Technical Bulletin 10-01
Requirements and Applications

Presented by:
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National Flood Insurance Program (NFIP) Regulations State:

- One Minimum Requirement Includes the Following:

  For all proposed development or construction, within a participating community, the community must “Review all permit applications to determine whether the proposed building sites will be reasonably safe from flooding.”
Reasonably Safe From Flooding

- Structure is dry during Base Flood condition
  - Low permeability soils to prevent water infiltration

- Structurally sound during Base Flood condition
  - Foundation walls & slab designed for conditions

44 CFR 65.2(c) Definition (MT Forms)

(c) For the purposes of this part, reasonably safe from flooding means base flood waters will not inundate the land or damage structures to be removed from the SFHA and that any subsurface waters related to the base flood will not damage existing or proposed buildings.
Typical Application
Who Is V3?

Community Acknowledgement Form (MT-1)

DEPARTMENT OF HOMELAND SECURITY - FEDERAL EMERGENCY MANAGEMENT AGENCY
COMMUNITY ACKNOWLEDGEMENT FORM

PAPERWORK BURDEN DISCLOSURE NOTICE

2. FORM: Community Acknowledgement Form (MT-1)
3. Frequency: Annually
4. Respondents: Individuals or entities, such as State, Local, Tribal, and Territorial governments
5. Estimated Total Annual Burden: 958800

This form must be completed for requests involving the existing or proposed placement of any structure, building, or other object in the floodplain, or in any area that appears to be a floodplain on the FIM. The form shall be submitted with the request form, and shall be reviewed by the community. This form shall also be submitted with any request for the construction of any structure, building, or other object in the floodplain, or in any area that appears to be a floodplain on the FIM. The form shall be signed by an authorized representative of the community.

Community Name: ____________________________
Property Name or Address: ______________________

A. REQUESTS INVOLVING THE PLACEMENT OF NEW STRUCTURES

As the community official responsible for floodplain management, I hereby acknowledge that I have received and reviewed the Community Acknowledgement Form (MT-1) and that this request is being forwarded to FEMA for final approval. I understand that this request is being forwarded to FEMA for final approval.

Community Comments: ________________________

Community Official's Name and Title: (Print or Type) ____________________________ Telephone No.: ____________________________
Community Name: ____________________________ Community Official's Signature (required): ____________________________ Date: ____________________________

B. PROPERTY LOCATED WITHIN THE FLOODPLAIN

As the community official responsible for floodplain management, I hereby acknowledge that I have received and reviewed this request for a LOHR. I understand that this request is being forwarded to FEMA for final approval. I have reviewed the floodplain map and found that the property is located within the floodplain. The community official has signed the Community Acknowledgement Form (MT-1) and submitted it to FEMA for final approval.

Community Comments: ________________________

Community Official's Name and Title: (Print or Type) ____________________________ Telephone No.: ____________________________
Community Name: ____________________________ Community Official's Signature (required): ____________________________ Date: ____________________________
Preferred Construction Methods

**Figure 2**  Structure on a stem wall foundation. The lowest floor is raised above the BFE. The space enclosed by the stem walls is filled with engineered compacted fill.

**Figure 3**  Structure on a crawlspace foundation. The lowest floor is raised above the BFE. Openings in the foundation walls allow water from floods higher than the fill elevation to enter the crawlspace and equalize the pressure on foundation walls.
Figure 4  Structure on a slab-on-grade foundation. The lowest floor is typically slightly higher than the surrounding grade.
What About Basements?

- Generally Not Allowed in SFHA
- Not Recommended for Areas Removed and/or Adjacent to SFHA

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**Flood Insurance Coverage for Basements**

It is extremely important to note that the NFIP offers only limited coverage for basement flooding. First, in order for a claim to be paid, there must be a general condition of overland flooding where floodwaters come in contact with the structure. Secondly, the NFIP does not provide coverage for finished nonstructural elements such as paneling and linoleum in basement areas. Contents coverage is restricted to a limited number of items listed in the flood insurance policy. Contact a local insurance agent for more information.
Basement Construction Methods

Figure 5  Basement foundation with lowest floor above the BFE. Damage from floods below the BFE is eliminated.

Figure 6  Basement foundation in fill placed above the BFE. The depth of the basement floor below the BFE is less than when no fill is placed.
Basement Construction Methods

Figure 7  Basement foundation with lowest opening above the BFE. Surface flooding is less likely to enter and inundate the basement.

Figure 8  Basement foundation with lowest opening at the BFE. The basement is exposed to flooding from any flood greater than the Base Flood.
### Foundation Flood Risk

#### Table 1  Flood Risk by Foundation Construction Method

<table>
<thead>
<tr>
<th>Flood Risk During the Base Flood</th>
<th>Fill</th>
<th>Foundation Construction Method</th>
<th>Floor Level</th>
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| Reasonably Safe From Flooding    | Follow Guidance in This Bulletin To Ensure That Building Is Reasonably Safe From Flooding

Legend:
- □ Reasonably Safe From Flooding
- Follow Guidance in This Bulletin To Ensure That Building Is Reasonably Safe From Flooding
Higher Risk Structures

Two Design Approaches Outlined in Guidance

- Simplified Approach
- Engineered Basement Option
Simplified Approach

- Ground At or Above BFE
- 20 Foot Setback
- Properly Compacted Fill That Extends 5 Feet Below Slab
- Generally Homogeneous Material with Low Permeability
- Basement No More Than 5 Feet Below BFE
- ¼ HP Sump Pump with Backup Power Supply Rated at 4X Estimated Seepage
- Discharge Above BFE
- Do Not Apply Building Code Exception for Drainage Systems in Well Drained Soils

Simplified Approach

Design Requirements

If, for a building and building site, all the requirements listed below are met (see Figure 10), the building is reasonably safe from flooding. If all of these requirements are not met, the more detailed analysis described under Engineered Basement Option, on page 19 of this bulletin, should be performed to determine whether the building is reasonably safe from flooding.

- The ground surface around the building and within a defined setback distance from the edge of the SFHA (see next item) must be at or above the BFE.
- The setback is the distance from the edge of the SFHA to the nearest wall of the basement. The minimum allowable setback distance is 20 feet.
- The ground around the building must be compacted fill, the fill material—or soil of similar classification and degree of permeability—must extend to at least 5 feet below the bottom of the basement floor slab.
- The fill material must be compacted to at least 95 percent of Standard Laboratory Maximum Dry Density (Standard Proctor), according to ASTM Standard D-698. Fill soils must be fine-grained soils of low permeability, such as those classified as CH, CL, SC, or ML, according to ASTM Standard D-2487, Classification of Soils for Engineering Purposes. See Table 18.4.2 in the 2000 International Building Code (IBC) for descriptions of these soil types.
- The fill material must be homogeneous and isotropic; that is, the soil must be all of one material, and the engineering properties must be the same in all directions.
- The elevation of the basement floor should be no more than 5 feet below the BFE.
- There must be a granular drainage layer beneath the floor slab, and a ¾-horsepower sump pump with a backup power supply must be provided to remove the seepage flow. The pump must be rated at four times the estimated seepage rate and must discharge above the BFE and away from the building. This arrangement is essential to prevent flooding of the basement or uplift of the floor under the effect of the seepage pressure.
- The drainage system must be equipped with a positive means of preventing backflow.
- Model building codes (such as the 2000 International Residential Code) also address foundation drainage (IRC Section R405) and foundation walls (IRC Section R406). Model building codes generally allow foundation drains to discharge through either mechanical means or gravity drains. In addition, there is often an exception to the requirement for drainage systems in well-drained soils. However, in or near floodplains, well-drained soils can, in fact, help convey groundwater towards the building foundation. Therefore, this exception should not apply in or near floodplains.
Figure 10 Requirements for use of the simplified approach to basement construction.
Simplified Approach

Design Assumptions

- Basement Footprint Less Than 1,200 Sq. Ft.
- Soil is Saturated
- BFE = Tailwater = Groundwater (generally conservative)
- Seepage Flow Zone is Defined
- Seepage Flow Calculated w/ Simplified Method
Simplified Approach

\[ q = k(a^2 - b^2)/2L \]

where: 
- \( q \) = flow in cfs for a 1-foot width of seepage zone
- \( k \) = soil permeability in feet per second
- \( a \) = head at entry surface in feet
- \( b \) = head at drain surface in feet
- \( L \) = length of seepage zone (setback distance) in feet

(1)

\[ Q = Pq \]

where: 
- \( Q \) = total seepage flow into drain in cts
- \( P = 2(b/2) \) (for a square basement, \( P = 4w \))

(2)

Required sump pump capacity = 4Q for a safety factor of 4

(3)

Figure 11  Method for calculation of seepage flow.

The Dupuit equation for the quantity of seepage flow is:

\[ q = k(a^2 - b^2)/2L \]

where: 
- \( q \) is the flow in cubic feet per second for a 1-foot width of seepage zone
- \( k \) is the soil permeability in feet per second (fps) (maximum value of \( k \) is 1x10^{-3} fps)
- \( a \) and \( b \) are hydraulic heads in feet \((a < b + 5)\)
- \( L \) is the length of the flow zone in feet \((L > 20 \text{ feet})\)
Engineered Approach

- Licensed Soils Engineer or Geologist
- More Detailed Look at Depth, Soil Type, & Stratification of Subsurface Soils
- Still Need BFE
- Elevation of Bottom of Basement Floor
- Setback Distance
- Elevation of Groundwater Table & Seasonal Variations
- Borings to a Depth Below Basement Floor that is 2x the Depth from BFE to Floor
Engineered Approach

- Engineering Classification of Soils
- Evaluation of Subsurface Conditions Landward from Structure
- Information About Basement Wall Penetrations (Utilities)
- Seepage Analysis (Simplified Approach or Flow Net)
Figure 12: Case I and Case II – homogeneous soil.

CASE I
Low q

CASE II
High q
Potential Uplift

CASE III
Moderate q
Potential Uplift

CASE IV
High q
Potential Uplift

Impervious
Pervious

BFE?
Hunt Club LOMR
Project History
Figure 5  Basement foundation with lowest floor above the BFE. Damage from floods below the BFE is eliminated.
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- **Reasonably Safe From Flooding**
- **Follow Guidance in This Bulletin To Ensure That Building Is Reasonably Safe From Flooding**
Who Is V3?

Lancaster Coach Homes
Who Is V3?

Lancaster Coach Homes

Historic Map

Current Regulatory Map
Future Regulatory Map
- No 20 Foot Setback
- No Soils Information
- Basement Are More Than 5 Feet Below BFE
- Limited Sump Pump Info.
- Engineered Approach
- TB 10-01 Will Help Resolve Violation
| QUESTIONS? |