, and uplift forces associated with the base flood elevation – The building will be constructed on 16” X 8” concrete footings and 8 inch wide, 8.0 foot concrete walls. The upper floor is further supported by columns set on footings. Since the location is located on the southern fringe of the Floodplain, hydrodynamic and hydrostatic pressure would result mostly from backwater pressure which would be relieved by garage doors and little or no velocity forces would be expected. The proposed construction will not create a rise of more than 0.5 feet. Debris-induced loads present the highest level of unpredictability and danger to the building. The proposed 6-inch thick concrete floor anchored to a 16” X 8” footing and 8.0 foot high 8 inch concrete walls will significantly reduce any buoyancy or uplift forces. One stairway is proposed for the building.

This certification is not intended to constitute a warranty or guarantee of performance expressed or implied.

3/17/2022
Signature of Professional Engineer
Registration No. 5206ES
Schaeffer Engineering & Land Surveying
1708 22nd Avenue South
Great Falls, MT 59405