MINUTES
MHCC MEETING

December 12, 2016

Via Teleconference

(Approved at the September 11-13, 2018 MHCC Meeting)

MINUTES
MANUFACTURED HOUSING CONSENSUS COMMITTEE (MHCC) MEETING

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Call to Order

MHCC Vice-Chair, Debra Blake, called the meeting to order at 1:05 p.m. (EDT). She stated that public comments would be allowed only after the committee has had a chance to discuss each topic if time permits.

Roll Call

Kevin Kauffman, Program Manager of the Administering Organization (AO) Home Innovation Research Labs, called the roll and announced that a quorum was present. Guests were asked to introduce themselves. See Appendix A for a list of meeting participants. Joseph Anderson, Leo Poggione, and Richard Weinert were unable to attend the meeting.

Opening Remarks

Pamela Beck Danner, Administrator of the Office of Manufactured Housing Programs (DFO), welcomed the MHCC members. Ms. Danner said this is a meeting of the Manufactured Housing Consensus Committee (MHCC), the meeting notice was published in the *Federal Register* dated November 21, 2016, and all documents pertaining to the meeting were uploaded to the Dropbox and are available on the hud.gov/mhs website.

Pamela Danner, DFO, said the objective of the meeting was to allow the MHCC to provide HUD with official written comments, and proposed changes, to the draft Interpretative Bulletin (IB) (Appendix B). Per the statutory requirements of the Manufactured Housing Construction and Safety Standards Act, there is 120-day comment period allowed prior to publication. The 120-day comment period began on October 27, 2016. The comments provided by the MHCC, along with HUD's response, will be published along with the proposed IB in *Federal Register* for public comment. The purpose of an IB is to provide clarification of the meaning of the Standard and to assist in the enforcement of the Standard. Per the request of the Regulatory Enforcement Subcommittee that met on November 28, 2016, HUD provided the MHCC a draft of the IB in regulatory format on Wednesday, December 7, 2016.

Mr. Kauffman provided a brief summary of meeting procedures to ensure compliance with MHCC Bylaws and that Robert's Rules of Order were followed.

Debra Blake, Vice-Chair, welcomed the committee and thanked Richard Mendlen for his work providing the draft IB to the committee for their review in a timely manner.

Approval of the Minutes

MHCC Motion to approve the October 25-27, 2016 MHCC Committee meeting minutes.

Maker: Alan Spencer Second: Joseph Sadler

The motion carried.

Regulatory Enforcement Subcommittee Report

Action Item 8: Foundation Systems Requirements in Freezing Climates

Debra Blake said the Regulatory Enforcement Subcommittee met on November 28, 2016, to review the SEBA report, *Manufactured Home Foundations in Freezing Climates, An Assessment of Design and Installation Practices for Manufactured Homes in Climates with Seasonally Frozen Ground,* presented to the MHCC during its meetings in October 2016. The net result of the meeting was a motion requesting HUD to provide the MHCC with a draft of the IB prior to this meeting, taking into consideration the discussion of the subcommittee, to allow the committee to review the information in interpretative bulletin format.

Discussion

William Freeborne said he had some editorial comments to provide and asked for clarification on the procedure for providing comment. Debra Blake said the purpose of the meeting was to review the IB, including the preamble, and take the opportunity as a full committee to provide edits, corrections, and comments. Alan Spencer asked for clarification of the start date of the 120-day comment period, and if the comments from this meeting will be considered the final comments from the MHCC on the draft IB. Pamela Danner said the 120-day comment period did begin on October 27, 2016. Ms. Danner said Kevin Kauffman (AO) will submit, on behalf of the MHCC, the comments from this meeting to HUD. The comments will be included, along with HUD's response, in the *Proposed Interpretative Bulletin* allowing for public (including MHCC members) comment.

Alan Spencer asked if the preamble will be published along with the IB. Pamela Danner said, yes. The preamble is background information that will be published with the *proposed* IB, however, when the IB is finalized, the preamble will be removed.

John Weldy asked the Regulatory Enforcement Subcommittee members why they asked HUD to submit the information to the MHCC in the form of an IB. Ishbel Dickens said subcommittee members wanted to better understand what was actually being proposed and, because there was not enough time for the subcommittee to meet again, this was the best way to move forward.

William Freeborne said he had comments on the preamble including the philosophy and the tone, however, he suggested that the MHCC should have a general discussion first. The draft IB deals with frost-free foundations (FFF) and frost-protected shallow foundations (FPSF) and he would like to include foundations below the frost line as another solution. The tone of the draft IB is very negative—throughout the document, it says FFFs do not work. After reading this document, who would want to attempt a FFF. In the preamble, it states the need to go through a retailer, professional engineer, and DAPIA, but it does not say who makes the determination for each site, or who will sign-off on the foundation plan. This needs more clarification.

John Weldy said the IB is a lengthy, in-depth document that is focused primarily on FFF and not FPSF. He said maybe the IB should only discuss FFF to narrow the focus. Mr. Weldy said he had a question regarding page 7 of the draft IB (first bullet, last sentence). "…In general, acceptable engineering practice is defined in and is consistent with ASCE 32." Mr. Weldy said he could not find the definition of "acceptable engineering practice" in ASCE 32-01. He said ASCE 32-01 specifically addresses frost-protected design, not frost-free design. The title of the document is *ASCE 32-01: Design and Construction of Frost-Protected Shallow Foundations*. Mr. Weldy read from the first section of ASCE 32-01:

"This Standard does not preclude the judgement and practice of those competent in foundation design and the prevention of frost damage, nor does it preclude compliance with other design considerations or local building code requirements. Structural requirements, other than frost protection, shall be in accordance with the building code or accepted design practices and are not included in this Standard."

Mr. Weldy said it appeared to him that the IB states acceptable engineering practice and design in a FFF should follow ASCE 32, which is by their own definition not designed for FFF design.

Debra Blake said the biggest issue during the subcommittee, when reviewing the SEBA report, was the focus on the use of "or" to require ASCE 32-01 and John Weldy is suggesting that 32-01 might not apply to FFF. There should be more clarification when ASCE 32-01 should be used.

John Weldy said 24 CFR Part 3285 allows for the use of ASCE 32-01. The preamble of the draft IB has a reference to FFF designs as well as FPSF designs, however, throughout the IB that reference is eliminated. Mr. Weldy said if you combine the definitions of FFF and FPSF, ASCE 32-01 does not apply.

Richard Mendlen said it is the *design principles and concepts* that are associated with ASCE 32-01 that are also incorporated into a design that would use a monolithic slab. Michael Henretty said the big issue is: what are the requirements when there is an alternative design. The SEBA report and the IB clarify what is required in the foundation plan.

Dominic Frisina said typically, foundations are over engineered. If a foot of fill is used, with no organic matter, under a pad, that pad will never move. Mr. Frisina said, what is the difference between park lots and private lots. He said he never saw a pad buckle, however, piers are typically installed incorrectly and cause problems.

Alan Spencer said HUD did respond to the comments provided by the Regulatory Enforcement Subcommittee by removing "or" and removing the *requirement* for ASCE 32-01. Mr. Spencer said the draft IB is focused on FFF and it does not really address FPSF, with the exception of Option 3.

William Freeborne said the draft IB should focus on FFF and be more positive by using examples like the one provided by Dominic Frisina, then providing additional help if the installer encounters certain challenging situations.

Joseph Sadler asked, what is the difference between frost-free and frost protected, he read from ASCE 32-01:

"For the purpose of this Standard, a frost-protected shallow foundation is a foundation that does not extend below the design frost depth, but is protected against effects of frost. This Standard applies to buildings on potentially frost-susceptible ground with slab-on-ground or suspended floor foundations."

Mr. Sadler said in North Carolina he had not seen many slabs, most foundations are on piers that go below the frost line, and he has not seen any issues with frost heave.

Scott Murphy Roberts, Hayman Engineering, said he worked with Paul Hayman when the frost-free concept was developed. Mr. Roberts said FPSF and FFF are not synonymous. The term frost-free foundation design was used to distinguish it from frost-protected shallow foundation design. The FPSF uses insulation to raise the frost depth in the vicinity of the home. The FFF is based on the concept of removing moisture from under the foundation, whether or not the soil is frost susceptible because you cannot have frost action if there is no moisture.

Steven Anderson said in North Dakota you cannot put a foundation above grade that is frost-protected because it is too cold. Alan Spencer said it is possible to use a FPSF but the frost depth is deeper and it is also possible to

use FFF if there is non-frost-susceptible soil that extends to the frost depth, which probably would not be cost effective.

Dominic Frisina said his area (northwestern Pennsylvania) has a high water table, and he used what they called a floating slab because it floated on top of the frost line. After the foundation area was dug out, there was a minimum of 1 ft of fill used that did not contain any organic matter or hold water (i.e., fill sand, crushed concrete, and gravel), and the slab was 6 in. thick that included wire or mesh. Mr. Frisina provided an example of his frustration and said he had a customer replacing an old home with a new one on an existing foundation and the inspector made them drill holes in a perfectly good slab and install piers. He said this action was a complete waste of money and is forcing customers to spend money they don't have. This is a disservice to our customers because we are making foundations too expensive, and the chattel lenders will not lend enough money to the homeowner to install it properly.

Debra Blake said she wanted to hear from manufacturers, engineers, and installers about what she read in the IB such as these foundation systems require engineered designed plans, and they need to be reviewed and approved by the manufacturer and the manufacturer's DAPIA. Ms. Blake wanted to know how this issue is currently being handled. She said Arizona allows for independently engineered designs that do not go back to the manufacturer and do not get approved by the DAPIA because the manufacturer's instructions allow for this flexibility.

James Demitrus agreed with Dominic Frisina. Mr. Demitrus said all of their homes are on concrete foundations and with the use of adequate fill underneath the slabs, they have had no problems in an area heavily populated with underground springs. He said he read a 1994 HUD report, researched by Jay Crandell and William Freeborne, based on a 10-year study that found FPSF successful in Scandinavia since 1950. Mr. Demitrus said he is confident FPSF is a proven option when working with frost-susceptible soil.

Steven Anderson said he did not see the need for the manufacturer or DAPIA approval, as long as the foundation design satisfies the local jurisdiction because they know their area better than the DAPIA or the manufacturer.

Scott Murphy Roberts said he would be hesitant to rely on local authorities because many are understaffed, are not familiar with manufactured housing, and are more familiar with the IRC. Mr. Roberts said it would be more burdensome to the local authorities if there is no engineering involved in the process.

Ishbel Dickens said there is a situation in Oregon in which the homes are separating and there is obviously an issue that HUD is trying to resolve with the introduction of the IB, but how do we encourage retailers, installers, manufacturers, and community owners to do the right thing for consumers. Ms. Dickens agreed with William Freeborne, there should be a more constructive tone to the IB—more carrot and less stick. She said there is misinformation out there that needs to be corrected if consumers are to be satisfied with their purchase, and how do we get everyone to do the right thing for the consumer without increasing costs.

Alan Spencer said the confusion began with the 13 HUD administered states, where information began to flow more freely, and it was discovered that there were designs that should not be used and there were designs that are acceptable but they did not go through the proper process by getting manufacturer and DAPIA approval. Mr. Spencer said additionally, there are states, not administered by HUD, with approved installation programs, but when compared with the requirements of 24 CFR Part 3285, they are not compliant. He said the IB should be based on education and provide a way to move forward so we can provide the consumer with a good product.

Timothy O'Leary said he read 24 CFR Part 3285.312 and he found it clearly talks about the placement of foundations in freezing climates and it specifically talks about slab systems. Mr. O'Leary said the documents provided also include examples of slab systems that included designs using fill, however, they included the addition of drain pipes. He said there were also examples for FFF and FPSF designs and suggested the MHCC should recommend that HUD separate FFF from FPSF to provide clarification between the two.

Myles Standish said in their installation manual, there is a requirement for an engineered foundation but there is not a requirement that the plan be approved by the manufacturer or the DAPIA.

Michael Henretty said the requirement for the plans to be reviewed by the manufacturer and the DAPIA are already in the HUD Code in 24 CFR Part 3285.2(c) when you have a variation to a plan that is not already included in the manufacturer's instruction manual.

Rick Hanger said he was trying to understand what problems we are trying to solve. In Colorado, there are about 30,000 installations and there has been no feedback from HUD about any concerns regarding the installation practices.

Alan Spencer said, can we allow for the current processes at the state level that has been previously approved, where there is a conflict between the state program and HUD, to continue in the interim.

Pamela Danner said, regarding Colorado, HUD is providing comments to Colorado and asked Michael Henretty to elaborate. Michael Henretty said comments were sent to Colorado because there are some issues (including treating leased land installations differently than owned land) and are in receipt of Colorado's response. They are working to respond back and Colorado will be updating their installation manual. Mr. Henretty said many states have approved programs that predate 24 CFR Part 3285 and they have not updated their codes to include it. The objective is to show where a program does not meet 24 CFR Part 3285 and to clarify for installers what the requirements are. He said some states are lacking a building code, so we need to do something that provides direction in order to have a uniform design. If there are plans that have previously been approved by the manufacturer and the DAPIA, all that is required is to have them reapproved because, in some cases, the plans have not been reviewed for decades.

Rick Hanger said their installers in Wyoming are now being required to install caissons (adding thousands of dollars to the home), and asked what problems are being found. Michael Henretty said, in Wyoming, he was aware of two local officials that are requiring the caissons because the installers did not have any other type of approved plan and the local officials had many problems with some parks within their jurisdictions. As a result, they are requiring a stricter interpretation of the process.

Joseph Sadler said the most important issue, regardless of how the foundation is built, is the identification of frost-susceptible soils and what causes frost heaving, which is a sufficiently cold climate to allow freezing temperatures to penetrate down to the subbase or subgrade and a supply of water from below, above, or laterally into the freezing zone and soil material that is frost susceptible in laying within the freezing region. Mr. Sadler said that puts everything on local jurisdiction officials to decide if one of these foundations is required.

Dominic Frisina provided an example of language included in installation manuals from the Colony Installation Manual, a note referring to a slab design:

Note #3
Final determination of the appropriate application of the footing above the frost line or floating slab is by the local authority having jurisdiction familiar with actual soil conditions based upon actual conditions. Determination of the proper footing design illustrated above can be made.

Mr. Frisina said, basically, manufacturers do not want to take responsibility.

John Weldy said while manufacturers provide basic foundation examples, manufacturers are not soil experts. The question is who is responsible for ensuring that the correct foundation design is used for the soil conditions at the installation site. The note is there to say the local jurisdiction has the authority, and it is their responsibility to ensure the foundation design is appropriate for use at the installation site. It is up to the local jurisdiction officials to decide if a soil sample is required to determine if the soil is frost susceptible.

There was a question about whether the IB is guidance or a rule.

Pamela Danner said 24 CFR Part 3285.312 is a rule and the IB is an interpretation of this section because there is a lack of understanding of what this means, in particular, item (b) *Placement in freezing climates.* The IB clarifies how HUD looks at 3285.312.

Alan Spencer said 24 CFR Part 3285.312 is clear and concise regarding alternative installation designs. The IB helps but it sets us back. Mr. Spencer said the state installation plans that he has reviewed, Colorado and Pennsylvania, appeared to him to be compliant, however, there may be a disconnect of what is actually being done in the field. He said education is needed to ensure users, installers, and manufacturers are all on the same page regarding foundation installation.

Steven Anderson asked Pamela Danner if the IB would be sent out to all local officials. Ms. Danner said yes, that is why it will be published in the *Federal Register* and published on the MHS website.

Timothy O'Leary said all IBs are included at the back of each HUD Code publication and they provide additional explanations. Mr. O'Leary said he liked the draft IB, but it could be more informative.

Public Comment

Mark Weiss, MHARR, said there was a question raised as to whether the draft IB was guidance or mandatory; this question is addressed in draft IB on page 10 and 11: "To ensure consistent and effective conformance, options with detailed guidance for complying designs are provided below and need to be followed." It continues with repeated references to mandatory commands (i.e., are to be deleted, need to indicate, need to be done, need to identify, must have a design, must provide buyers with…). The bottom line is this contains mandatory language.

Mr. Weiss said when the Regulatory Enforcement Subcommittee met on November 28, 2016, there were two motions. The first motion recommending that HUD use the SEBA report as the basis for an Interpretative Bulletin, was rejected by a six to two margin. HUD came back with a draft IB and on page 5 it states, "Thus, the Appendix [which is the SEBA report] provides the technical basis for the guidance and recommendation included herein." The draft IB preamble, on page 7 states, "acceptable engineering practice is defined in and is consistent with ASCE 32." This statement is repeated on page 10 at the end of the first paragraph. Mr. Weiss said the Regulatory Enforcement Subcommittee specifically said do not base the IB on the SEBA report and that is exactly what HUD has done, particularly regarding the definition of acceptable engineering practice. By having the SEBA

report included as the appendix to the IB and having the SEBA report specifically referenced in the IB, particularly on page 23 and 24, bootstraps the SEBA report to the IB.

Mr. Weiss said HUD's position is that the IB does not change 24 CFR Part 3285, however, it does, and this information should be going through a different process. He also noted that the start date of October 27, 2016, when the SEBA report was presented, as the start of the 120-day review rather than December 8, 2016, when the draft IB was actually provided is either disingenuous, or it reflects the reality that the SEBA report is the IB despite the discussion during the Regulatory Enforcement Subcommittee meeting. He said, as he indicated in his letter to the MHCC (Appendix C), MHARR strenuously opposes the IB procedurally and substantively, and with the few weeks left before the MHCC membership changes and the beginning of a new administration, there should not be changes like this especially on a rushed basis.

Kevin Kauffman, AO, provided clarification to Mr. Weiss' comments regarding the failed motion from the Regulatory Enforcement Subcommittee meeting. He said a motion to something that was rejected is not the same as passing a motion telling HUD not to do something. For example, a motion to recommend HUD to use the SEBA report is different that a motion to recommend HUD NOT to use the report.

Lois Starkey, MHI, submitted comments to the MHCC (Appendix D).

Scott Murphy Roberts, Hayman Engineering, had several points to discuss:

- There is confusion with FFF vs. FPSF and the SEBA report equated a FFF with a FPSF. There are two definitions of FFF: 1) SEBA referenced ASCE 32-01 4.2 foundations on non-frost-susceptible ground; and 2) Paul Hayman's design which was based on removing moisture from the ground in order to prevent frost heave. If you are discussing SEBA's definition, it is covered under ASCE 32-01. There should be clear definitions and nomenclature to distinguish between all of these foundation designs.
- Mr. Roberts said he agreed with Dominic Frisina to keep costs at a minimum to the customer. The FFF concept, the removal the moisture from the soil, was an attempt to find an alternative concept to save on the insulation costs while continuing to protect the home from frost action.
- The responsibility cannot be with the manufacturer because they cannot know the local conditions of the installation site. The SEBA report states the responsibility to determine foundation conditions is with the local authorities, however, the reverse process is more appropriate, the engineer determines and the local authority verifies. Ultimately, the responsibility has to be assigned to the installer (who uses the services of an engineer when appropriate), because the installer should be verifying the conditions at the installation site.
- Design guidance should not be removed from the IB because, from an engineer's perspective, the more guidance provided leads to better-informed assumptions in the design.
- 3285.312 notes three types of foundations: 1) conventional footings; 2) monolithic slabs; and 3) insulated foundations. The FFF, using the definition of removing moisture from the soil, does not fall under any of these categories. It might be considered under insulated foundations according to accepted engineering practice with zero insulation.

Jay Crandell, ARES Consulting, said the FFF approach, as it is described in the SEBA report, is described as Mr. Roberts mentioned. FFF is different, FFFs do not have to be coupled with monolithic slabs, many FFFs are without slabs and do not rely on the insulation when used. The important thing is when insulation is used, it

negates the need for soil evaluation because it has been prevented from freezing. When there is a monolithic slab that does not use insulation, both accepted engineering practices and ASCE 32-01 require evidence that the frost susceptibility issue is addressed. What is required to do that, as reasonable acceptable engineering practice, is to ensure that the surface and subsurface site drainage and the soil materials are not frost susceptible. Engineering is a practical science that requires evidence. When relying on certain soil conditions, like the frost-free footing of monolithic slab system, then those conditions need to be verified onsite. The IB provides correct interpretation on how to apply reasonable accepted engineering practice, whether it comes from 24 CFR Part 3285.312 or ASCE 32-01, based on reasonable evidence that there is compliance with the HUD code. Mr. Crandell said "acceptable engineering practice" is not a wide open door. He asked, what is not justified or unreasonable with the SEBA report.

Discussion Continued

Michael Henretty clarified that a FFF is included in 24 CFR Part 3285.312(c) as a design variation to the installation instructions. Jay Crandell added that a monolithic slab is a variation of a FFF because it does not rely on insulation, it must rely on well drained, non-frost-susceptible soils.

Jay Crandell, in answer to a question regarding the clarity of the SEBA report, said it was clear to him because he wrote it, but if it is not clear to the MHCC, it would not be clear to those outside this committee. Mr. Crandell said everyone is in agreement that there is some more work to be done such as specific language, format, or possibly the arrangement of the information.

Debra Blake asked the committee to review the list of proposed changes to the IB. Ms. Blake said the target audience of the IB are not engineers, they are installers and regulators. The IB should be worded in such a way, that an installer will be able to know what to do when installing a home so it complies with the HUD code and is safe for the consumer. Steven Anderson said the language should be understandable to the consumer so the manufacturer/installer can provide an answer to their questions regarding why something is done.

Motion to submit the following 12 comments on the Interpretative Bulletin to HUD:

1. **Tone of the IB needs to be more positive.**
2. **The focus of the IB should be to inform and educate.**
3. **The IB should focus on compliance with 3285.**
4. **The IB should be simplified (too lengthy).**
5. **Add definition for frost free foundation (FFF) and frost protected shallow foundation (FPSF).**
6. **Clarify if the IB is intended to be site specific.**
7. **Target audience should be installers, local jurisdiction, regulators, and manufacturers.**
8. **The problem doesn't seem to appear in all states and how to solve that problem.**
9. **Ensure additional cost are not incurred due to IB.**
10. **Reference to actual designs and specific engineering language in the IB should be removed.**
11. **Ensure IB doesn't exceed reasonable acceptable engineering practice as required in 3285.312(b)(2).**
12. **Remove reference to the SEBA report from the IB.**

Maker: Steven Anderson Second: Alan Spencer
Meeting Vote: 16-0-0.

While reviewing the draft IB, the MHCC wanted to add another item to their list of comments to HUD.

Motion to submit an additional comment item 13 on the Interpretative Bulletin to HUD:

13. **Remove local authority having jurisdiction (LAHJ) where the plan approval is not required and in HUD administered states (3286.3 HUD administered installation program) from the IB.**

Maker: Alan Spencer Second: Joseph Sadler
The motion carried.

Motion to submit redlined comments on the Interpretative Bulletin to HUD:

Maker: Steven Anderson Second: Richard Nolan
The motion carried.

See Appendix E for proposed changes the MHCC is submitting to HUD.

Wrap UP

Richard Mendlen, acting DFO, thanked the MHCC for their time and said HUD is looking forward to receiving MHCC comments.

Kevin Kauffman, AO, said the comments provided in this meeting will be followed-up with a ballot. Debra Blake, Vice-Chair, asked Mr. Kauffman to include guidance with the ballot, making it clear that what is being balloted are the ratifications of the actions of this meeting, not additional commentary.

The meeting adjourned at 4:05 p.m.

APPENDIX A: PARTICIPANT LIST

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MHCC MEETING
December 12, 2016

APPENDIX B:
DRAFT
Interpretative Bulletin for Model Manufactured Home Installation Standards
Foundation Requirements in Freezing Climates

Richard Mendlen, HUD

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

24 CFR PART 3285

(Docket no. FR-xxxx-X-xx)

Interpretative Bulletin for Model Manufactured Home Installation Standards

Foundation Requirements in Freezing Climates

24 CFR Part 3285.312(b)

Agency: Office of the Assistant Secretary for Housing-Federal Housing Commissioner, HUD.

Action: Notice of Proposed Installation Interpretative Bulletin I-1-17

Summary: The purpose of this proposed Interpretative Bulletin is to provide guidance for designing and installing manufactured home foundations in areas subject to freezing climates with seasonal ground freezing, in accordance with 24 CFR § 3285.312(b) of the Model Manufactured Home Installation Standards, wherever soil conditions are susceptible to frost heave. Specifically, this guidance is being provided for installing manufactured home foundation systems in areas where frost susceptible seasonally frozen ground conditions are encountered and when footings do not extend below the frost depth at the site. These types of foundation systems are often called "frost-free foundations" (FFF), or "frost-protected shallow foundations" (FPSF). In addition, guidance is also being provided for installing manufactured homes where non-frost susceptible soil conditions are available at the site to protect foundations against the effects of frost heave.

DATES: Comment Due Date: [Insert date 60 days from the date of publication in the FEDERAL REGISTER].

ADDRESSES: Interested persons are invited to submit comments regarding this Interpretative Bulletin to the Regulations Division, Office of General Counsel, Department of Housing and Urban Development, 451 Seventh Street, SW, Washington, DC 20410-0500. Room 10276, Washington, DC 20410-0500.

Communications must refer to the above docket number and title. There are two methods for submitting public comments. All submissions must refer to the above docket number and title.

1. Submission of Comments by Mail. Comments may be submitted by mail to the Regulations Division, Office of General Counsel, Department of Housing and Urban Development, 451 7th Street, SW, Room 10276, Washington, DC 20410-0500.

2. Electronic Submission of Comments. Interested persons may submit comments electronically through the Federal eRulemaking Portal at www.regulations.gov. HUD strongly encourages commenters to submit comments electronically. Electronic submission of comments allows the commenter maximum time to prepare and submit a comment, ensures timely receipt by HUD, and enables HUD to make them immediately available to the public. Comments submitted electronically through the www.regulations.gov website can be viewed by other commenters and interested members of the public. Commenters should follow the instructions provided on that site to submit comments electronically.

Note: To receive consideration as public comments, comments must be submitted through one of the two methods specified above. Again, all submissions must refer to the docket number and title of the rule.

No Facsimile Comments. Facsimile (FAX) comments are not acceptable.

Public Inspection of Public Comments. All properly submitted comments and communications submitted to HUD will be available for public inspection and copying between 8 a.m. and 5 p.m. weekdays at the above address. Due to security measures at the HUD Headquarters building, an advance appointment to review the public comments must be scheduled by calling the Regulations Division at 202-708-3055 (this is not a toll-free number). Individuals with speech or hearing impairments may access this number through TTY by calling the Federal Information Relay Service at 800-877-8339. Copies of all comments submitted are available for inspection and downloading at www.regulations.gov.

FOR FURTHER INFORMATION CONTACT: Pamela Beck Danner, Administrator, Office of Manufactured Housing Programs, Office of Housing, Department of Housing and Urban Development,

451 Seventh Street, SW, Washington DC 20410; telephone (202) 708-6409 (this is not a toll free number). Persons with hearing or speech impairments may access this number via TTY by calling the toll free Federal Information Relay Service at1-800-877-8389.

SUPPLEMENTARY INFORMATION:

II. Background

The National Manufactured Housing Construction and Safety Standards Act of 1974 (42 U.S.C. 5401-5426) (the Act) as amended in 2000 authorizes the Department to establish Model Manufactured Home Installation Standards (Installation Standards) and establish an installation program to enforce those Installation Standards. Section 604(a)(3) of the Act as amended in 2000 also created the Manufactured Housing Consensus Committee (MHCC), in which section 604(b)(3) of the Act directs HUD to provide the consensus committee with an opportunity to review any HUD proposed Interpretative Bulletin and to provide written comments to the Department for a period of up to 120 days.

As a result of problems and inquiries related to the proper design, use, and installation use of frost protected foundation systems in areas subject to freezing climatic conditions, HUD commissioned a study and report to assess both design and installation practices of manufactured homes located in climates with seasonally frozen ground. HUD provided the consensus committee with a report of its findings on October 26, 2016, entitled "An Assessment of Design and Installation Practices For Manufactured Homes in Climates with Seasonally Frozen Ground" prepared by SEBA Professional Services, LLC (see Appendix), and announced it would form the basis for an Interpretative Bulletin to be issued on the subject.

The study and resulting report found some key factors needed for long-term and consistent success require special considerations that are often neglected, particularly for FFF designs and installations that rely on well-drained and non-frost susceptible soil conditions. These factors include appropriately engineered installation details, site investigation practices, fulfillment of responsibilities by all parties associated with manufactured home installation, and verification procedures to ensure that

important design conditions are actually being achieved in practice. Accordingly, this Interpretative Bulletin was developed for the purpose of clarifying requirements and providing practical guidance for the manufactured housing industry when designing or setting foundations for manufactured homes in locations subject to freezing climates with seasonal ground freezing.

HUD also indicated at the October 26th meeting of the MHCC, that it would consider any comments received from the consensus committee on the report and scheduled a teleconference on November 28, 2016, with the Regulatory Subcommittee of the MHCC and with the MHCC on December 12, 2016, to receive feedback and recommendations from the subcommittee and MHCC. As a result of those discussions, the Regulatory Subcommittee recommended that HUD draft an Interpretative Bulletin for the December 12, 2016, teleconference with the full MHCC, taking into consideration the comments from the Regulatory Subcommittee teleconference and comments from the MHCC. A large part of the discussion focused on what constitutes acceptable engineering practice. Some members of the subcommittee expressed concerns on whether the SEI/ASCE 32-01 Standard should exclusively define accepted engineering practice or if other engineering alternatives should be allowed. HUD has considered comments from the Regulatory Subcommittee and the MHCC and included them where it deemed appropriate in the text of the Interpretative Bulletin.

II. The Interpretative Bulletin.

This guidance is being issued in response to numerous requests, inquiries, and questions regarding how to comply with HUD's requirements for foundations in freezing climates, in accordance with 24 CFR § 3285.312(b) of the Model Manufactured Home Installation Standards, when footings do not extend below the frost depth at the site. Engineered foundations designs such as "frost-free foundations" (FFF) including monolithic slab systems (3282.321(b)(2) that rely on non-frost-suceptible soil conditions) and frost-protected shallow foundations (FPSF) including insulated foundations (3282.312(b)(3) that rely on insulation to prevent ground freezing) have great appeal and potential in freezing climates as a cost-effective means of installing manufactured homes on seasonally-frozen

ground. Understandably, their use has been promoted and increased in recent years as a means for reducing manufactured housing installation costs when compared to using conventional or proprietary foundation support systems in freezing climates. However, some key factors important to their long-term and consistent success require special considerations that are often neglected, particularly for FFF designs and installations. These factors include appropriately engineered installation details, site investigation practices, and verification procedures to ensure that important design conditions are actually being achieved in practice.

Important factors or design considerations in any frost-protected foundation include:

- clarity of technical requirements;
- definite criteria for determining soil frost susceptibility and soil moisture sub-surface drainage conditions; and
- guidance on water table depth to determine if the site is suitably well drained.

In addition, for foundations being placed on non-frost susceptible soil, it is also necessary to provide guidance on appropriate site-specific details such as the depth of non-frost-susceptible soil or fill layers required for the frost depth encountered at the site and the layout of sub-surface drainage, when sub-surface site conditions are not well drained. Clarification and accuracy of roles during the site testing and installation process also plays an important part in ensuring that frost-protected foundation designs meet the requirements of HUD's Manufactured Home Model Installation Standards.

The HUD commissioned study reviewed a selection of representative FFF designs in current use for consistency with the HUD code, the SEI/ASCE 32-01 (ASCE 32) standard titled *Design and Construction of Frost Protected Shallow Foundations,* and generally accepted engineering practice. These reviews and additional technical information (including terminology and technical references) are included in an engineering assessment report located in the Appendix. Thus, the Appendix provides the technical basis for the guidance and recommendations included herein.

A summary of key findings from the engineering assessment in the Appendix are as follows:

- One of the reviewed FFF designs demonstrated an appropriate application of the HUD code and ASCE 32 standard's technical requirements for frost protection of foundations. Thus, it is possible to develop a compliant FFF design in accordance with acceptable engineering practice or ASCE 32..
- All other reviewed FFF designs contained a number of flaws or non-conformances, including:
    - A lack of clarity of technical requirements in manufacturer installation instructions, details, and notes
    - Missing or vague criteria for identification and measurement of soil frost susceptibility
    - Missing or vague guidance for determining soil moisture, sub-surface drainage conditions, and water table depth in relation to determining if the site is "well drained" and suitable for an FFF installation.
    - Missing guidance to direct appropriate site specific adjustments of important installation details (e.g., depth of non-frost-susceptible soil or fill layers and lay-out of sub-surface drainage when required).
- A number of the FFF installation designs reviewed showed a pattern of confused roles and responsibilities, often assigning design decisions and site engineering evaluations to local regulatory officials who are typically neither qualified nor trained in foundation engineering or soil mechanics and engineering. Furthermore, they are not charged for such responsibilities because it may pose a conflict of interest (i.e., enforcers making design and construction decisions or judgments on matters they will be enforcing) and a potential conflict with state engineering practice laws (i.e., conducting engineering or design activities for which they are not licensed). Consequently, this practice can lead to an incorrect selection of the proper foundation and drainage system for the site.

Consequently, most of the reviewed FFF designs were found to be not in conformance with the HUD Code and the ASCE 32 reference standard for frost-protection of shallow foundations. In addition, one state's installation rules were reviewed and provisions related to FFF design and installations were found

to be similarly non-compliant. Thus, a need exists to clarify requirements and provide guidance for proper and compliant applications of FFF designs as an alternative to a conventional (frost depth) footing or a conventional FPSF design using insulation to protect against ground freezing per the ASCE 32 standard.

In view of the above, each organization involved in the process of foundation design, approval, and installation has responsibilities that must be met. These responsibilities are described in more detail in the Interpretative Bulletin.

- Manufacturers need to ensure their foundation designs fully comply with 24 Code of Federal Regulations (CFR) 3285, Model Manufactured Home Installation Standards (HUD Code) by use of acceptable engineering practice or applicable provisions of the SEI/ASCE 32-01 Standard, Design and Construction of Frost-Protected Shallow Foundations (ASCE 32). In general, acceptable engineering practice is defined in and is consistent with ASCE 32.
- Manufacturers also need to review and, as appropriate, delete or revise any installation instructions that rely exclusively on surface drainage to prevent the effects of frost heave and inform installers that prior to beginning the installation, a site-specific soil test is required to determine soil frost susceptibility, the water table level, and sub-surface drainage conditions.
- Retailers need to verify that the installations are performed only by licensed installers. Additionally, retailers need to notify HUD of any new manufactured home sales within or into a HUD-administered state by filing the required HUD forms.
- Design professionals and Design Approval Primary Inspection Agencies (DAPIAs) need to ensure that foundation designs comply with all aspects of the HUD Code as provided in 24 CFR 3285 as well as the ACSE 32 standard incorporated by reference. Designs that rely on surface drainage exclusively or do not specify the means of assessing frost susceptibility of soils and their sub-surface drainage characteristics need to be disapproved or revised to meet the provisions of

this Interpretative Bulletin. Additionally, design and installation responsibilities may not be delegated to local regulatory authorities.

- Installers should consider all sites in freezing climates as frost susceptible unless a soil test or other evidence is provided to prove the site is non-frost susceptible.
- Installers should never install a new home on a site that has conditions not covered in the manufacturer's installation instructions or the engineered foundation plan, and should bring the site conditions to the engineer or architect of record or any licensed architect or engineer for design consideration. Once the plan is updated to address site conditions and sealed, it is to be sent to the manufacturer and its DAPIA for approval as well as the Local Authority Having Jurisdiction (LAHJ), as applicable. Installers should not use any design that has them take on the responsibility of assessing frost susceptibility and sub-surface drainage conditions without proper soil analysis.
- Regulatory officials and inspectors need to reject installation plans that require them to take on any aspect of design responsibility. If a site is claimed to have soil that is non-frost susceptible and that is well-drained, soil tests or other evidence must be provided to the regulatory official and/or inspector.
- Installation plans including engineered foundation plans need to be available on-site during inspections. If these plans are not available, the home cannot pass inspection.
- In areas where no set local frost depth is determined, the depths corresponding with the Air Freezing Index (Figure 1) may be used.
- Installation rules in both states and local municipalities should be compared to the ASCE 32 standard and the HUD Code to ensure conformity.

In view of the above described concerns, this Interpretative Bulletin was developed for the purpose of clarifying requirements and providing practical guidance for the manufactured housing industry when designing or setting foundations for a manufactured home in locations subject to freezing

climates with seasonal ground freezing. This guidance is intended for first-time installations, not replacement installs when current foundations exist on site.

In summary, in order to resolve the identified problems and previously discussed concerns in this Preamble associated with frost protected shallow foundations designs and installation practices, it will be necessary for all responsible parties in the process to follow and adhere to the guidance in this Interpretative Bulletin. These concerns and issues involve designers, DAPIAs, manufacturers, installers, and regulatory authorities. The most important factor in reducing problems is a properly designed installation instruction giving appropriate direction and details for installers to implement and regulatory officials to verify and inspect. Because this over-arching concern is applicable to all methods of installation related to foundation frost-protection, specific recommendations and guidance for various design and installation options are provided in the Interpretative Bulletin.

INSTALLATION INTERPRETATIVE BULLETIN I-1-17

FOUNDATION REQUIREMENTS IN FREEZING CLIMATES

This Interpretative Bulletin is being issued to provide guidance for all parties associated with designing and installing manufactured home foundation systems in areas subject to freezing climates in accordance with 24 CFR 3285.312(b) of HUD's Model Manufactured Home Installation Standards. A detailed review of several systems outlined in the report provided in the Appendix indicate that many Frost Free Foundation (FFF) designs and practices are not conforming to the requirements outlined in 24 CFR part 3285.312(b) , and as such are not in conformance with acceptable engineering practice or SEI/ASCE 32-01, *Design and Construction of Frost-Protected Shallow Foundations*. In general, the basis for acceptable engineering practice is described and defined by consensus in the SEI/ASCE 32-01 Standard.

These non-conformances are largely due to lack of consistency in design approaches, insufficient or nonexistent instructions in Manufacturers Installation Instructions related to FFF designs, the lack of understanding of best practices for installation site analysis and foundation installation, and an overreliance on localities that often do not possess officials with specialized knowledge of FFF designs and requirements. These shortcomings can be improved by establishing consistent, well-documented best practices and supplemental guidelines for the use of FFF designs.

I. Recommended Practices and Procedures

The following recommendations, practices and procedures need to be followed by all parties involved in manufactured home installations in order to ensure that foundations installed in freezing climates are not subject to frost heave.

1. Recommendations for Manufacturers:

Manufacturers should require that design professionals who submit plans to them for approval, as required by 24 CFR Part 3285.2 (c) (1) (ii), develop foundation frost-protection installation methods that comply with applicable provisions of the HUD's Model Manufactured Home Installation Standards, 24 CFR 3280.312(b)(2) or (3). To ensure consistent and effective conformance, options

with detailed guidance for complying designs are provided below and need to be followed. These directions should also be incorporated into their Manufacturer Installation Instruction manual as required by 24 CFR Part 3285.2 (c)(2).

- Current Frost Free Foundation (FFF) installation instructions that rely exclusively on surface drainage as a means of foundation frost-protection are to be deleted from the manufacturer's installation instructions or immediately revised.
- Manufacturer installation instructions for FFF designs need to indicate that, prior to commencement of installation; a site-specific soil test is required in order to determine if the site soil is non-frost-susceptible and that the soil is "well-drained" with a water table depth consistently and sufficiently below the frost line.
- Manufacturer installation instructions should indicate that a ground water assessment needs to be done prior to commencement of installation.
- Manufacturer's installation instructions need to identify what steps need to be taken to confirm that the site soil is non-frost-susceptible. If a soil test is not done to prove that the soil is non-frost susceptible, then the site must be assumed to be frost susceptible and must be developed accordingly, as such tests must be done prior to commencement of installation.
- To facilitate installations in locations subject to freezing, manufacturer instructions should have at least one example of an acceptable foundation system for frost and non-frost susceptible soil conditions for use in freezing climate locations. These designs must have a design professional's seal, and if not previously part of the manufacturer's instructions, be approved by the manufacturer and its Design Approval Primary Inspection Agency (DAPIA).

2. Recommendations for Retailers and Park Owners Operating as Retailers:

- Retailers and park owners operating as retailers must provide buyers with a copy of the required consumer disclosure which indicates that new manufactured homes must be installed by licensed

installers and need to verify and employ only installers that have the proper licenses and training to install manufactured homes within the state of each home's installation.

For new home installations in HUD Administered Installation States, retailers and park owners acting as retailers must notify HUD of the certification and location of each home installation (HUD 305 form) and the completion of the installation certification (HUD 306 form) after each installation must be inspected by a qualified inspector (see 24 CFR § 3286.511(a)) and the acceptability of the installation verified on a HUD approved inspection form (HUD 309 form).

3. Recommendations for Design Professionals and DAPIAs:

   Foundation frost-protection methods used for installation designs must comply with HUD's Model Manufactured Home Installation Standards by use of acceptable engineering practice or the ASCE 32 standard. To ensure consistent and effective conformance, alternatives with detailed guidance for development of complying designs by manufacturers and for DAPIA review and approval are provided in the next section of this Interpretative Bulletin, *"Design Options, Compliance Checklists, and Installation Practices"*.

   - FFF installation designs that rely exclusively on surface drainage as a means of foundation frost-protection are not acceptable. Any existing installation designs of this type should be removed for use and DAPIA approval withdrawn.
   - FFF installation designs that do not specify appropriate means of assessing the frost-susceptibility of soils and their sub-surface drainage characteristics on a site-specific basis need to be removed from use and the manufacturer's installation instructions and DAPIA approval withdrawn.
   - FFF installation designs that assign design responsibilities to local regulatory authorities, such as assessing site drainage, water table depth, or soil frost-susceptibility are also not acceptable and need to be disapproved.

4. Recommendations for Installers

When installing a new home on a site that has conditions not covered in the manufacturer's installation manual or an engineered foundation plan, the special site conditions should be brought to the attention of the engineer or architect of record. If there is no engineer or architect of record, a licensed engineer or licensed architect should be retained to evaluate the conditions and then design a plan to install the home. Once this plan is finalized and sealed, it must be sent to the manufacturer and its DAPIA for approval per 24 CFR Part 3285.2(c)(1)(ii). The plan should also be submitted to the Local Authority Having Jurisdiction (LAHJ) for approval if applicable.

- Installers should never install manufactured homes using FFF installation designs that rely exclusively on surface drainage as a means of frost protection.
- Installers should never initiate a FFF installation where the instructions require them to take on design responsibility of assessing soil frost-susceptibility and sub-surface drainage conditions without proper soil testing and analysis. Instead, installers should verify that appropriate soil testing and site assessment for use of a FFF design has been completed prior to initiating an installation. Refer to the next section for guidance.
- Prior to installation of an engineered system that is not included in the manufacturer's installation instructions, installers need to verify that the installation plan is stamped by an engineer or architect of record as well as approved by the manufacturer and its DAPIA. In addition, an LAHJ may require that the plans be reviewed and sealed by an engineer or architect that is licensed in the state where the installation is occurring.
- Installers should only use foundation plans that have been approved by the manufacturer and its DAPIA on or after January 1, 2009, the effective date of HUD's installation program.

5. Recommendations for Local Regulatory Officials and Inspectors:

   Regulatory officials and inspectors should reject installation plans that require them to execute a design responsibility such as assessing the subsurface drainage, water table depth, or frost-susceptibility of soils on a given site. Freezing-climate installation plans that rely exclusively on surface drainage as a means of frost protection should not be approved by local regulatory officials.

   - Where a site is claimed to have non-frost-susceptible and "well-drained" soils as a basis for setting foundation pads or footings above the design frost depth, evidence should be required including soils tests and site sub-surface drainage and groundwater investigation by a qualified soils laboratory or soils engineering professional or geologist. Single site soil samples may be taken in HUD administered states by the installer or by qualified soil engineering professionals with the soil tests done by a qualified soils engineering laboratory or soils engineering professional.
   - Regulatory officials should assure that the approved installation plans and the manufacturer installation instructions are on site and available during inspections. If approved installation plans are not available and on site during inspections, the home cannot pass inspection.
   - In areas where the local frost depth is unavailable, local regulatory officials should consider permitting design frost depths to be determined in accordance with Table 1. Design Frost Depth for Footings and Figure 1. U.S. Air Freezing Map Index.

II. DESIGN OPTIONS, CHECKLISTS AND INSTALLATION BEST PRACTICES

OPTION #1: Checklist for Conventional Footings in Freezing Climates

HUD Code, 24 CFR Part 3285.312(b)(1)

- Obtain the local-design frost depth for footings from one of the following:
    - The local authority having jurisdiction (LAHJ),
    - Use Table 1 with the site's Air-Freezing Index (AFI) from Figure 1[1], or
    - Consult with a registered professional engineer, registered architect, or registered geologist.
- When using Table 1 and Figure 1 to determine frost depth for footings, the depth of interior pier footings complying with footnote (b) of Table 1 may be taken as one-half the depth required in Table 1 with approval of the LAHJ.
- Based on the required frost depth for footings, dig the footing to the frost depth.
- Check the soil bearing at depth of the footing with a torque probe, pocket penetrometer or other suitable testing device.
- Based on the tested soil bearing value, properly size the footing according to the manufacturer's installation instructions or use Table to 24 CFR Part 3285.312 in the HUD Code.
- Place footing pads and construct piers or supports at locations specified in accordance with the manufacturer's installation instructions.
- Backfill as needed and grade the site as required for drainage:
    - Crown the finish grade at the centerline of the foundation
    - Slope grade a minimum of ½-inch per foot for a minimum distance of 10 feet away from the home perimeter.

[1] A list of AFI values for various states and counties can be found in the 2015 International Residential Code (IRC), Table R403.3(2), published by the International Code Council, Inc., and used as the model building code for most states.

TABLE 1. DESIGN FROST DEPTH FOR FOOTINGS[a]

AIR-FREEZING INDEX [See Figure 4]	MINIMUM DEPTH[b] (inches)
≤ 50	3
250	9
350	12
500	16
1000	24
1500	32
2000	40
2500	45
3000	52
3500	57
4000	62
4250	65

a. These design frost depths are intended to be used for protection of building foundations against frost heave and are not applicable to site or street utilities or other non-building applications.

b. These design frost depths for footings shall be permitted to be halved for footings interior to the building perimeter and located within an enclosed space. Where skirting is used to enclose the space, the skirting shall be insulated to a minimum R-5 (1000 to 2500 AFI) or R-10 (>2500 AFI) and vents shall be capable of automatically closing at outdoor temperatures below 40 deg F (which necessitates use of a ground vapor barrier).

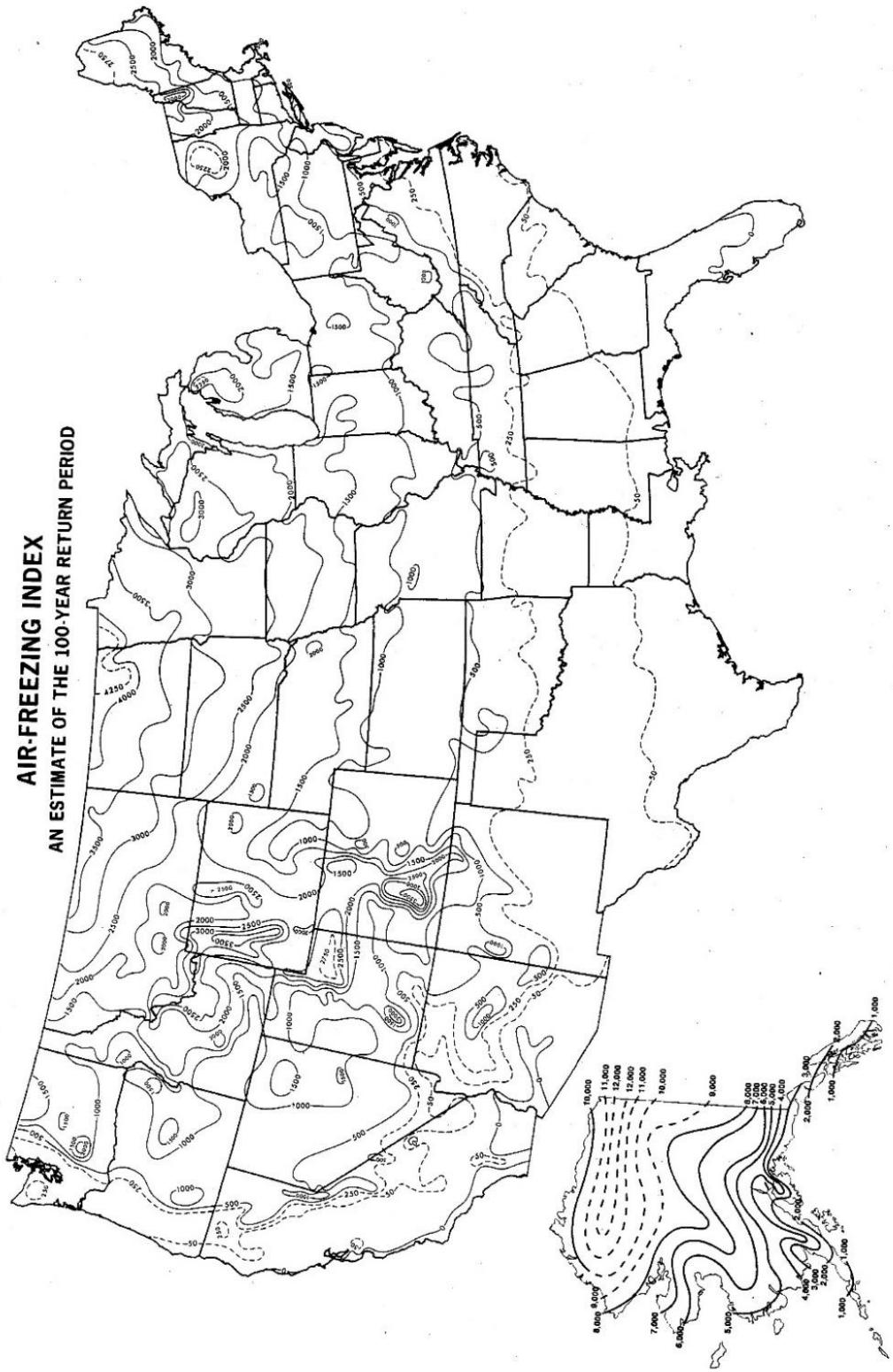

Figure 1. U.S. Air Freezing Index Map (based on Steurer, 1989 and Steurer and Crandell, 1995)

OPTION #2: Checklist for Monolithic Slab Systems in Freezing Climates ("Frost Free Footing")

HUD Code, 24CFR Part 3285.312(b)(2)

Pre-Installation Preparations:

- Before initiating installation, verify that the installation instructions are designed (sealed) by a registered professional engineer or registered architect, and approved by the manufacturer and its DAPIA. The LAHJ can require that the plans also be reviewed and sealed by an engineer or architect in the state where the installation is to occur.
- Verify that the LAHJ has accepted and approved the foundation and installation plan and all applicable permits are obtained. An approved installation design needs to comply with one of the following conformance options for the proposed installation design as permitted in HUD's Model Manufactured Home Installation Standards:
    - Complies with acceptable engineering practice or the ASCE 32 standard by use of non-frost-susceptible fills or existing soils (adequately tested and verified as defined in ASCE 32) and that such fills or soils extend to the local frost depth with provision for adequate surface drainage and, in addition, subgrade drainage where underlying soils are poorly drained and/or the water table is within two feet of the design frost depth.
    - Complies with acceptable engineering practice to prevent the effects of frost heave in a manner equivalent to the ASCE 32 standard. Equivalent alternative accepted engineering practices include: (1) the specification of an alternative criteria for testing the frost susceptibility of soils (e.g., different fines content allowances based on substantiating data), and (2) different frost depth determination based on thermal modeling of the climatic, soil, and foundation conditions

NOTE: Reliance solely on surface drainage to prevent frost heave without verification of non-frost-susceptible fill materials or existing non-frost susceptible soils to frost depth does not comply with the

SEI/ASCE 32 standard or HUD Code's allowance for "acceptable engineering practice to prevent the effects of frost heave."

- For designs that rely on well-drained sites and use of existing soils to frost depth that are non-frost susceptible, verify the following before initiating installation:
    - The non-frost-susceptible condition of existing soils above the frost depth (and below the base of the proposed slab) have been tested in accordance with ASTM D442 and determined to have a fines mass content of less than 6% passing a #200 sieve for the specific installation site or the development as a whole. A soils report should be provided by the engineer or soil lab of record for verification.
    - Alternatively, conduct such testing as follows:
        - Obtain a minimum of two soil samples per installation site (one at each end of the foundation area) and from any borrow materials on site used as fill. A materials report from a quarry may be used when material is supplied from a licensed quarry.
        - When conducting borings for soil samples, take a minimum of one pint (plastic bag full) of soil from depths of one foot and at the locally prescribed frost depth or as determined from Table 1, Design Frost Depth for Footings. Continue each boring to two feet below the locally-prescribed frost depth (as measured from the proposed finish grade) to determine if the water table is present.
        - Deliver or send the soil samples to a soils laboratory for particle size testing per ASTM D442.
        - If the soils laboratory report indicates greater than 6% fines by mass passing a #200 sieve then the soil at the site is frost susceptible and either footing to frost depth or one of the alternative foundation options (see Appendix) for frost susceptible soil conditions must be used.

- The water table condition of the site has been assessed by the engineer or architect of record and documentation provided of the water table being at least two feet below the local frost depth. Alternatively, make this determination using soil borings as described above.
- If the water table is higher than two feet below the local frost depth, a network of drainage pipes sloped to drain to daylight must be placed at the base of non-frost-susceptible fill (e.g., clean gravel or crush rock) placed to a depth equal to the local frost depth.
- Alternatively, a site specific foundation design can be prepared and sealed by a professional engineer or registered architect or geologist and approvedby the manufacturer and its DAPIA.
- Save documentation of all of the above and provide to the LAHJ for verification.

- For designs that rely on well-drained sites and use of fill materials to frost depth that are non-frost susceptible, verify the following before initiating installation:
  - The slab base and foundation fill materials are specified by the engineer or architect of record as non-frost susceptible such as clean gravel or crushed rock or other suitable material with no more than 6% fines by mass passing a #200 sieve per ASTM D442 test method. Non-frost susceptible subgrade materials are to be filled from the frost depth to the slab base for the entire extent of the slab plus any over dig.
  - The water table condition of the site has been assessed by the engineer or architect of record and documentation provided of the water table being at least two feet below the local frost depth. Alternatively, make this determination using soil borings as described above.
    - If the water table is higher than two feet below the local frost depth, a network of drainage pipe sloped to drain to daylight must be placed at the

base of non-frost-susceptible fill (e.g., clean gravel or crush rock) placed to a depth equal to the local frost depth.

- Save documentation of all of the above and provide to the LAHJ for verification.

Installation Phase:

- Excavate slab area to frost depth or only to the bottom of the slab's non-frost-susceptible base layer if existing soils have been determined to be non-frost susceptible down to frost depth during the pre-installation preparation phase (see above).
- Place foundation drains sloped to drain to daylight at the bottom of the non-frost-susceptible base or fill material layer.
- Place the non-frost-susceptible fill and base materials, compacting as required by the manufacturer's installation instructions and/or the engineer or architect of record. Do not initiate fill placement where compaction requirements and methods are not specified. Obtain compaction requirements, as needed, from the engineer or architect of record. The minimum requirement is 90% compaction per 24 CFR Part 3285.201 although the engineer or architect of record or LAHJ may require a higher compaction level based on the fill material used.
- Construct the reinforced monolithic slab in accordance with the manufacturer's installation instructions or according to the manufacturer and DAPIA approved plans.
- Backfill as needed and grade the site as required for drainage:
  - Slope grade a minimum of ½-inch per foot for a minimum distance of 10 feet away from the home perimeter.

NOTE: The above procedures also apply to designs where a monolithic slab is not used and pier footing pads are placed directly on non-frost-susceptible fill materials (e.g., clean gravel or crushed rock).

OPTION #3: Checklist for Frost Protected Shallow Foundations (Insulated Foundations).

HUD Code, 24 CFR Part 3285.312(b)(3)

Pre-Installation Preparations:

- Before initiating installation, verify that the installation instructions are designed (sealed) and certified by a registered professional engineer or registered architect, approved by the manufacturer and its DAPIA.
- Also, verify that the instructions include an approved installation design complying with one of the following basis for the proposed installation design, as permitted in the HUD Code:
    - Complies with acceptable engineering practice or the SEI/ASCE 32-01 standard by use of properly-specified insulation materials and sized in accordance with the local climate and located around the perimeter of the foundation (including insulated skirting with vents capable of closing at temperatures below 40 degrees) or the entire foundation pad is insulated where there is no skirting or the skirting is un-insulated or the skirting has non-closing vents. Non-frost-susceptible base materials are used at a minimum thickness required by acceptable engineering practice or SEI/ASCE 32, and insulation materials are protected against damage in accordance with acceptable engineering practice or SEI/ASCE 32.
    - Complies with acceptable engineering practice to prevent the effects of frost heave in a manner equivalent to the insulation provisions in the SEI/ASCE 32 standard. Equivalent alternative accepted engineering practices include: (1) the specification of an alternative insulation amounts based on dynamic thermal modeling of the climatic, soil, and foundation conditions specific to the site, and (2) alternative insulation materials or types with data substantiating long-term R-values in below-grade applications.

NOTE: Designs which place insulation materials in a discontinuous fashion, such that exposed slab edges or other types of thermal bridging occurs, do not meet the requirements of the SEI/ASCE 32 standard or

the HUD Code provisions that allow the use of "acceptable engineering practice to prevent the effects of frost heave."

- Obtain foundation insulation materials as specified in the installation instruction and verify the correct type is received. Commonly accepted insulation materials include Extruded Polystyrene (XPS) and Expanded Polystyrene (EPS) of various "types" in accordance with ASTM C578 and ASCE 32 standards.
- Insulation material conformance with the specified type should be verified by product labels or a certification from the insulation manufacturer. Materials commonly stocked in supply stores may not be the correct "type" even though it may be the correct "kind" (e.g., XPS or EPS).

NOTE: There is no need to determine the frost susceptibility of underlying soils to frost depth in the insulated foundation design approach when the provisions of ASCE 32 are satisfied.

Installation Phase:

- Excavate the foundation area to the correct shallow foundation depth as indicated in the manufacturer's installation instructions or by the engineer or architect of record (generally the foundation depth need not exceed 12" to 16" below finish grade).
- Place specified non-frost-susceptible base material and provide drainage pipes around the perimeter, at a minimum of 4 inches (within the base material layer) as required by the installation instructions. Pipes need to be run to day-light or have a mechanical means of draining the water (see detail in Appendix) .
- Sequence the foundation slab or pad construction and insulation placement in accordance with the design approach indicated on the manufacturer's installation instructions. Where sub-slab insulation is required, this will need to be placed before slab construction. Perimeter insulation may be placed after slab construction (see detail in Appendix).
- After construction of the slab and supports and placement of the home, construct the insulated skirting with automatically closing vents as required by the manufacturer's installation

instructions. Where the foundation slab is entirely insulated with horizontal below ground insulation (the design does not rely on perimeter insulation only), no skirting is required. (See detail in Appendix).

- Place wing insulation (extending outward horizontally underground from the perimeter of the foundation) as required by the installation instructions. Depending on the design approach and climate severity, wing insulation may or may not be required.
- Provide protection of any exposed exterior insulation or within 10 inches of the finish grade surface. (see detail in Appendix)
- Backfill as needed and grade the site as required for drainage:
    - Slope grade a minimum of ½-inch per foot for a minimum distance of 10 feet away from the home perimeter.

This Interpretative Bulletin is issued pursuant to 24 CFR 3285.2 and 3285.312(b) of HUD's Model Manufactured Home Installation Standards.

Date: _____

_____
Ed Golding
Principal Deputy Assistant Secretary for Housing

APPENDIX

MANUFACTURED HOMES IN FREEZING CLIMATES

An Assessment of Design and Installation Practices

For Manufactured Homes in Climates with Seasonally Frozen Ground

Prepared by: SEBA Professional Services, LLC

For

The U.S. Department of Housing and Urban Development

Office of Manufactured Housing Programs

Under Contract #DUIOOH-14-C-04

MHCC MEETING

December 12, 2016

APPENDIX C: COMMENTS

Mark Weiss, MHARR

Manufactured Housing Association for Regulatory Reform

1331 Pennsylvania Avenue, NW • Suite 512 • Washington, DC 20004 • 202-783-4087 • Fax 202-783-4075 • mharrdg@aol.com

December 9, 2016

VIA FEDERAL EXPRESS AND ELECTRONIC SUBMISSION

Manufactured Housing Consensus Committee
C/O Home Innovation Research Labs
MHCC Administering Organization
400 Prince George's Boulevard
Upper Marlboro, Maryland 20774

Re: Public Comment – HUD-Proposed Interpretive Bulletin
Entitled "Foundation Requirements in Freezing Climates"

Dear MHCC Members:

Purporting to act under sections 604(b)(2) and (3) of the National Manufactured Housing Construction and Safety Standards Act of 1974, as amended by the Manufactured Housing Improvement Act of 2000 (42 U.S.C. 5403(b)(2), (3)), the U.S. Department of Housing and Urban Development (HUD) has developed and submitted to the Manufactured Housing Consensus Committee (MHCC) – for consideration at a meeting on December 12, 2016 – a proposed "Interpretive Bulletin" (IB) entitled "Foundation Requirements in Freezing Climates." The text of the 25-page proposed IB was provided to MHCC members and program stakeholders by the MHCC Administering Organization (AO) on December 8, 2016, less than two full business days prior to the scheduled meeting date.

Following a complete review of the proposed IB, MHARR reiterates its strenuous opposition to this unlawful effort to: (1) substantively modify and amend sections 3285.312(b)(2) and (3) of the federal installation standards (24 C.F.R. 3285.312(b)(2),(3)) via a purported "interpretation;" (2) impose costly, restrictive and unnecessary new mandates on manufacturers, retailers, communities, consumers and others without specific objective evidence of systemic failures under the existing standards; and (3) unlawfully dictate the content of installation standards in 37 states with existing HUD-approved state-law installation programs – all as previously detailed in an October 20, 2016 MHARR communication to HUD (incorporating its earlier April 14, 2016 objections), attached as "Appendix E" to the draft minutes of the November 28, 2016 meeting of the MHCC Regulatory and Enforcement Subcommittee.

Based on these objections, the proposed IB represents a blatant abuse of HUD's authority and the procedures of the 2000 reform law relating to the development and use of Interpretive Bulletins. What it proposes is a significant, substantive change both to the HUD standards and –

by extension – the existing standards in 37 states with state installation programs previously approved by HUD. Further, the IB – despite claims to the contrary by HUD – expressly and deliberately ignores the outcome of the two resolutions addressed by the MHCC Regulatory and Enforcement Subcommittee at its November 28, 2016 meeting.

The first resolution addressed by the Subcommittee would have "recommend[ed] to HUD to use the SEBA[1] report, Manufactured Home Foundations in Freezing Climates including appendices as the basis for an Interpretative Bulletin." (Emphasis added). That motion was rejected by the Subcommittee, by a 6-2 margin of voting members.[2] Yet the proposed IB does exactly what the Subcommittee rejected, expressly stating that "the appendix" – i.e., the SEBA report – "provides the technical basis for the guidance and recommendations included herein."[3]

The second Subcommittee resolution – which was approved unanimously – asked HUD to "draft an Interpretative Bulletin before the December 12 MHCC teleconference taking into consideration the comments from the November 28th MHCC Regulatory Subcommittee teleconference." There is no indication whatsoever, though, in the proposed IB that HUD has considered – let alone addressed – the concerns raised by the Subcommittee, which overlap with the specific objections previously asserted by MHARR. Indeed, the only evidence in the IB is that HUD did just the opposite – by ignoring the Subcommittee's rejection of the SEBA Report as the basis for any resulting IB.

For these reasons alone, the proposed IB should either be withdrawn by HUD or rejected by the MHCC with instructions to HUD to specifically address the major concerns that have been raised regarding the substance, legitimacy and extremely harmful expected impacts of the IB and the allegedly supporting SEBA report. With a new administration set to take office in just five weeks, which may take an entirely different view of this and other related regulatory matters,[4] there is no basis whatsoever – and no demonstrated need – to railroad the proposed IB (or any similar measure) through the MHCC without sufficient time for proper analysis and consideration of all relevant statutory factors, including evidence of necessity and evidence of cost impacts – as well as proper compliance with the law in treating this action as a proposed amendment to the standards. Instead, the program and the program Administrator – as has increasingly been the case – are simply taking the conclusions of paid contractors and seeking to impose those conclusions as high-cost mandates on program stakeholders. This is unacceptable and should be rejected by the MHCC if HUD insists on going forward.

Sincerely,

Mark Weiss
President and CEO

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[1] I.e., SEBA Professional Services, L.L.C., the HUD program's installation contractor.

[2] See, Draft Minutes – MHCC Regulatory Subcommittee Meeting at p. 3.

[3] See, proposed IB at p. 5.

[4] Indeed, both the incoming administration and Congress – on November 15, 2016 – have called for a moratorium on all pending regulations.

cc: Hon. Julian Castro
Mr. Edward Golding
Other Interested HUD Code Industry Retailers, Communities, Manufacturers and Installers

MHCC MEETING

December 12, 2016

APPENDIX D: COMMENTS

Lois Starkey, MHI

Manufactured Housing Institute

December 8, 2016

Pamela Danner
Administrator
Office of Manufactured Housing Programs
Department of Housing and Urban Development
451 7th St. SW
Washington, DC 20410

Re: Foundation Requirements in Freezing Climates

Dear Ms. Danner:

As the Manufactured Housing Consensus Committee (MHCC) prepares to meet on December 12 to discuss the proposed Interpretive Bulletin (IB) provided to the MHCC on December 7, regarding manufactured home installations in areas subject to freezing climates, the Manufactured Housing Institute (MHI) would like to offer our initial concerns and recommendations for consideration by the Consensus Committee. MHI will be submitting additional detailed comments during the public comment period. In the meantime, we ask that these issues be addressed before the process moves forward any further.

MHI is the only national trade organization representing all segments of the factory-built housing industry. MHI members include home builders, lenders, home retailers, community owners and managers, suppliers and others affiliated with the industry. MHI's membership includes 50 affiliated state organizations. In 2016 we are projected to produce close to 80,000 homes, which represents nearly 9 percent of new single family home starts. MHI members represent about 87 percent of manufactured homes produced each year.

For the reasons outlined below, MHI objects to the proposed IB which is based on the report, *Manufactured Home Foundations in Freezing Climates,* prepared by SEBA Professional Services. MHI's concerns mirror those raised by members of the Manufactured Housing Consensus Committee's Regulatory Subcommittee during their November 28 conference call about the report. In particular, MHI is concerned that:

- The report unnecessarily places limits on the flexibility of professional engineers and architects that have experience designing systems based on knowledge of local site conditions.
- States in northern climates have been utilizing frost free foundation systems that are not included within this report with few complaints. By insisting on adherence to the American Society of Civil Engineers' "Design and Construction of Frost Protected Shallow Foundations" (ASCE 32-01), the guidance would effectively limit other acceptable

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http://www.manufacturedhousing.org info@mfghome.org

engineering practices and fundamentally alter the discretion provided for in the HUD Code 3285.312[1].

- The draft IB, would require a level of technical skill and experience for installers, code officials, and inspectors that is not widely available in the market today, and therefore, would result in unreasonable costs to both private enterprise and local government in hiring and training additional staff to manage the additional requirements imposed by the guidance.

MHI agrees with the general consensus of the MHCC Regulatory Subcommittee that HUD's concerns over the implementation of proper foundation design and construction actually relate to a general lack of knowledge of the current regulations. While CFR Part 3285 has been in effect since 2009, HUD has only recently focused on compliance and enforcement of this regulation. Establishing prescriptive requirements and criteria is not the appropriate solution to addressing HUD's implementation concerns. The requirements proposed by SEBA restrict or limit options currently provided for in the regulations, which are designed as performance-based standards to encourage innovation and provide flexibility for alternative approaches to designing and constructing foundations.

To ensure compliance with CFR Part 3285, HUD should focus on encouraging best practices and providing greater clarity, while allowing for design innovation and the integration of more efficient, modern, and cost-effective building and design technologies. A non-binding guidance that focuses on highlighting performance-based best practices could achieve these objectives. Rather than limiting options, as would be done by adopting the SEBA report as an IB, HUD should engage a task force of State Administrative Agencies, engineers, and installers to identify practices that have been used successfully in frost susceptible climates, particularly in states that have recently experienced "polar vortex" winters. For example, Wisconsin and Maine have successfully regulated installations in frost susceptible climates. States with approved programs should continue to be permitted to establish and enforce regulations and determine acceptable alternative designs.

While MHI believes it is unnecessary and overly prescriptive to finalize an IB that relies on the SEBA report, should HUD move forward with such guidance we believe that it must remain entirely consistent with CFR Part 3285. If the IB changes what is required under CFR Part 3285, as the December 7 draft does, then a full rulemaking process should be followed. As HUD considers moving forward with an IB, the following concerns must be addressed:

- Ensure that the guidance is only applied to new slabs and foundation systems. Existing slab foundations that show no signs of failure should be exempt, or grandfathered, under current rules. This would address concerns raised by community owners and retailers that a restrictive IB could impact their ability to replace older homes in a cost effective manner. HUD could work with industry and other stakeholders to develop new, innovative and cost effective methods for retrofitting existing foundations.

[1] 24 CFR Part 3285.312 – "(i)In accordance with acceptable engineering practice to prevent the effects of frost heave; or (ii) in accordance with SEI/ASCE 3201)."

- Retain the flexibility in 24 CFR Part 3285.312(b)(2)(1)(ii) that allows registered professional engineers or architects to develop alternative foundation designs. The IB requires all alternative frost free systems to be designed in accordance with SEI/ASCE 32-01.
- Preserve flexibility to determine soil type and frost heave susceptibility, including the ability to rely not only on soil tests, but soil records, and soil classifications and bearing capacities, as is provided for in 3285.202(b) and 3285.312(b)(1).

Thank you for your consideration of MHI's concerns about regulations regarding manufactured home installations in frost susceptible climates. We stand ready to work with you to ensure that homes in freezing climates are installed safely and securely.

Sincerely,

Lesli Gooch, Ph.D.
Senior Vice President, Government Affairs & Chief Lobbyist

Cc: Members of the Manufactured Housing Consensus Committee

MHCC MEETING
December 12, 2016

APPENDIX E:
MHCC COMMENTS ON THE DRAFT Interpretative Bulletin for Model Manufactured Home Installation Standards Foundation Requirements in Freezing Climates

MHCC

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

24 CFR PART 3285

(Docket no. FR-xxxx-X-xx)

Interpretative Bulletin for Model Manufactured Home Installation Standards

Foundation Requirements in Freezing Climates

24 CFR Part 3285.312(b)

Agency: Office of the Assistant Secretary for Housing-Federal Housing Commissioner, HUD.

Action: Notice of Proposed Installation Interpretative Bulletin I-1-17

Summary: The purpose of this proposed Interpretative Bulletin is to provide guidance for designing and installing manufactured home foundations in areas subject to freezing climates with seasonal ground freezing, in accordance with 24 CFR § 3285.312(b) of the Model Manufactured Home Installation Standards, wherever soil conditions are susceptible to frost heave. Specifically, this guidance is being provided for installing manufactured home foundation systems in areas where frost susceptible seasonally frozen ground conditions are encountered and when footings do not extend below the frost depth at the site. These types of foundation systems are often called "frost-free foundations" (FFF), or "frost-protected shallow foundations" (FPSF). In addition, guidance is also being provided for installing manufactured homes where non-frost susceptible soil conditions are available at the site to protect foundations against the effects of frost heave.

DATES: Comment Due Date: [Insert date 60 days from the date of publication in the FEDERAL REGISTER].

ADDRESSES: Interested persons are invited to submit comments regarding this Interpretative Bulletin to the Regulations Division, Office of General Counsel, Department of Housing and Urban Development, 451 Seventh Street, SW, Washington, DC 20410-0500. Room 10276, Washington, DC 20410-0500.

Communications must refer to the above docket number and title. There are two methods for submitting public comments. All submissions must refer to the above docket number and title.

1. Submission of Comments by Mail. Comments may be submitted by mail to the Regulations Division, Office of General Counsel, Department of Housing and Urban Development, 451 7th Street, SW, Room 10276, Washington, DC 20410-0500.

2. Electronic Submission of Comments. Interested persons may submit comments electronically through the Federal eRulemaking Portal at www.regulations.gov. HUD strongly encourages commenters to submit comments electronically. Electronic submission of comments allows the commenter maximum time to prepare and submit a comment, ensures timely receipt by HUD, and enables HUD to make them immediately available to the public. Comments submitted electronically through the www.regulations.gov website can be viewed by other commenters and interested members of the public. Commenters should follow the instructions provided on that site to submit comments electronically.

Note: To receive consideration as public comments, comments must be submitted through one of the two methods specified above. Again, all submissions must refer to the docket number and title of the rule.

No Facsimile Comments. Facsimile (FAX) comments are not acceptable.

Public Inspection of Public Comments. All properly submitted comments and communications submitted to HUD will be available for public inspection and copying between 8 a.m. and 5 p.m. weekdays at the above address. Due to security measures at the HUD Headquarters building, an advance appointment to review the public comments must be scheduled by calling the Regulations Division at 202-708-3055 (this is not a toll-free number). Individuals with speech or hearing impairments may access this number through TTY by calling the Federal Information Relay Service at 800-877-8339. Copies of all comments submitted are available for inspection and downloading at www.regulations.gov.

FOR FURTHER INFORMATION CONTACT: Pamela Beck Danner, Administrator, Office of Manufactured Housing Programs, Office of Housing, Department of Housing and Urban Development,

451 Seventh Street, SW, Washington DC 20410; telephone (202) 708-6409 (this is not a toll free number). Persons with hearing or speech impairments may access this number via TTY by calling the toll free Federal Information Relay Service at1-800-877-8389.

SUPPLEMENTARY INFORMATION:

II. Background

The National Manufactured Housing Construction and Safety Standards Act of 1974 (42 U.S.C. 5401-5426) (the Act) as amended in 2000 authorizes the Department to establish Model Manufactured Home Installation Standards (Installation Standards) and establish an installation program to enforce those Installation Standards. Section 604(a)(3) of the Act as amended in 2000 also created the Manufactured Housing Consensus Committee (MHCC), in which section 604(b)(3) of the Act directs HUD to provide the consensus committee with an opportunity to review any HUD proposed Interpretative Bulletin and to provide written comments to the Department for a period of up to 120 days.

As a result of problems and inquiries related to the proper design, use, and installation use of frost protected foundation systems in areas subject to freezing climatic conditions, HUD commissioned a study and report to assess both design and installation practices of manufactured homes located in climates with seasonally frozen ground. HUD provided the consensus committee with a report of its findings on October 26, 2016, entitled "An Assessment of Design and Installation Practices For Manufactured Homes in Climates with Seasonally Frozen Ground" prepared by SEBA Professional Services, LLC (see Appendix), and announced it would form the basis for an Interpretative Bulletin to be issued on the subject.

The study and resulting report found some key factors needed for long-term and consistent success require special considerations that are often neglected, particularly for FFF designs and installations that rely on well-drained and non-frost susceptible soil conditions. These factors include appropriately engineered installation details, site investigation practices, fulfillment of responsibilities by all parties associated with manufactured home installation, and verification procedures to ensure that

important design conditions are actually being achieved in practice. Accordingly, this Interpretative Bulletin was developed for the purpose of clarifying requirements and providing practical guidance for the manufactured housing industry when designing or setting foundations for manufactured homes in locations subject to freezing climates with seasonal ground freezing.

HUD also indicated at the October 26th meeting of the MHCC, that it would consider any comments received from the consensus committee on the report and scheduled a teleconference on November 28, 2016, with the Regulatory Subcommittee of the MHCC and with the MHCC on December 12, 2016, to receive feedback and recommendations from the subcommittee and MHCC. As a result of those discussions, the Regulatory Subcommittee recommended that HUD draft an Interpretative Bulletin for the December 12, 2016, teleconference with the full MHCC, taking into consideration the comments from the Regulatory Subcommittee teleconference and comments from the MHCC. A large part of the discussion focused on what constitutes acceptable engineering practice. Some members of the subcommittee expressed concerns on whether the SEI/ASCE 32-01 Standard should exclusively define accepted engineering practice or if other engineering alternatives should be allowed. HUD has considered comments from the Regulatory Subcommittee and the MHCC and included them where it deemed appropriate in the text of the Interpretative Bulletin.

II. The Interpretative Bulletin.

This guidance is being issued in response to numerous requests, inquiries, and questions regarding how to comply with HUD's requirements for foundations in freezing climates, in accordance with 24 CFR § 3285.312(b) of the Model Manufactured Home Installation Standards, when footings do not extend below the frost depth at the site. Engineered foundations designs such as "frost-free foundations" (FFF) including monolithic slab systems (3282.321(b)(2) that rely on non-frost-suceptible soil conditions) and frost-protected shallow foundations (FPSF) including insulated foundations (3282.312(b)(3) that rely on insulation to prevent ground freezing) have great appeal and potential in freezing climates as a cost-effective means of installing manufactured homes on seasonally-frozen

ground. Understandably, their use has been promoted and increased in recent years as a means for reducing manufactured housing installation costs when compared to using conventional or proprietary foundation support systems in freezing climates. However, some key factors important to their long-term and consistent success require special considerations that are often neglected, particularly for FFF designs and installations. These factors include appropriately engineered installation details, site investigation practices, and verification procedures to ensure that important design conditions are actually being achieved in practice.

Important factors or design considerations in any frost-protected foundation include:

- clarity of technical requirements;
- definite criteria for determining soil frost susceptibility and soil moisture sub-surface drainage conditions; and
- guidance on water table depth to determine if the site is suitably well drained.

In addition, for foundations being placed on non-frost susceptible soil, it is also necessary to provide guidance on appropriate site-specific details such as the depth of non-frost-susceptible soil or fill layers required for the frost depth encountered at the site and the layout of sub-surface drainage, when sub-surface site conditions are not well drained. Clarification and accuracy of roles during the site testing and installation process also plays an important part in ensuring that frost-protected foundation designs meet the requirements of HUD's Manufactured Home Model Installation Standards.

The HUD commissioned study reviewed a selection of representative FFF designs in current use for consistency with the HUD code, the SEI/ASCE 32-01 (ASCE 32) standard titled *Design and Construction of Frost Protected Shallow Foundations,* and generally accepted engineering practice. These reviews and additional technical information (including terminology and technical references) are included in an engineering assessment report located in the Appendix. Thus, the Appendix provides the technical basis for the guidance and recommendations included herein.

A summary of key findings from the engineering assessment in the Appendix are as follows:

- One of the reviewed FFF designs demonstrated an appropriate application of the HUD code and ASCE 32 standard's technical requirements for frost protection of foundations. Thus, it is possible to develop a compliant FFF design in accordance with acceptable engineering practice or ASCE 32..
- All other reviewed FFF designs contained a number of flaws or non-conformances, including:
    - A lack of clarity of technical requirements in manufacturer installation instructions, details, and notes
    - Missing or vague criteria for identification and measurement of soil frost susceptibility
    - Missing or vague guidance for determining soil moisture, sub-surface drainage conditions, and water table depth in relation to determining if the site is "well drained" and suitable for an FFF installation.
    - Missing guidance to direct appropriate site specific adjustments of important installation details (e.g., depth of non-frost-susceptible soil or fill layers and lay-out of sub-surface drainage when required).
- A number of the FFF installation designs reviewed showed a pattern of confused roles and responsibilities, often assigning design decisions and site engineering evaluations to local regulatory officials who are typically neither qualified nor trained in foundation engineering or soil mechanics and engineering. Furthermore, they are not charged for such responsibilities because it may pose a conflict of interest (i.e., enforcers making design and construction decisions or judgments on matters they will be enforcing) and a potential conflict with state engineering practice laws (i.e., conducting engineering or design activities for which they are not licensed). Consequently, this practice can lead to an incorrect selection of the proper foundation and drainage system for the site.

Consequently, most of the reviewed FFF designs were found to be not in conformance with the HUD Code and the ASCE 32 reference standard for frost-protection of shallow foundations. In addition, one state's installation rules were reviewed and provisions related to FFF design and installations were found

to be similarly non-compliant. Thus, a need exists to clarify requirements and provide guidance for proper and compliant applications of FFF designs as an alternative to a conventional (frost depth) footing or a conventional FPSF design using insulation to protect against ground freezing per the ASCE 32 standard.

In view of the above, each organization involved in the process of foundation design, approval, and installation has responsibilities that must be met. These responsibilities are described in more detail in the Interpretative Bulletin.

- Manufacturers need to ensure their foundation designs fully comply with 24 Code of Federal Regulations (CFR) 3285, Model Manufactured Home Installation Standards (HUD Code) by use of acceptable engineering practice or applicable provisions of the SEI/ASCE 32-01 Standard, Design and Construction of Frost-Protected Shallow Foundations (ASCE 32). In general, acceptable engineering practice is defined in and is consistent with ASCE 32.
- Manufacturers also need to review and, as appropriate, delete or revise any installation instructions that rely exclusively on surface drainage to prevent the effects of frost heave and inform installers that prior to beginning the installation, a site-specific soil test is required to determine soil frost susceptibility, the water table level, and sub-surface drainage conditions.
- Retailers need to verify that the installations are performed only by licensed installers. Additionally, retailers need to notify HUD of any new manufactured home sales within or into a HUD-administered state by filing the required HUD forms.
- Design professionals and Design Approval Primary Inspection Agencies (DAPIAs) need to ensure that foundation designs comply with all aspects of the HUD Code as provided in 24 CFR 3285 as well as the ACSE 32 standard incorporated by reference. Designs that rely on surface drainage exclusively or do not specify the means of assessing frost susceptibility of soils and their sub-surface drainage characteristics need to be disapproved or revised to meet the provisions of

this Interpretative Bulletin. Additionally, design and installation responsibilities may not be delegated to local regulatory authorities.

- Installers should consider all sites in freezing climates as frost susceptible unless a soil test or other evidence is provided to prove the site is non-frost susceptible.
- Installers should never install a new home on a site that has conditions not covered in the manufacturer's installation instructions or the engineered foundation plan, and should bring the site conditions to the engineer or architect of record or any licensed architect or engineer for design consideration. Once the plan is updated to address site conditions and sealed, it is to be sent to the manufacturer and its DAPIA for approval as well as the Local Authority Having Jurisdiction (LAHJ), as applicable. Installers should not use any design that has them take on the responsibility of assessing frost susceptibility and sub-surface drainage conditions without proper soil analysis.
- Regulatory officials and inspectors need to reject installation plans that require them to take on any aspect of design responsibility. If a site is claimed to have soil that is non-frost susceptible and that is well-drained, soil tests or other evidence must be provided to the regulatory official and/or inspector.
- Installation plans including engineered foundation plans need to be available on-site during inspections. If these plans are not available, the home cannot pass inspection.
- In areas where no set local frost depth is determined, the depths corresponding with the Air Freezing Index (Figure 1) may be used.
- Installation rules in both states and local municipalities should be compared to the ASCE 32 standard and the HUD Code to ensure conformity.

In view of the above described concerns, this Interpretative Bulletin was developed for the purpose of clarifying requirements and providing practical guidance for the manufactured housing industry when designing or setting foundations for a manufactured home in locations subject to freezing

climates with seasonal ground freezing. This guidance is intended for first-time installations, not replacement installs when current foundations exist on site.

In summary, in order to resolve the identified problems and previously discussed concerns in this Preamble associated with frost protected shallow foundations designs and installation practices, it will be necessary for all responsible parties in the process to follow and adhere to the guidance in this Interpretative Bulletin. These concerns and issues involve designers, DAPIAs, manufacturers, installers, and regulatory authorities. The most important factor in reducing problems is a properly designed installation instruction giving appropriate direction and details for installers to implement and regulatory officials to verify and inspect. Because this over-arching concern is applicable to all methods of installation related to foundation frost-protection, specific recommendations and guidance for various design and installation options are provided in the Interpretative Bulletin.

INSTALLATION INTERPRETATIVE BULLETIN I-1-17

FOUNDATION REQUIREMENTS IN FREEZING CLIMATES

(insert definitions of FFF and FPSF)

(remove all references to ASCE 32 where possible)

This Interpretative Bulletin is being issued to provide guidance for all parties associated with designing and installing manufactured home foundation systems in areas subject to freezing climates in accordance with 24 CFR 3285.312(b) of HUD's Model Manufactured Home Installation Standards. A detailed review of several systems outlined in the report provided in the Appendix indicate that many Frost Free Foundation (FFF) designs and practices are not conforming to the requirements outlined in 24 CFR part 3285.312(b) , and as such are not in conformance with acceptable engineering practice or SEI/ASCE 32-01, *Design and Construction of Frost-Protected Shallow Foundations*. ~~In general, the basis for acceptable engineering practice is described and defined by consensus in the SEI/ASCE 32-01 Standard~~.

These non-conformances are largely due to lack of consistency in design approaches, insufficient or nonexistent instructions in Manufacturers Installation Instructions related to FFF designs, the lack of understanding of best practices for installation site analysis and foundation installation, and an overreliance on localities that often do not possess officials with specialized knowledge of FFF designs and requirements. These shortcomings can be improved by establishing consistent, well-documented best practices and supplemental guidelines for the use of FFF designs.

I. Recommended Practices and Procedures

The following recommendations, practices and procedures need to be followed by all parties involved in manufactured home installations in order to ensure that foundations installed in freezing climates are not subject to frost heave.

1. Recommendations for Manufacturers:

Manufacturers should require that design professionals who submit plans to them for approval, as required by 24 CFR Part 3285.2 (c) (1) (ii), develop foundation frost-protection installation methods

that comply with applicable provisions of the HUD's Model Manufactured Home Installation Standards, 24 CFR 3285~~0~~.312(b)(2) or (3). To ensure consistent and effective conformance, options with detailed guidance for complying designs are provided below and need to be followed. ~~These directions should also be incorporated into their Manufacturer Installation Instruction manual as required by 24 CFR Part 3285.2 (e)(2).~~

- Current Frost Free Foundation (FFF) installation instructions that rely exclusively on surface drainage as a means of foundation frost-protection ~~are to be~~ should be deleted from the manufacturer's installation instructions or immediately revised.
- Manufacturer installation instructions for FFF designs need to indicate that, prior to commencement of installation; a site-specific soil test is required in order to determine if the site soil is non-frost-susceptible and that the soil is "well-drained" with a water table depth consistently and sufficiently below the frost line.
- Manufacturer installation instructions should indicate that a ground water assessment needs to be done prior to commencement of installation.
- Manufacturer's installation instructions need to identify what steps need to be taken to ~~confirm~~ identify unusual soil conditions or frost susceptible soil as required by local jurisdictions or the installer ~~that the site soil is non-frost-susceptible~~. ~~If a soil test is not done to prove that the soil is non-frost susceptible, then the site must be assumed to be frost susceptible and must be developed accordingly, as such tests must be done prior to commencement of installation.~~
- To facilitate installations in locations subject to freezing, manufacturer instructions should have at least one example of an acceptable foundation system for frost and non-frost susceptible soil conditions for use in freezing climate locations. These designs must have a design professional's seal, and if not previously part of the manufacturer's instructions, be approved by the manufacturer and its Design Approval Primary Inspection Agency (DAPIA).

~~2. Recommendations for Retailers and Park Owners Operating as Retailers:~~

- ~~Retailers and park owners operating as retailers must provide buyers with a copy of the required consumer disclosure which indicates that new manufactured homes must be installed by licensed installers and need to verify and employ only installers that have the proper licenses and training to install manufactured homes within the state of each home's installation.~~

~~For new home installations in HUD-Administered Installation States, retailers and park owners acting as retailers must notify HUD of the certification and location of each home installation (HUD 305 form) and the completion of the installation certification (HUD 306 form) after each installation must be inspected by a qualified inspector (see 24 CFR § 3286.511(a)) and the acceptability of the installation verified on a HUD approved inspection form (HUD 309 form).~~

3. Recommendations for Design Professionals and DAPIAs:

   Foundation frost-protection methods used for installation designs must comply with HUD's Model Manufactured Home Installation Standards by use of acceptable engineering practice or the ASCE 32 standard. To ensure consistent and effective conformance, alternatives with detailed guidance for development of complying designs by manufacturers and for DAPIA review and approval are provided in the next section of this Interpretative Bulletin, *"Design Options, Compliance Checklists, and Installation Practices"*.

   - FFF installation designs that rely exclusively on surface drainage as a means of foundation frost-protection are not acceptable. Any existing installation designs of this type should be removed for use and DAPIA approval withdrawn.
   - FFF installation designs that do not specify appropriate means of assessing the frost-susceptibility of soils and their sub-surface drainage characteristics on a site-specific basis ~~need to~~ should be removed from use and the manufacturer's installation instructions and DAPIA approval withdrawn.

- ~~FFF installation designs that assign design responsibilities to local regulatory authorities, such as assessing site drainage, water table depth, or soil frost-susceptibility are also not acceptable and need to be disapproved.~~

4. Recommendations for Installers

When installing a new home on a site that has conditions not covered in the manufacturer's installation manual or an engineered foundation plan, the special site conditions should be brought to the attention of the engineer or architect of record. If there is no engineer or architect of record, a licensed engineer or licensed architect should be retained to evaluate the conditions and then design a plan to install the home. Once this plan is finalized and sealed, it must be sent to the manufacturer and its DAPIA for approval per 24 CFR Part 3285.2(c)(1)(ii). ~~The plan should also be submitted to the Local Authority Having Jurisdiction (LAHJ) for approval if applicable.~~

- Installers should never install manufactured homes using FFF installation designs that rely exclusively on surface drainage as a means of frost protection.
- Installers should never initiate a FFF installation where the instructions require them to take on design responsibility of assessing soil frost-susceptibility and sub-surface drainage conditions without proper soil testing and analysis. Instead, installers should verify that appropriate soil testing and site assessment for use of a FFF design has been completed prior to initiating an installation. Refer to the next section for guidance.
- Prior to installation of an engineered system that is not included in the manufacturer's installation instructions, installers need to verify that the installation plan is stamped by an engineer or architect of record as well as approved by the manufacturer and its DAPIA. ~~In addition, an LAHJ may require that the plans be reviewed and sealed by an engineer or architect that is licensed in the state where the installation is occurring.~~

- ~~Installers should only use foundation~~ Frost-Free Foundation plans that have been approved ~~by the manufacturer and its DAPIA on or after~~ prior to January 1, 2009, ~~the effective date of HUD's installation program~~ should be reviewed and reapproved by the manufacturer and DAPIA.

5. Recommendations for Local Regulatory Officials and Inspectors:

   Regulatory officials and inspectors should verify compliance with 3285.312. ~~reject installation plans that require them to execute a design responsibility such as assessing the subsurface drainage, water table depth, or frost susceptibility of soils on a given site. Freezing climate installation plans that rely exclusively on surface drainage as a means of frost protection should not be approved by local regulatory officials.~~

   - Where a site is claimed to have non-frost-susceptible and "well-drained" soils as a basis for setting foundation pads or footings above the design frost depth, evidence should be required including soils tests and site sub-surface drainage and groundwater investigation by a qualified soils laboratory or soils engineering professional or geologist. Single site soil samples may be taken in HUD administered states by the installer or by qualified soil engineering professionals with the soil tests done by a qualified soils engineering laboratory or soils engineering professional.
   - Regulatory officials should assure that the approved installation plans and the manufacturer installation instructions are on site and available during inspections. If approved installation plans are not available and on site during inspections, the home cannot pass inspection.
   - In areas where the local frost depth is unavailable, local regulatory officials should consider permitting design frost depths to be determined in accordance with Table 1. Design Frost Depth for Footings and Figure 1. U.S. Air Freezing Map Index.

II. DESIGN OPTIONS, CHECKLISTS AND INSTALLATION BEST PRACTICES

OPTION #1: Checklist for Conventional Footings in Freezing Climates

HUD Code, 24 CFR Part 3285.312(b)(1)

- Obtain the local-design frost depth for footings from either one of the following:
    - The local authority having jurisdiction (LAHJ),
    - Use Table 1 with the site's Air-Freezing Index (AFI) from Figure 1[1], or
    - Consult with a registered professional engineer, registered architect, or registered geologist.
- When using Table 1 and Figure 1 to determine frost depth for footings, the depth of interior pier footings complying with footnote (b) of Table 1 may be taken as one-half the depth required in Table 1 ~~with approval of the LAHJ~~.
- Based on the required frost depth for footings, dig the footing to the frost depth.
- Check the soil bearing at depth of the footing with a torque probe, pocket penetrometer or other suitable testing device.
- Based on the tested soil bearing value, properly size the footing according to the manufacturer's installation instructions or use Table to 24 CFR Part 3285.312 in the HUD Code.
- Place footing pads and construct piers or supports at locations specified in accordance with the manufacturer's installation instructions.
- Backfill as needed and grade the site as required for drainage:
    - Crown the finish grade at the centerline of the foundation
    - Slope grade a minimum of ½-inch per foot for a minimum distance of 10 feet away from the home perimeter.

[1] A list of AFI values for various states and counties can be found in the 2015 International Residential Code (IRC), Table R403.3(2), published by the International Code Council, Inc., and used as the model building code for most states.

TABLE 1. DESIGN FROST DEPTH FOR FOOTINGS[a]

AIR-FREEZING INDEX [See Figure 4]	MINIMUM DEPTH[b] (inches)
≤ 50	3
250	9
350	12
500	16
1000	24
1500	32
2000	40
2500	45
3000	52
3500	57
4000	62
4250	65

a. These design frost depths are intended to be used for protection of building foundations against frost heave and are not applicable to site or street utilities or other non-building applications.

b. These design frost depths for footings shall be permitted to be halved for footings interior to the building perimeter and located within an enclosed space. Where skirting is used to enclose the space, the skirting shall be insulated to a minimum R-5 (1000 to 2500 AFI) or R-10 (>2500 AFI) and vents shall be capable of ~~automatically~~ closing at outdoor temperatures below 40 deg F (which necessitates use of a ground vapor barrier).

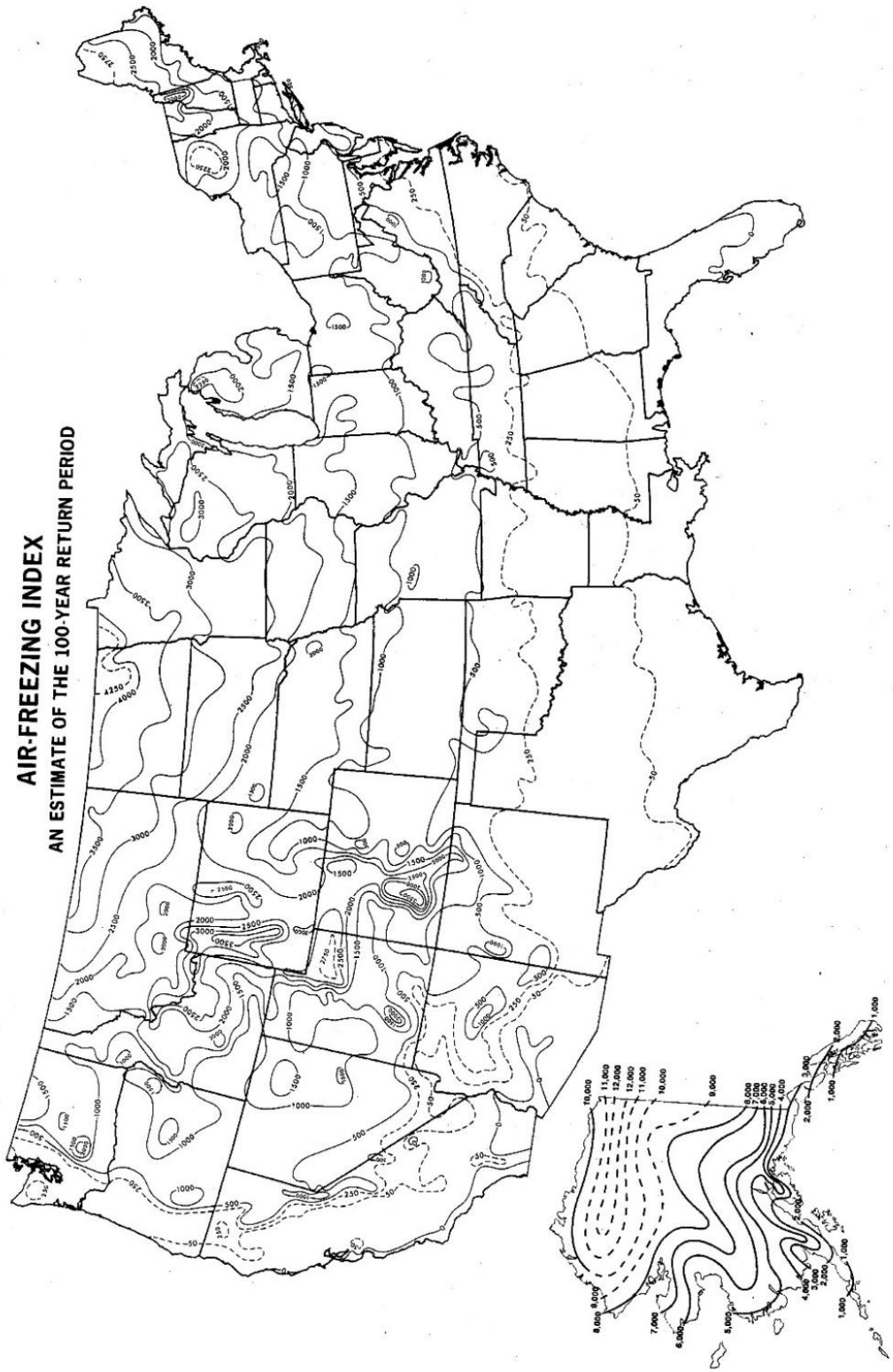

Figure 1. U.S. Air Freezing Index Map (based on Steurer, 1989 and Steurer and Crandell, 1995)

OPTION #2: Checklist for Monolithic Slab Systems in Freezing Climates ("Frost Free Footing")

HUD Code, 24CFR Part 3285.312(b)(2)

Pre-Installation Preparations:

- Before initiating installation, verify that the installation instructions are designed (sealed) by a registered professional engineer or registered architect, and approved by the manufacturer and its DAPIA. The LAHJ can require that the plans also be reviewed and sealed by an engineer or architect in the state where the installation is to occur.
- Verify that the LAHJ has accepted and approved the foundation and installation plan and all applicable permits are obtained. An approved installation design needs to comply with one of the following conformance options for the proposed installation design as permitted in HUD's Model Manufactured Home Installation Standards:
    - Complies with acceptable engineering practice or the ASCE 32 standard by use of non-frost-susceptible fills or existing soils (adequately tested and verified as defined in ASCE 32) and that such fills or soils extend to the local frost depth with provision for adequate surface drainage and, in addition, subgrade drainage where underlying soils are poorly drained and/or the water table is within two feet of the design frost depth.
    - Complies with acceptable engineering practice to prevent the effects of frost heave in a manner equivalent to the ASCE 32 standard. Equivalent alternative accepted engineering practices include: (1) the specification of an alternative criteria for testing the frost susceptibility of soils (e.g., different fines content allowances based on substantiating data), and (2) different frost depth determination based on thermal modeling of the climatic, soil, and foundation conditions

NOTE: Reliance solely on surface drainage to prevent frost heave without verification of non-frost-susceptible fill materials or existing non-frost susceptible soils to frost depth does not comply with the

SEI/ASCE 32 standard or HUD Code's allowance for "acceptable engineering practice to prevent the effects of frost heave."

- For designs that rely on well-drained sites and use of existing soils to frost depth that are non-frost susceptible, verify the following before initiating installation:
    - The non-frost-susceptible condition of existing soils above the frost depth (and below the base of the proposed slab) have been tested in accordance with ASTM D442 and determined to have a fines mass content of less than 6% passing a #200 sieve for the specific installation site or the development as a whole. A soils report should be provided by the engineer or soil lab of record for verification.
    - Alternatively, conduct such testing as follows:
        - Obtain a minimum of two soil samples per installation site (one at each end of the foundation area) and from any borrow materials on site used as fill. A materials report from a quarry may be used when material is supplied from a licensed quarry.
        - When conducting borings for soil samples, take a minimum of one pint (plastic bag full) of soil from depths of one foot and at the locally prescribed frost depth or as determined from Table 1, Design Frost Depth for Footings. Continue each boring to two feet below the locally-prescribed frost depth (as measured from the proposed finish grade) to determine if the water table is present.
        - Deliver or send the soil samples to a soils laboratory for particle size testing per ASTM D442.
        - If the soils laboratory report indicates greater than 6% fines by mass passing a #200 sieve then the soil at the site is frost susceptible and either footing to frost depth or one of the alternative foundation options (see Appendix) for frost susceptible soil conditions must be used.

- The water table condition of the site has been assessed by the engineer or architect of record and documentation provided of the water table being at least two feet below the local frost depth. Alternatively, make this determination using soil borings as described above.
- If the water table is higher than two feet below the local frost depth, a network of drainage pipes sloped to drain to daylight must be placed at the base of non-frost-susceptible fill (e.g., clean gravel or crush rock) placed to a depth equal to the local frost depth.
- Alternatively, a site specific foundation design can be prepared and sealed by a professional engineer or registered architect or geologist and approvedby the manufacturer and its DAPIA.
- Save documentation of all of the above and provide to the LAHJ for verification.

- For designs that rely on well-drained sites and use of fill materials to frost depth that are non-frost susceptible, verify the following before initiating installation:
  - The slab base and foundation fill materials are specified by the engineer or architect of record as non-frost susceptible such as clean gravel or crushed rock or other suitable material with no more than 6% fines by mass passing a #200 sieve per ASTM D442 test method. Non-frost susceptible subgrade materials are to be filled from the frost depth to the slab base for the entire extent of the slab plus any over dig.
  - The water table condition of the site has been assessed by the engineer or architect of record and documentation provided of the water table being at least two feet below the local frost depth. Alternatively, make this determination using soil borings as described above.
    - If the water table is higher than two feet below the local frost depth, a network of drainage pipe sloped to drain to daylight must be placed at the

base of non-frost-susceptible fill (e.g., clean gravel or crush rock) placed to a depth equal to the local frost depth.

- Save documentation of all of the above and provide to the LAHJ for verification.

Installation Phase:

- Excavate slab area to frost depth or only to the bottom of the slab's non-frost-susceptible base layer if existing soils have been determined to be non-frost susceptible down to frost depth during the pre-installation preparation phase (see above).
- Place foundation drains sloped to drain to daylight at the bottom of the non-frost-susceptible base or fill material layer.
- Place the non-frost-susceptible fill and base materials, compacting as required by the manufacturer's installation instructions and/or the engineer or architect of record. Do not initiate fill placement where compaction requirements and methods are not specified. Obtain compaction requirements, as needed, from the engineer or architect of record. The minimum requirement is 90% compaction per 24 CFR Part 3285.201 although the engineer or architect of record or LAHJ may require a higher compaction level based on the fill material used.
- Construct the reinforced monolithic slab in accordance with the manufacturer's installation instructions or according to the manufacturer and DAPIA approved plans.
- Backfill as needed and grade the site as required for drainage:
  - Slope grade a minimum of ½-inch per foot for a minimum distance of 10 feet away from the home perimeter.

NOTE: The above procedures also apply to designs where a monolithic slab is not used and pier footing pads are placed directly on non-frost-susceptible fill materials (e.g., clean gravel or crushed rock).

OPTION #3: Checklist for Frost Protected Shallow Foundations (Insulated Foundations).

HUD Code, 24 CFR Part 3285.312(b)(3)

Pre-Installation Preparations:

- Before initiating installation, verify that the installation instructions are designed (sealed) and certified by a registered professional engineer or registered architect, approved by the manufacturer and its DAPIA.
- Also, verify that the instructions include an approved installation design complying with one of the following basis for the proposed installation design, as permitted in the HUD Code:
    - Complies with acceptable engineering practice or the SEI/ASCE 32-01 standard by use of properly-specified insulation materials and sized in accordance with the local climate and located around the perimeter of the foundation (including insulated skirting with vents capable of closing at temperatures below 40 degrees) or the entire foundation pad is insulated where there is no skirting or the skirting is un-insulated or the skirting has non-closing vents. Non-frost-susceptible base materials are used at a minimum thickness required by acceptable engineering practice or SEI/ASCE 32, and insulation materials are protected against damage in accordance with acceptable engineering practice or SEI/ASCE 32.
    - Complies with acceptable engineering practice to prevent the effects of frost heave in a manner equivalent to the insulation provisions in the SEI/ASCE 32 standard. Equivalent alternative accepted engineering practices include: (1) the specification of an alternative insulation amounts based on dynamic thermal modeling of the climatic, soil, and foundation conditions specific to the site, and (2) alternative insulation materials or types with data substantiating long-term R-values in below-grade applications.

NOTE: Designs which place insulation materials in a discontinuous fashion, such that exposed slab edges or other types of thermal bridging occurs, do not meet the requirements of the SEI/ASCE 32 standard or

the HUD Code provisions that allow the use of "acceptable engineering practice to prevent the effects of frost heave."

- Obtain foundation insulation materials as specified in the installation instruction and verify the correct type is received. Commonly accepted insulation materials include Extruded Polystyrene (XPS) and Expanded Polystyrene (EPS) of various "types" in accordance with ASTM C578 and ASCE 32 standards.
- Insulation material conformance with the specified type should be verified by product labels or a certification from the insulation manufacturer. Materials commonly stocked in supply stores may not be the correct "type" even though it may be the correct "kind" (e.g., XPS or EPS).

NOTE: There is no need to determine the frost susceptibility of underlying soils to frost depth in the insulated foundation design approach when the provisions of ASCE 32 are satisfied.

Installation Phase:

- Excavate the foundation area to the correct shallow foundation depth as indicated in the manufacturer's installation instructions or by the engineer or architect of record (generally the foundation depth need not exceed 12" to 16" below finish grade).
- Place specified non-frost-susceptible base material and provide drainage pipes around the perimeter, at a minimum of 4 inches (within the base material layer) as required by the installation instructions. Pipes need to be run to day-light or have a mechanical means of draining the water (see detail in Appendix) .
- Sequence the foundation slab or pad construction and insulation placement in accordance with the design approach indicated on the manufacturer's installation instructions. Where sub-slab insulation is required, this will need to be placed before slab construction. Perimeter insulation may be placed after slab construction (see detail in Appendix).
- After construction of the slab and supports and placement of the home, construct the insulated skirting with automatically closing vents as required by the manufacturer's installation

instructions. Where the foundation slab is entirely insulated with horizontal below ground insulation (the design does not rely on perimeter insulation only), no skirting is required. (See detail in Appendix).

- Place wing insulation (extending outward horizontally underground from the perimeter of the foundation) as required by the installation instructions. Depending on the design approach and climate severity, wing insulation may or may not be required.
- Provide protection of any exposed exterior insulation or within 10 inches of the finish grade surface. (see detail in Appendix)
- Backfill as needed and grade the site as required for drainage:
    - Slope grade a minimum of ½-inch per foot for a minimum distance of 10 feet away from the home perimeter.

This Interpretative Bulletin is issued pursuant to 24 CFR 3285.2 and 3285.312(b) of HUD's Model Manufactured Home Installation Standards.

Date: _____

_____
Ed Golding
Principal Deputy Assistant Secretary for Housing

APPENDIX

MANUFACTURED HOMES IN FREEZING CLIMATES

An Assessment of Design and Installation Practices

For Manufactured Homes in Climates with Seasonally Frozen Ground

Prepared by: SEBA Professional Services, LLC

For

The U.S. Department of Housing and Urban Development

Office of Manufactured Housing Programs

Under Contract #DUIOOH-14-C-04