

# **Flood Standards Report of Activities as of November 1, 2017**



## **Florida Commission on Hurricane Loss Projection Methodology**

**FLORIDA COMMISSION ON HURRICANE  
LOSS PROJECTION METHODOLOGY**

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November 1, 2017

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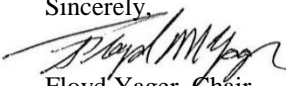
Dear Trustees:

As Chair of the Florida Commission on Hurricane Loss Projection Methodology (Commission), I am pleased to present to you the Flood Standards Report of Activities as of November 1, 2017. This report documents the Commission's work relating to the development and adoption of flood standards.

Section 627.0628, F.S., created the Commission as a panel of experts to be administratively housed in the State Board of Administration but requires the Commission to independently exercise its power and duties. The statute established a July 1, 2017, deadline for the Commission to "adopt actuarial methods, principles, standards, models, or output ranges for personal lines residential flood loss." Initial flood standards, principles, output ranges, and procedures were adopted on June 15 & 16, 2017. Revised standards and procedures were adopted on October 25, 2017 coinciding with the adoption of the 2017 hurricane standards and procedures.

If you have any questions or comments regarding the work of the Commission, please call me at (847) 402-4753.

Sincerely,



Floyd Yager, Chair

# Florida Commission on Hurricane Loss Projection Methodology

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# **I. INTRODUCTION**

# INTRODUCTION

## *Legislative Findings and Intent*

In 1995, the Florida Legislature enacted s. 627.0628, Florida Statutes (F.S.), creating the Florida Commission on Hurricane Loss Projection Methodology (Commission).<sup>1</sup> The Legislature specifically determined that “reliable projections of hurricane losses are necessary to assure that rates for residential insurance are neither excessive nor inadequate,” and that in recent years computer modeling has made it possible to improve on the accuracy of hurricane loss projections. The Legislature found that “it is the public policy of this state to encourage the use of the most sophisticated actuarial methods to ensure that consumers are charged lawful rates for residential property insurance coverage.”<sup>2</sup> The Legislature clearly supports and encourages the use of computer modeling as part of the ratemaking process.

In 2014, the Florida Legislature expanded the role of the Commission by passing CS/CS/CS/SB 542 creating s. 627.715, F.S., which allowed for authorized insurers in Florida to write flood insurance. Additionally, several existing statutes were amended including the statute creating the Commission, s. 627.0628, F.S., and the insurance rating law statutory section, s. 627.062, F.S., dealing with rate filings. The new legislation tasked the Commission with adopting “actuarial methods, principles, standards, models, or output ranges for personal lines residential flood loss no later than July 1, 2017.” The Commission started the process in 2014, and published Discussion Flood Standards as of December 1, 2015 which also provided for various types of feedback leading up to the July 1, 2017, statutory deadline for adopting flood standards. The Commission adopted principles, standards, and output ranges for personal lines residential flood loss in June 2017.

Where appropriate, this *Flood Standards Report of Activities* refers to hurricane and attempts to incorporate the references to hurricane in the context of the Commission’s duties, but the report does not contain any specific hurricane standards nor does it specifically address the process of reviewing hurricane models. The hurricane standards and process of reviewing hurricane models is published in the *2017 Hurricane Standards Report of Activities*. Hurricane models will be reviewed separately from flood models using their respective standards as adopted by the Commission. The adoption of flood standards and the acceptability process for flood models is accomplished in parallel with the Commission’s role regarding hurricane models.

## *The Role of the Commission*

Although the statutory section creating the Commission is in the Florida Insurance Code, the Commission is an independent body and is administratively housed in the State Board of Administration of Florida (SBA). The role of the Commission is limited to adopting findings relating to the accuracy or reliability of particular methods, principles, standards, models, or output ranges used to project hurricane losses, flood losses, and probable maximum loss calculations.

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<sup>1</sup> CS/HB 2619 (Ch. 95-276, Laws of Florida).

<sup>2</sup> Section 627.0628(1)(a), F.S.



Section 627.0628(3)(c), F.S., states that “to the extent feasible,” the SBA must “employ actuarial methods, principles, standards, models, or output ranges found by the Commission to be accurate or reliable” in formulating reimbursement premiums for the Florida Hurricane Catastrophe Fund (FHCF). Under s. 627.0628(3)(d), F.S., individual insurers are required to use the Commission’s findings in order to support or justify a rate filing with the Office of Insurance Regulation (OIR) as follows, “an insurer shall employ and may not modify or adjust actuarial methods, principles, standards, models, or output ranges found by the commission to be accurate or reliable in determining hurricane loss factors and probable maximum loss levels for use in a rate filing under s. 627.062. An insurer may employ a model in a rate filing until 120 days after the expiration of the commission’s acceptance of that model and may not modify or adjust models found by the commission to be accurate or reliable in determining probable maximum loss levels. This paragraph does not prohibit an insurer from using a straight average of model results or output ranges for the purposes of a rate filing for personal lines residential flood insurance coverage under s. 627.062.”

The Legislature addressed the definition of and the protection of trade secrets used in designing and constructing a hurricane model in 2005 and 2010, and for a flood model in 2014. In s. 627.0628(3)(g), F.S.,<sup>3</sup> the Legislature found that it is a public necessity to protect trade secrets “used in designing and constructing a hurricane or flood loss model,” and therefore, allowed an exemption from the public records law requirements and the public meetings law requirements. The goal of this legislation was to enable the Commission to have access to all aspects of hurricane and flood models and to encourage private companies to submit such models for review without concern that trade secrets will be disclosed. The exemption applies to “a trade secret, as defined in s. 812.081, F.S., which is used in designing and constructing a hurricane or flood loss model” being exempt pursuant to s. 627.0628(3)(g), F.S., from the requirements of the public records law s. 119.07(1), F.S., including s. 24(a), Article I of the State Constitution and the public meetings law s. 286.011, F.S., including s. 24(b), Article I of the State Constitution.

In 2010 the Legislature revised the scope of the public records exemption by providing that the definition of “trade secret” in the Uniform Trade Secrets Act would apply in place of the definition in s. 812.081, F.S.<sup>4</sup> The effect of this change was to make the public records exemption for trade secrets consistent with other similar exemptions.

The 2010 legislation also required that any portion of a closed Commission meeting be recorded. No portion of the closed meeting may be off the record. The bill also created a public records exemption for the recordings of closed meetings.

In 2014 the Legislature expanded the definition of and the protection of trade secrets to include those used in designing and constructing a “flood loss model.”<sup>5</sup>

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<sup>3</sup> Created in 2005 by HB 1939 (Ch. 2005-264, Laws of Florida).

<sup>4</sup> HB 7119 (Ch. 2010-90, Laws of Florida). The language in s. 812.081, F.S., defines trade secrets which relate to theft, robbery, and related crimes. Under s. 688.002(4), F.S., “trade secret” means information, including a formula, pattern, compilation, program, device, method, technique, or process that:

- (a) Derives independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable by proper means by, other persons who can obtain economic value from its disclosure or use; and
- (b) Is the subject of efforts that are reasonable under the circumstances to maintain its secrecy.

<sup>5</sup> SB 1262 (Ch. 2014-98, Laws of Florida).

## *The Work of the Commission*

The Commission was created as a panel of experts to evaluate computer models and other recently developed or improved actuarial methodologies for projecting hurricane losses, flood losses, and probable maximum loss levels so as “to resolve conflicts among actuarial professionals” and “to provide both immediate and continuing improvement in the sophistication of actuarial methods used to set rates.”<sup>6</sup>

Sections 627.0628(3)(a) and (b), F.S., define the role of the Commission:

The commission shall consider any actuarial methods, principles, standards, models, or output ranges that have the potential for improving the accuracy of or reliability of the hurricane loss projections used in residential property insurance rate filings and flood loss projections used in rate filings for personal lines residential flood insurance coverage. The commission shall, from time to time, adopt findings as to the accuracy or reliability of particular methods, principles, standards, models, or output ranges.

The commission shall consider any actuarial methods, principles, standards, or models that have the potential for improving the accuracy of or reliability of projecting probable maximum loss levels. The commission shall adopt findings as to the accuracy or reliability of particular methods, principles, standards, or models related to probable maximum loss calculations.

The statutory language is clear in that those methods or models that have the potential for improving the accuracy or reliability of hurricane loss projections, flood loss projections, and probable maximum loss levels are the ones to be considered by the Commission. “Improving” suggests that the methods or models should be an improvement over the then existing current methods or models used in the residential rate filing process prior to the Commission’s enactment.

In 2014, the Legislature revised s. 627.0628(3)(e), F.S., establishing a new deadline for the Commission to take action. No later than July 1, 2017, “the Commission shall adopt actuarial methods, principles, standards, models, or output ranges for personal lines residential flood loss.” To achieve the requirements of the new Florida Statutes mandate, the Commission, in 2014, created a Flood Standards Development Committee. The committee met monthly to develop a set of “discussion flood standards” which were published December 1, 2015. After receiving input during on-site modeling organization feedback visits and further refinement through committee meetings, the Commission adopted flood standards in June 2017 meeting the statutory deadline. The flood standards and procedures in this *Flood Standards Report of Activities* were adopted on June 15 & 16, 2017 and October 25, 2017. The Commission will adopt revisions to the flood standards in 2021.

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<sup>6</sup> Section 627.0628(1)(b), F.S.

## *The Mission Statement*

At the September 21, 1995, Commission meeting, the following mission statement was adopted:

The mission of the Florida Commission on Hurricane Loss Projection Methodology is to assess the efficacy of various methodologies which have the potential for improving the accuracy of projecting insured Florida losses resulting from hurricanes and to adopt findings regarding the accuracy or reliability of these methodologies for use in residential rate filings.

The mission statement closely tracks the statute and restates the critical aspects of the Commission's work. Minor revisions to the mission statement were adopted on November 30, 1995.

The mission statement was revised on September 15, 2009, to reflect the Commission's role in reviewing models for their ability for projecting probable maximum loss levels. Thus, the mission statement was modified, as follows:

The mission of the Florida Commission on Hurricane Loss Projection Methodology is to assess the effectiveness of various methodologies which have the potential for improving the accuracy of projecting insured Florida losses and probable maximum loss levels resulting from hurricanes and to adopt findings regarding the accuracy or reliability of these methodologies for use in residential rate filings and probable maximum loss calculations.

The mission statement was revised again on October 13, 2015, to reflect the Commission's role in reviewing models for their ability for projecting flood losses used in rate filings for personal lines residential flood insurance coverage. Thus, the mission statement was modified, as follows:

The mission of the Florida Commission on Hurricane Loss Projection Methodology is to assess the effectiveness of various methodologies which have the potential for improving the accuracy of projecting insured Florida losses and probable maximum loss levels resulting from hurricanes and floods and to adopt findings regarding the accuracy or reliability of these methodologies for use in residential rate filings (hurricane loss projections), personal lines residential rate filings (flood loss projections), and probable maximum loss calculations.

## **II. PRINCIPLES**

## PRINCIPLES

1. The mission of the Florida Commission on Hurricane Loss Projection Methodology is to assess the effectiveness of various methodologies which have the potential for improving the accuracy of projecting insured Florida losses and probable maximum loss levels resulting from hurricanes and floods and to adopt findings regarding the accuracy or reliability of these methodologies for use in residential rate filings (hurricane loss projections), personal lines residential rate filings (flood loss projections), and probable maximum loss calculations. *History-New 9/21/95, rev. 11/30/95, rev. 9/15/09, rev. 10/13/15*
2. The Commission shall recognize that a modeling organization may develop either a hurricane model, a flood model, or both. As a result, the Commission's adoption of standards and the review of each respective model shall be independent and separate of the other type of model. The acceptability or failure of one type of model shall not have an immediate impact on the acceptability or failure of another type of model from the same modeling organization. Although the review process is similar in context for all types of models, the Commission shall recognize the unique process applicable to a hurricane model review and the unique process applicable to a flood model review. Only one type of model shall be submitted at a time by a modeling organization for review for that type of model (hurricane or flood) except as provided for in the Acceptability Process of its most recent *Hurricane Standards Report of Activities* or *Flood Standards Report of Activities*. *History-New 6/16/17*
3. The Commission shall consider the costs and benefits associated with its review process, including costs and benefits to the State and its citizens, to the insurance industry, and to the modeling organizations. *History-New 8/18/06*
4. The general focus of the Commission shall be on those areas of modeling which produce the most variation in output results and have the most promise of improving the science of modeling. *History-New 8/18/06*
5. The Commission shall pursue and promote research opportunities from time to time when issues need resolution and such research would advance the science of modeling. *History-New 8/18/06*
6. All models or methods shall be theoretically sound. *History-New 9/21/95, rev. 8/18/06*
7. The Commission's review process shall be active and designed to test model output for reasonableness and to test model assumptions. *History-New 8/18/06*
8. Models or methods shall not be biased in a way that overstates or understates results. *History-New 9/21/95, rev. 8/18/06*
9. All sensitive components of models or methods shall be identified. *History-New 9/21/95, rev. 8/18/06*

10. The trade secret aspects of models or methods being reviewed by the Commission shall be protected. *History-New 11/30/95, rev. 5/20/96, rev. 9/14/05, rev. 8/18/06*
11. Commission members shall have sufficient information concerning model assumptions and factors used in model development, whether trade secret or not, to make a finding about a model's acceptability. *History-New 8/18/06*
12. The Commission's review process of models or methods shall not restrict competition in the catastrophe modeling industry or thwart innovation in that industry. *History-New 11/30/95, rev. 5/20/96, rev. 8/18/06*
13. The Commission shall consider how advances in science or technology shall be incorporated in its revision of standards, and, where and when appropriate, develop new standards or revise existing standards to reflect these advances. *History-New 8/18/06, rev. 9/16/09*
14. The Commission shall consider how statutory changes shall be incorporated in its revision of standards, and, where and when appropriate, develop new standards or revise existing standards to reflect these statutory changes. *History-New 8/18/06, rev. 9/16/09*
15. The Commission's review of models or methods for acceptability shall give priority to new standards and standards that have been modified. *History-New 8/18/06, rev. 9/16/09*
16. The output of models or methods shall be reasonable and the modeling organization shall demonstrate its reasonableness. *History-New 9/21/95, rev. 8/22/03, rev. 8/18/06*
17. All adoptions of findings and any other formal action taken by the Commission shall be made at a publicly-noticed meeting, by motion followed by a formal member by member roll call vote, all of which shall be transcribed by a court reporter, such transcription to be made a part of the official record of the proceedings of the Commission. The Commission shall not record a transcript for the portion of a Commission meeting where trade secrets used in the design and construction of the model are discussed. No official action or decision shall be made in a closed meeting. *History-New 11/30/95, rev. 8/22/03, rev. 9/14/05, rev. 8/18/06, rev. 9/15/09, rev. 10/13/15*
18. All findings adopted by the Commission are subject to revision at the discretion of the Commission. *History-New 11/30/95*
19. No model or method shall be determined to be acceptable by the Commission until it has been evaluated by the Commission in accordance with the process and procedures which the Commission considers appropriate for that model or method. *History-New 11/30/95, rev. 5/20/96, rev. 8/18/06*
20. The Commission's determination of acceptability of a specific model or method does not constitute determination of acceptability of other versions or variations of that model or method; however, the Commission shall attempt to accommodate routine updating of acceptable models or methods. *History-New 11/30/95, rev. 5/20/96, rev. 8/18/06*

- 21.** The Commission shall consider the educational needs of its members and from time to time implement educational programs that further Commission members' understanding of the science of modeling. *History-New 8/18/06*

### **III. COMMISSION STRUCTURE**



## COMMISSION STRUCTURE

### *Oversight*

The Commission was created, pursuant to s. 627.0628, F.S., “to **independently** exercise the powers and duties specified” in that statute. The Commission is administratively housed within the State Board of Administration of Florida (SBA), and as a cost of administration, the Florida Hurricane Catastrophe Fund (FHCF) provides travel reimbursement, expenses, and staff support. The SBA has no governing authority over the Commission; however, the SBA annually appoints one of the Commission members to serve as Chair, appoints one of the Commission members who is the actuary member of the FHCF Advisory Council, and has final approval authority over the Commission’s budget.

### *Membership and Required Expertise*

Section 627.0628(2)(b), F.S., requires that the Commission consist of twelve members with the following qualifications and expertise:

1. The Insurance Consumer Advocate;
2. The senior employee of the State Board of Administration responsible for operations of the Florida Hurricane Catastrophe Fund;
3. The Executive Director of the Citizens Property Insurance Corporation;
4. The Director of the Division of Emergency Management;
5. The actuary member of the Florida Hurricane Catastrophe Fund Advisory Council;
6. An employee of the Florida Department of Financial Services, Office of Insurance Regulation who is an actuary responsible for property insurance rate filings and who is appointed by the Director of the Office of Insurance Regulation;
7. Five members appointed by the Chief Financial Officer, as follows:
  - a. An actuary who is employed full time by a property and casualty insurer which was responsible for at least 1 percent of the aggregate statewide direct written premium for homeowner’s insurance in the calendar year preceding the member’s appointment to the Commission;
  - b. An expert in insurance finance who is a full time member of the faculty of the State University System and who has a background in actuarial science;
  - c. An expert in statistics who is a full time member of the faculty of the State University System and who has a background in insurance;
  - d. An expert in computer system design who is a full time member of the faculty of the State University System;
  - e. An expert in meteorology who is a full time member of the faculty of the State University System and who specializes in hurricanes;
8. A licensed professional structural engineer who is a full-time faculty member in the State University System and who has expertise in wind mitigation techniques. This appointment shall be made by the Governor.

The licensed professional structural engineer was added by virtue of CS/SB 1770, which was enacted and became law in 2013. This legislation amended the requirements in s. 627.0628(2)(b), F.S., and enhanced the expertise immediately available to the Commission by increasing the membership to provide for the appointment of an additional member with special qualifications and attributes.

### ***Terms of Members***

The Insurance Consumer Advocate, Chief Operating Officer of the FHCF, Executive Director of Citizens Property Insurance Corporation, Director of the Division of Emergency Management, and the actuary member of the FHCF Advisory Council shall serve as a Commission member for as long as the individual holds the position listed.

The member appointed by the Director of the Office of Insurance Regulation shall serve until the end of the term of office of the Director who appointed him or her, unless removed earlier by the Director for cause. The five members appointed by the Chief Financial Officer shall serve until the end of the Chief Financial Officer's term of office, unless the Chief Financial Officer releases them earlier for cause (s. 627.0628(2)(c), F.S.).

### ***Officers***

**Officers:** The officers of the Commission shall be a Chair and a Vice Chair.

**Selection:** Annually, the SBA shall appoint one of the Commission members to serve as the Chair (s. 627.0628(2)(d), F.S.). After the Chair is appointed, the Commission shall, by majority roll call vote, select a Vice Chair.

Duties of the Chair and Vice Chair:

A. The **CHAIR** shall:

1. Preside at all meetings except during committee meetings where other Commission members are designated to act as committee chairs;
2. Conduct a roll call of members at each meeting;
3. Ensure all procedures established by the Commission are followed;
4. Designate one of the Commission members to act in the role of Chair at any meeting where the Chair and Vice Chair cannot attend;
5. Assign members to serve on Committees and appoint Committee Chairs.

B. The **VICE CHAIR** shall:

In the absence or request of the Chair, preside at Commission meetings and have the duties, powers, and prerogatives of the Chair.

## ***Member Duties and Responsibilities***

The purpose of the Commission is to adopt findings relating to the accuracy or reliability of particular methods, principles, standards, models, or output ranges used to project hurricane losses, flood losses, and probable maximum loss levels. This work is extremely technical and requires specialized expertise. Therefore, the Legislature, in s. 627.0628, F.S., limited membership on the Commission to a careful balance of individuals meeting specific employment, education, and expertise requirements. Thus, each member's contribution cannot be underestimated and each member should make every effort to attend all meetings, in person or by telephone, and be prepared to actively participate. In particular, each member has the following responsibilities and duties:

1. Fully prepare for each Commission meeting and committee meeting where the member is designated as a committee member;
2. Attend and participate at each meeting in person or by telephone;
3. Give notice to SBA staff, in advance if possible, when a member must leave a meeting early or cannot attend at all;
4. Abide by the requirements of Florida's Sunshine Law. A summary of the requirements of the law is outlined in this section;
5. Since it is the SBA's responsibility to fund all Commission activities, all communications related directly to Commission activities should be directed to SBA staff who are responsible for administrative support of the Commission. Directly related to Commission activities, the following communications should not take place:
  - a. Commission members should not contact Professional Team members or modeling organizations directly, except in conjunction with communications during the on-site visit of a Commission member,
  - b. Modeling organizations should not contact Commission members or Professional Team members directly,
  - c. Professional Team members should not contact Commission members or modeling organizations directly.

A Committee Chair or the Commission Chair may, in conjunction with SBA staff, contact a modeling organization or outside party for the purpose of clarifying or refining input or suggested revisions to the *Hurricane Standards Report of Activities* and *Flood Standards Report of Activities*;

6. Give notice of "special" conflicts of interest where the member, the member's relative, business associate, or any principal by whom he or she is retained stands to reap a direct financial benefit or suffer a potential loss from the issue being voted on. Financial benefit which is speculative, uncertain, or subject to many contingencies is not a special benefit that would preclude a member from voting. See Attorney General's Opinion 96-63 (September 4, 1996) and Commission on Ethics Opinion 94-18 (April 21, 1994). If a special conflict of interest arises and the special conflict is apparent prior to the meeting, the member must give advance notice to SBA staff. If the special conflict becomes apparent during a meeting, the member should immediately inform the Chair or Vice Chair. The conflicted member shall recuse himself or herself from any activity of the Commission in the area of the special conflict;
7. Commission members are expected to meet the highest standards of ethical behavior. Commission members may be subject to the Code of Ethics for Public Officers and Employees, ss. 112.311-112.326, F.S., including, but not limited to, s. 112.313(7), F.S.,

relating to conflicting employment or contractual relationships; s. 112.3143, F.S., relating to voting conflicts; and s. 112.3145, F.S., relating to disclosure of financial interests. It is understood, given the nature of the expertise held by Commission members, that general conflicts of interest are inherent. The conflicts of interest which are addressed in s. 112.3143, F.S., and the conflicts which would preclude a Commission member from voting on an issue are only those conflicts which are special. Additionally, Commission members should be mindful of situations which may arise that have the potential to give an unfair advantage to any modeling organization or result in a particular Commission member having unique information and being in a position to exercise greater influence than other Commission members.

### ***New Member Orientation and Continuing Education of Existing Members***

As part of the SBA's administrative support of the Commission, the SBA staff is responsible for new member orientation. The SBA staff may also design programs for continuing education at the request of the Commission. The cost of such programs is subject to approval through the state budgetary process as outlined under ***Budget Consideration***.

### ***On-Site Visits to the Modeling Organization by Commission Members***

The 2005 and 2014 legislative changes to s. 627.0628, F.S., specified that the goal was to enable the Commission to have access to all aspects of hurricane and flood models. Since both a public records exemption and a public meetings exemption are provided in the law, Commission members are able to review trade secrets in much more depth and able to inquire into the underlying nature of the hurricane and flood models without exposing such trade secret information to modeling organization competitors.

Although reliance on the expertise of the Professional Team continues to be necessary in the Commission's review process, it is anticipated that Commission members may request to have greater access to the hurricane and flood models by going to the modeling organization's location for an on-site visit.

The procedure for on-site visits and additional verification review visits requires that the Commission member obtain approval from the Commission and obtain authorization from the SBA for reimbursable travel (due to budget considerations). The deadline for requesting on-site visits, which includes any additional verification review visits, is seven days prior to the Commission meeting to review modeling organization hurricane model or flood model submissions in order for the requests to be placed on the meeting agenda.

Travel arrangements are coordinated through SBA staff and in accordance with the SBA's travel policy. Commission members are responsible for their own transportation arrangements to/from and during the on-site visits.

The Commission member's on-site visit shall take place at the same time as the Professional Team's on-site or additional verification review. The Commission member's presence shall not disrupt the activities or work of the Professional Team. This procedure will limit Commission member(s) participation to that of an observer during the Professional Team activities and their review process. The Commission member may ask questions of the modeling organization in meetings separate from those of the Professional Team. Given time and resource constraints, all reasonable attempts will be made to schedule meetings between the modeling organization and Commission members, and the modeling organization should make its best effort to be available to answer the Commission member's questions.

If any notes are taken by a Commission member, the notes identified by the modeling organization as trade secret shall be placed in a sealed envelope marked "Confidential" with the date, time, and Commission member's signature across the seal. The notes shall be kept by the modeling organization and returned to the Commission member during the closed meeting to discuss trade secrets. At the conclusion of the closed meeting, all notes shall be returned to the modeling organization.

It should also be noted that the job of the Professional Team while on-site is to review the hurricane or flood model rather than to educate Commission members. The education of Commission members by the Professional Team is better accomplished in other settings.

Commission members shall refrain from discussing the hurricane or flood model among themselves while on-site and shall be mindful of the requirements of the public meeting laws of Florida. Since Professional Team members have signed contracts with the SBA that contain a confidentiality clause accepted by each modeling organization and are prohibited from discussing such proprietary information, Commission members cannot be included in any activities, meetings, or deliberations of the Professional Team.

**Trade Secret Documents for Review On-Site by Commission Members:** The Professional Team reviews the Audit sections of the *Hurricane Standards Report of Activities* and the *Flood Standards Report of Activities* while on-site, and a Commission member may have additional questions or prefer a more in-depth discussion about a particular audit requirement. In order for the modeling organization to have the necessary personnel and documents available, Commission member(s) shall identify the items from the Audit section of the *Hurricane Standards Report of Activities* or from the Audit section of the *Flood Standards Report of Activities* that they are particularly interested in reviewing on-site. Each Commission member may create a prioritized list of items that should be provided to SBA staff no later than the Commission meeting to review modeling organization hurricane model or flood model submissions. The list will be provided to the modeling organization with the Professional Team pre-visit letter, in preparation for the member's on-site visit.

All items included in the Audit sections are of equal importance since all are required for verification of the hurricane and flood standards. Because the time needed to review the different audit requirements will vary, Commission members should prioritize the items they request to review based upon their expertise and interest. Due to time constraints, it will be the responsibility of the member(s) to allocate their time accordingly while on-site.

## ***Documents Containing Trade Secrets Used in the Design and Construction of Hurricane and Flood Models***

**Material Containing Potential Hurricane or Flood Model Trade Secrets to be Visually Displayed or Discussed during Closed Meetings (Trade Secret Items):** The Commission may develop a list of information, documents, and presentation materials that contain potential trade secrets used in the design or construction of the hurricane or flood model that the Commission wants to review during the closed portion of the Commission meeting to review hurricane or flood models for acceptability in addition to the trade secret items identified in the *Hurricane Standards Report of Activities* and the *Flood Standards Report of Activities*.

The trade secret material shown to the Commission shall be under the control of the modeling organization. This information, by law, shall be confidential and exempt from the State's public records requirements.

## ***Closed Meetings for the Purpose of Discussing Trade Secrets Used in the Design and Construction of Hurricane or Flood Models***

There is an exemption from public meeting requirements for those portions of a Commission meeting where trade secrets, used in the design and construction of hurricane or flood models, are discussed. The closed portion of a Commission meeting where trade secrets are reviewed and discussed will be held prior to the public portion of the Commission meeting to review hurricane or flood models for acceptability. Voting regarding the acceptability of a hurricane or flood model shall only take place during the public portion of the meeting. During any closed meeting, Commission members shall confine their discussions to trade secrets related to that particular hurricane or flood model under consideration. Discussions other than those involving trade secrets shall take place during the public portion of the meeting. Only public information that is absolutely essential to the understanding of the trade secret information may be provided along with the trade secret information during the closed meeting. Any such public information discussed must be discussed during the public portion of the meeting to ensure full access of the public to that information.

In accordance with s. 627.0628(3)(g), F.S., the closed portion of a Commission meeting shall be recorded electronically as per SBA policies and procedures. The recording is exempt from s. 119.07(1), F.S., and s. 24(a), Article 1 of the State Constitution.

**Attendees:** The only authorized attendees of the closed portion of the Commission meeting to review hurricane or flood models for acceptability shall include Commission members, Commission staff, Professional Team members, and modeling organization designated personnel, staff, and consultants.

**Role of Professional Team:** The discussion of trade secrets may involve verbal explanations, review of documents, and various types of demonstrations. Although the Professional Team will be present during the discussion of trade secrets, they should be viewed by the Commission members as a resource to confirm that the information being provided is consistent with the information provided on-site. Questions related to modeling organization trade secrets shall be addressed directly to the modeling organization rather than to the Professional Team members.

**Room Requirements:** Before the closed portion of the Commission meeting to review hurricane or flood models for acceptability begins, the room shall be cleared of all unauthorized persons and all their belongings. No briefcases, cellular phones, laptops, or other electronic devices shall be accessible to the authorized attendees during the closed meeting other than equipment needed by the modeling organization and equipment required by the Commission to accommodate Commission members.

All telephone lines and all microphones shall be checked to ensure that discussions cannot be heard, relayed, or recorded beyond the confines of the room. Personnel outside of the meeting room shall be asked to move to a distance where discussions cannot be inadvertently overheard or visual presentations seen. No telephone calls shall be made or received from the meeting room during the discussions of trade secrets other than those needed to meet the needs of the modeling organization. Authorized attendees needing to make or receive telephone calls shall be required to leave the meeting room to handle such communications. Any notes taken by authorized attendees, other than the modeling organization, shall be collected and given to the modeling organization at the conclusion of the closed meeting and prior to anyone leaving the meeting room. During the closed meeting, internet access may be available where modeling organizations may choose to provide direct access to the model by electronic means to help answer questions of Commission members.

**Teleconference:** Due to security reasons, a teleconference call-in number shall not be available to authorized attendees. If requested by the modeling organization, Commission staff will contact, from the meeting room, additional modeling organization personnel to allow their participation by phone.

**Breaks:** If a break is taken during a closed meeting, authorized attendees shall not discuss any of the proceedings from the time the meeting doors are open until they are closed following the conclusion of the break. No notes or other recorded information shall be taken out of the meeting room during a break. Other than authorized attendees, no one shall be allowed to enter the meeting room during a break with the exception of building maintenance personnel, food or beverage service personnel, or electronic technicians needed to provide services for the meeting room.

**Transcripts:** The Commission will not record a transcript for the closed portion of a Commission meeting.

**Quorum Requirements:** A quorum of Commission members is not required to conduct the closed portion of the Commission meeting.

**Additional Closed Meetings:** Once the initial closed portion of a Commission meeting has concluded, the public portion of the meeting shall begin. Upon a motion and a second and a majority vote, the Commission may decide to go back into a closed meeting. If such a decision is made by the Commission, all meeting security requirements previously outlined shall apply.

## *Commission Meetings*

**Quorum:** A majority of the twelve Commission members (i.e., seven members) is required to constitute a quorum. A quorum is the number of members necessary to transact the official business of the Commission. “Presence” shall be defined as either a physical presence or as participation by any other means that allows the Commission member to communicate simultaneously with those members who are present.

**Voting Abstentions based on Conflict:** For the purpose of determining whether there is a quorum, if a member abstains from voting based on a special conflict of interest (as defined under *Member Duties and Responsibilities*), that member would still be deemed present for purposes of the quorum requirement (Attorney General’s Opinion 75-244; August 29, 1975).

**Temporary Absence:** “If a member in attendance at a meeting is called away and is unable to return to the meeting, the transcript should reflect the point at which ... [the member] left and - if the remaining members constitute a quorum - the meeting should continue.” If, however, the member is only temporarily absent, and this member is needed to constitute a quorum, the “appropriate procedure would be to recess the meeting until the member can return or, at least, to postpone a vote on any matter before the body until ... [the member’s] return” (Attorney General’s Opinion 74-289; September 20, 1974).

**Meeting Notices:** Written notice of a meeting of the Commission shall be provided to each member as soon as possible, and at a minimum, except in the event of an emergency meeting, at least seven days prior to the date scheduled. Section 286.011, F.S., requires public meetings to be noticed, and the notice must contain a time certain, a date, and the location of the meeting. If available, an agenda should be provided. If no agenda is available, it is sufficient if the notice summarizes the subject matter to be covered in the public meeting.

**Public Access:** Any member of the public shall have access to all Commission meetings that do not involve the discussion of trade secrets used in designing and constructing hurricane or flood models. That portion of a Commission meeting where a trade secret is addressed is confidential and exempt pursuant to s. 627.0628(3)(g)2, F.S., and thus will not be open to the public.

**Agendas:** Agendas listing topics planned for discussion shall be furnished to each member prior to the meeting. The agenda is to be used merely as a guide and topics not listed may be raised and discussed and the members may choose not to address an issue or topic listed on the agenda.

**Location:** Meetings shall be in Tallahassee, Florida, unless special circumstances arise.

**Recording:** The SBA staff shall be responsible for ensuring that all Commission meetings are recorded. A transcribed record shall be taken for all public portions of Commission meetings and an electronic recording shall be taken for all closed portions of Commission meetings. Commission meeting records shall be maintained by SBA staff in accordance with SBA policies and procedures. The Commission will not record a transcript for any closed portion of a Commission meeting.



**Voting Requirement:** Except in the case of a special conflict of interest (as defined under *Member Duties and Responsibilities*), no Commission member who is present at any meeting at which an official decision or act is to be taken or adopted by the Commission may abstain from voting (s. 286.012, F.S.).

**Designation of an Acting Chair:** Depending on the circumstances, the Chair or Vice Chair may temporarily appoint any member to act as Chair in those situations where the physical presence of a Chair is desirable to facilitate conducting the meeting.

**Purpose and Conduct of Meetings:** The Commission holds six types of meetings:

1. Committee meetings designed to review and revise the hurricane and flood standards, disclosures, audit requirements, forms, acceptability process, and other sections of the *Hurricane Standards Report of Activities* and the *Flood Standards Report of Activities*,
2. Commission meetings to adopt revisions to the hurricane and flood standards, disclosures, audit requirements, forms, acceptability process, and other sections of the *Hurricane Standards Report of Activities* and the *Flood Standards Report of Activities*,
3. Commission meetings to review hurricane or flood model submissions,
4. Commission meetings to review hurricane or flood models for acceptability,
5. Commission meetings to consider an appeal by a modeling organization if a hurricane or flood model is not found acceptable by the Commission, and
6. Planning workshops for the purpose of discussing, studying, and educating Commission members on scientific advances and new developments in the fields of meteorology, hydrology, hydraulics, engineering, actuarial science, statistics, and computer/information science. The discussions from the planning workshops may be used in planning for future hurricane and flood standards, disclosures, audit requirements, and forms.

The meetings to review hurricane or flood models for acceptability may involve the discussion of modeling organization trade secrets. The Commission shall conduct the portion of a meeting where trade secrets used in the design and construction of the hurricane or flood model are discussed as a closed meeting. Each type of meeting is discussed below.

### ***Committee Meetings***

Committee meetings are for the purpose of discussing issues, developing hurricane and flood standards, completing necessary groundwork, and reaching a consensus among those present so when the Commission meets later to formally adopt the hurricane and flood standards, the *Hurricane Standards Report of Activities*, and the *Flood Standards Report of Activities*, most of the issues can be easily resolved with less detail and finalizing work required. Committee meetings provide for an informal workshop environment where Commission members, Professional Team members, SBA staff, modeling organizations, insurers, regulators, and the general public are encouraged to participate and provide input. A working draft of proposed revisions to the hurricane and flood standards, disclosures, audit requirements, forms, acceptability process, and other portions of the *Hurricane Standards Report of Activities* and the *Flood Standards Report of Activities* is created. A public notice is required, but it is not necessary that a quorum be present since all official business requiring a vote will be conducted at Commission meetings.

Committee meetings are also for the purpose of reviewing, determining the scope, and establishing priorities for any ideas, issues, and concepts new or previously presented at Commission meetings, Committee meetings, or workshops. The Committee may make a recommendation to the Commission on those that could be subjects for current consideration or for future inquiries and investigation.

The role of the Chair of a committee is to present the draft of proposed hurricane or flood standards and other relevant documents with the aid of the Professional Team and SBA staff. The role of the other committee members is to thoroughly review the proposed draft and provide input and ideas at the committee meetings. Committee members have the responsibility of preparing in advance and becoming familiar with all the relevant issues. Such members have the responsibility of reading documents, raising questions, forming opinions, and participating in discussions. The role of the other Commission members is to participate, at their option, in all or various committee meetings. In this manner the difficult work will be spread among Commission members and specific expertise will be utilized when reviewing and revising hurricane and flood standards. It is beneficial for each Commission member to be fully prepared to participate as an active committee member and provide quality input and discussion at the committee stage.

Committee meetings are not Commission meetings. Due to quorum requirements, no formal voting shall take place at committee meetings, but a consensus among committee members and others participating is desirable. The Committee Chair is expected to report issues and bring work products to the Commission at properly scheduled and noticed Commission meetings. It is possible for a committee to meet with one Commission member (the Chair of the committee) and other interested parties (non-Commission members), but such committee meetings shall be publicly noticed and approved by the Commission Chair. The committee meeting idea works best when Commission members guide the committee meetings and there is broad participation by the public, modeling organizations, regulators, or other interested parties. Although committee meetings can be held with a substantial number of Commission members present, care should be taken to include the public and all interested parties to gain maximum participation and input. Committee Chairs should regularly call upon and solicit input from any and all interested parties present.

The recommended way to conduct a committee meeting for hurricane and flood standards is as follows:

1. Standard
  - a. Each standard should be taken in order and read in its entirety or presented visually to the members.
  - b. The Committee Chair asks if the standard is located in the appropriate grouping of standards or if it should be moved to a more appropriate section.
  - c. The Committee Chair asks if the standard is still relevant, whether it should be eliminated, or if modifications should be made. If modifications are suggested, the Chair should ask for proposed wording, if anything needs to be added, or if anything needs to be deleted in the standard.
  - d. Any proposed changes to the standard are then read and explained.
  - e. The Committee Chair next asks if there are any objections to the proposed changes and if any further changes are needed.

- f. The Committee Chair asks whether there are wording issues associated with the standard, are there any ambiguities, or are there ways to further clarify the standard by better drafting.
2. Purpose
  - a. The Committee Chair reads or visually presents the purpose of the standard and asks if the purpose is clear and if any changes are needed.
  - b. The Committee Chair asks if there are any objections or comments regarding the wording in the Purpose section.
  - c. The Committee Chair asks if there are any wording or drafting issues associated with the purpose.
3. Disclosures
  - a. The Committee Chair reads or visually presents each disclosure and asks if the disclosure is relevant and located with the appropriate standard.
  - b. The Committee Chair asks whether any additions, deletions, or other proposed changes are needed to the disclosures.
  - c. The Committee Chair asks if there are any objections to the proposed changes and if any further changes are needed.
  - d. The Committee Chair asks whether there are wording issues or additional instructions that need to be addressed to clarify the disclosure requirements.
4. Audit
  - a. The Committee Chair reads or visually presents the audit requirements and asks if it is clear and will be sufficient to help verify if the modeling organization has met the standard.
  - b. The Committee Chair asks whether any additions, deletions, or other proposed changes are needed to the audit requirements.
  - c. The Committee Chair asks if there are any objections to the proposed changes and if any further changes are needed.
  - d. The Committee Chair asks whether there are wording issues or additional instructions that need to be addressed to clarify the audit requirements.
5. Forms
  - a. The Committee Chair asks whether the forms are appropriate, relevant, and located in the appropriate grouping of standards.
  - b. The Committee Chair asks if there are any proposed changes suggested for the forms and if additional instructions are needed.
  - c. The Committee Chair asks if there are any objections to the proposed changes or if additional wording changes are needed for clarification.
6. Trade Secret Items
 

The committee will identify trade secret information, documents, and presentation materials that contain potential trade secrets used in the design or construction of the hurricane or flood models that the Commission wants the modeling organization to visually display or discuss during the closed portion of a Commission meeting to review hurricane or flood models for acceptability.
7. Consideration of ideas, issues, concepts, inquiries, and investigations
 

The committee will discuss, evaluate, and prioritize any ideas, issues, concepts, inquiries, and investigations presented at prior Commission meetings, committee meetings, or workshops. The committee will consider the associated costs and time constraints.

The meeting of the Acceptability Process Committee will proceed differently, but will follow a similar logical pattern as described above. The Acceptability Process Committee will start by reviewing the “Process for Determining the Acceptability of a Computer Simulation Hurricane Model,” or the “Process for Determining the Acceptability of a Computer Simulation Flood Model.” All proposed revisions will be discussed and any modifications will be considered. Comments will be solicited from those participating. Finally, any wording or formatting issues will be discussed.

Following the discussion of the acceptability process, the Acceptability Process Committee will take up other various sections of the *Hurricane Standards Report of Activities* or the *Flood Standards Report of Activities* by considering their appropriateness and relevancy, proposed revisions and any modifications, and wording or formatting issues.

As consensus is built and revisions are agreed to, the SBA staff in conjunction with the Professional Team will note the revisions and modifications and produce the draft documents that will be distributed in advance of the Commission meetings that will be held for the purpose of adopting the hurricane and flood standards and finalizing the *Hurricane Standards Report of Activities* for the next odd-numbered year and the *Flood Standards Report of Activities* every four years.

### ***Commission Meetings to Adopt Hurricane and Flood Standards***

The Chair of the Commission will open the meeting and ask each Committee Chair, who presided over the revisions to the hurricane and flood standards, to comment as to the purpose of each hurricane and flood standard and any suggested revisions by the committee under each hurricane and flood standard. This will not only include the hurricane and flood standard, but the purpose, the disclosures, the audit requirements, and the forms. The Committee Chair along with the Professional Team and SBA staff will discuss and comment on revisions to the hurricane and flood standards. The Commission members will ask questions and offer further suggestions if necessary and appropriate. The Chair may also ask for comments from others in attendance including modeling organizations, regulators, insurers, or the general public.

Once the discussion is concluded, the Committee Chair should make a motion that the Commission adopt the hurricane or flood standard along with the suggested revisions including those associated with the purpose section, the disclosures, the audit requirements, and the forms. Another committee member should second the motion. The Commission Chair will then ask if there is any further discussion. The Commission Chair will recognize Commission members for final comments or questions. Once the discussion is completed, the Commission Chair will ask for a roll call vote. Each hurricane and flood standard (including its accompanying purpose section, disclosures, audit requirements, and forms) shall be voted on separately.

The “Process for Determining the Acceptability of a Computer Simulation Hurricane Model” and the “Process for Determining the Acceptability of a Computer Simulation Flood Model” will each be voted on separately. The Commission Chair will ask the Chair of the Acceptability Process Committee to explain the revisions to the acceptability process. Once this is completed and comments are made by the Professional Team and SBA staff, the Committee Chair should

make a motion that the Commission adopt the acceptability process as amended. Another Acceptability Process Committee member should second the motion. The Commission Chair will ask if there is any further discussion. After recognizing Commission members for discussion, the Commission Chair will ask for a roll call vote.

The final items to be voted on by the Commission include the remaining sections of the *Hurricane Standards Report of Activities* and the *Flood Standards Report of Activities*. If any of these sections do not change, they can be combined and adopted with one roll call vote. The

Acceptability Process Committee will be responsible for these recommendations. The Committee Chair will discuss any revisions and modifications and should make a motion to approve each section separately. Another Acceptability Process Committee member should second the motion. The Commission Chair will recognize Commission members for discussion and questions, and then will ask for a roll call vote.

As a final consideration, the Commission Chair should consider whether it is appropriate to authorize the SBA staff to make any needed editorial changes consistent with the adopted *Hurricane Standards Report of Activities* and the *Flood Standards Report of Activities*. This would be done by a roll call vote after a Commission member makes a motion that is seconded and after discussion.

Once all voting necessary to finalize the *Hurricane Standards Report of Activities* and the *Flood Standards Report of Activities* is completed, the Commission may take up other business or may adjourn.

### ***Commission Meetings to Review Modeling Organization Hurricane or Flood Model Submissions***

The purpose of the meeting to review modeling organization hurricane or flood model submissions is to identify any “deficiencies” in the hurricane or flood model submissions, to create a list of “issues” to be addressed by each modeling organization, and to determine for a hurricane model submission whether an “existing” modeling organization is required to submit Form S-6, Hypothetical Events for Sensitivity and Uncertainty Analysis, prior to the Professional Team on-site review.

Modeling organization hurricane or flood model submissions shall be received by the applicable November 1 deadline. The hurricane or flood model submissions will have been distributed to each Commission member and the Professional Team for their review. The SBA staff will work with the Professional Team to identify any deficiencies or issues. Prior to the meeting, the Commission Chair working with SBA staff and the Professional Team may request that the modeling organization meet with the Commission (in person or by conference call) or provide additional information to clarify the hurricane or flood model submission.

**Deficiency:** A deficiency is defined as a lack of required documentation. A list of deficiencies shall be created if the hurricane or flood model submission is incomplete, unclear, or non-responsive. Failure to adequately provide a required written response or the necessary public documentation expected by the Commission in the hurricane or flood model submission shall

result in a deficiency. If necessary, the Commission will attempt to further clarify its expectations by providing additional comments or instructions with the deficiency so that the modeling organization is fully aware of what is expected and will have a reasonable opportunity to correct the deficiency. The Commission shall determine the appropriate time frame for correcting deficiencies. Failure to correct the deficiency within the time frame specified shall result in the termination of the review process. The Commission Chair has the discretion to extend the time frame for a modeling organization correcting deficiencies if unusual circumstances are involved.

**Issue:** Issues are related to the operation and theoretical soundness of the hurricane or flood model. Issues should not require a modeling organization to submit additional public documentation that is not required of all modeling organizations. Issues shall be addressed by the modeling organization with the Professional Team during the on-site review as well as with the Commission when the modeling organization presents the hurricane or flood model to the Commission for acceptability. Should the nature of an issue be such that the Commission feels public documentation is needed, then the documentation shall be added to the disclosure requirements and required of all modeling organizations. Otherwise, some modeling organizations might be put in an awkward position and vulnerable to making more information about their hurricane or flood model public than other modeling organizations thus resulting in a competitive disadvantage. [See **Principle #12:** *The Commission's review process of models or methods shall not restrict competition in the catastrophe modeling industry or thwart innovation in that industry.*]

In conducting the meeting to review the modeling organization hurricane or flood model submissions, the Commission Chair will take up one modeling organization hurricane or flood model submission at a time as indicated on the agenda for the meeting. The Commission Chair will take up each hurricane or flood standard grouping and consider all the responses provided under the hurricane or flood standard including the modeling organization's response to compliance with the hurricane or flood standard, the information provided in the disclosures, any response provided to the audit requirements, and the completeness of the forms.

The first point of discussion will relate to hurricane or flood model submission deficiencies. The SBA staff working with the Professional Team will have provided a report to the Commission members regarding deficiencies that have been identified and that need to be corrected. The Commission shall review those deficiencies and add, delete, or modify the list as appropriate. Following a discussion of the deficiencies, the Commission will next discuss the issues identified under each grouping of hurricane or flood standards. The SBA staff working with the Professional Team will have provided the Commission members with a list of issues prior to the meeting. The Commission shall review those issues associated with each grouping of hurricane or flood standards and add, delete, or modify the list as appropriate. For hurricane model submissions only, a third point of discussion will relate to the requirement of Form S-6, Hypothetical Events for Sensitivity and Uncertainty Analysis, for an existing modeling organization. The SBA staff working with the Professional Team will have provided, prior to the meeting, a recommendation to the Commission for requiring a completed Form S-6, Hypothetical Events for Sensitivity and Uncertainty Analysis. The Commission shall determine, based on the recommendation and hurricane model revisions disclosed in the hurricane model submission, whether an existing modeling organization shall be required to provide Form S-6, Hypothetical Events for Sensitivity and Uncertainty Analysis.

Upon review of each grouping of hurricane or flood standards, the Commission Chair will ask if there is a motion and a second to continue the review process subject to the correction of the deficiencies and to approve the list of issues to be addressed in the review process. The Statistical Standards motion shall also include the decision on the requirement of Form S-6, Hypothetical Events for Sensitivity and Uncertainty Analysis. Motions shall include a specific time frame for correcting any deficiencies in the hurricane or flood model submission and if required for a hurricane model submission, a specific time frame for providing a completed Form S-6, Hypothetical Events for Sensitivity and Uncertainty Analysis, prior to the Professional Team on-site review. The modeling organization shall resubmit or amend the original hurricane or flood model submission as specified by the Commission in the Acceptability Process of the *Hurricane Standards Report of Activities* or the *Flood Standards Report of Activities*. The Commission Chair will call for further discussion. After discussion, the Commission Chair will ask for a roll call vote. The next grouping of hurricane or flood standards will then be addressed. At any point, the Commission can determine that the modeling organization has not been responsive to the hurricane or flood model submission requirements and vote to terminate the review process.

The Commission Chair shall provide a letter to each modeling organization listing:

1. Deficiencies identified in the hurricane or flood model submission with the time frame assigned for correcting the deficiencies,
2. Issues to be addressed with the Professional Team during the on-site review and with the Commission during the meeting to review the hurricane or flood model for acceptability, and
3. Inquiries and investigations to be addressed with the Professional Team during the on-site review.

### ***Commission Meetings to Review Hurricane or Flood Models for Acceptability***

The Commission meeting to review a hurricane or flood model for acceptability will begin with the Commission Chair calling upon the modeling organization to provide an overview presentation as required in the acceptability process of the *Hurricane Standards Report of Activities* or the *Flood Standards Report of Activities*. The modeling organization shall make a presentation and Commission members may ask questions during and after the presentation.

The next portion of the meeting will be closed to the public and will involve the discussion of trade secrets used in the design and construction of the hurricane or flood model identified in the *Hurricane Standards Report of Activities* or the *Flood Standards Report of Activities* as trade secret items and by the Professional Team during the on-site or additional verification reviews.

At the public meeting to determine the acceptability of a hurricane or flood model, once a quorum is present, either in person or by telecommunications, all votes shall be by a roll call vote based on the majority vote of those present. No Commission member, who is present at any Commission meeting at which an official decision or act is taken or adopted by the Commission, may abstain from voting except when a special conflict of interest exists (s. 286.012, F.S., s. 112.3143, F.S.).

For those circumstances in which a hurricane or flood standard does not apply to a particular hurricane or flood model, if the Commission votes affirmatively that the hurricane or flood standard does not apply, then such a vote shall constitute a determination by the Commission that the hurricane or flood standard is not applicable.

The hurricane standards are categorized under six groupings:

1. General Standards,
2. Meteorological Standards,
3. Statistical Standards,
4. Vulnerability Standards,
5. Actuarial Standards, and
6. Computer/Information Standards.

The flood standards are categorized under seven groupings:

1. General Flood Standards,
2. Meteorological Flood Standards,
3. Hydrological and Hydraulic Flood Standards,
4. Statistical Flood Standards,
5. Vulnerability Flood Standards,
6. Actuarial Flood Standards, and
7. Computer/Information Flood Standards.

The minimum number of vote tallies taken to determine the acceptability of a hurricane or flood model shall be one for each group of hurricane or flood standards. If the Commission determines that the hurricane or flood model meets all hurricane or flood standards in a grouping, the hurricane or flood model is found acceptable with respect to each individual hurricane or flood standard in the grouping. Hurricane or flood standards with subparts denoted by a notation of A, B, C, etc. are considered one hurricane or flood standard. At the request of any Commission member, one or more hurricane or flood standards in a grouping may be set aside from the remaining hurricane or flood standards in that grouping for a separate vote.

Based upon a motion of any member that is duly seconded, the Commission may review and modify the voting requirements for any hurricane or flood model as may be appropriate due to the unique aspects of the hurricane or flood model.

At the start of the second public portion of the meeting, the Commission Chair will first ask the modeling organization to explain corrections made for deficiencies identified in the meeting to review modeling organization hurricane or flood model submissions. The Commission Chair will ask Commission members for questions or comments. Failure to provide the trade secret information required in the Hurricane Standards Report of Activities or the Flood Standards Report of Activities and the Professional Team report shall result in a deficiency. If the Commission identifies other deficiencies, the Commission shall specify a time frame for correction of those deficiencies that may include a review by one or more Professional Team members.



The Commission Chair will then announce that the Commission is ready to review the hurricane or flood model for acceptability. The Commission Chair will ask Commission members their preference for reading the hurricane or flood standards by title or in entirety. The Commission Chair will read the first hurricane or flood standard and will call upon the modeling organization to discuss the compliance of the hurricane or flood model with the hurricane or flood standard. The Commission Chair will next call upon the Professional Team to comment after which the Commission Chair will ask Commission members for questions or comments. If there are none, or after all questions have been responded to, the Commission Chair will then proceed to begin reading the next hurricane or flood standard. Once all the hurricane or flood standards in a grouping have been presented and discussed, the Commission Chair will ask the Commission members whether there are any hurricane or flood standards that need to be carved out and voted on separately. If no response is heard, the Commission Chair will ask for a motion to find the hurricane or flood model acceptable under that grouping of hurricane or flood standards. A motion will be made and seconded by Commission members at this time. Prior to voting, the Commission Chair will ask if there is any further discussion. If members have questions or comments, they will be recognized. Once the discussion is completed, the Commission Chair will ask for a roll call vote. Any hurricane or flood standards carved out will be voted on separately in a roll call vote.

The Commission Chair will then move to the next grouping of hurricane or flood standards and begin to read the first hurricane or flood standard in the grouping. The review process will follow as indicated in the paragraph above.

The Commission will have completed its determination of the acceptability of the hurricane or flood model when it has completed voting on all hurricane or flood standards. This does not preclude the Commission from revisiting a previous vote or revising the voting procedure as noted above. Upon conclusion of voting on all the hurricane or flood standards, the Commission Chair will instruct SBA staff to tally the votes. The SBA staff member will indicate whether the hurricane or flood model has been found acceptable by noting that the Commission does or does not find the hurricane or flood model to have met all the hurricane or flood standards. If the Commission finds the hurricane or flood model acceptable, the Commission Chair will indicate to the modeling organization that the modeling organization will receive a letter as provided in the acceptability process of the *Hurricane Standards Report of Activities* or the *Flood Standards Report of Activities*.

The voting procedure can be changed only if approved by the Commission members, given a quorum is present. This will require a motion, a second, and approval of a majority by roll call vote.

***Commission Meetings to Consider an Appeal by a Modeling Organization if a Hurricane or Flood Model is not Found to be Acceptable by the Commission***

If a hurricane or flood model fails to meet one or more hurricane or flood standards and is not found to be acceptable by the Commission, the modeling organization may file an appeal with the Commission and request a meeting with the Commission in order to provide additional information and data to the Commission to justify that the hurricane or flood model complies with the hurricane or flood standards and other requirements. The appeal process is specified in

the acceptability process of the *Hurricane Standards Report of Activities* and the *Flood Standards Report of Activities*.

The purpose of the meeting to consider an appeal by a modeling organization is to review the appeal documentation and determine whether or not to reconsider the hurricane or flood model.

The Commission Chair will call upon the modeling organization to provide a presentation which would include reasons and justification for reconsideration. Commission members may ask questions during and after the presentation. After discussion, the Commission Chair will ask for a motion to reconsider the hurricane or flood model. A motion will be made and seconded by Commission members. Prior to voting, the Commission Chair will ask if there is any further discussion. Once discussion is completed, the Commission Chair will ask for a roll call vote.

If the motion to reconsider the hurricane or flood model is successfully approved by a majority vote, the Commission shall then determine if additional data and information is necessary prior to reconsideration of the hurricane or flood model. The Commission may formulate additional questions and request additional data and information to be responded to by the modeling organization. Such questions, data, and information may include proprietary information, and if so, may be addressed by the modeling organization in a closed session if requested by the modeling organization. If additional data and information is necessary for reconsideration of the hurricane or flood model, the Commission questions, data, and information request shall be provided to the modeling organization in a letter from the Commission Chair no later than ten days after the meeting to consider the appeal request. The Commission may proceed with scheduling a meeting with the modeling organization for reconsideration of the hurricane or flood model.

If the Commission does not specify any follow up questions or identify any additional data or information needed, the Commission may proceed with the reconsideration of the hurricane or flood model. The Commission shall then determine which hurricane or flood standards should be reconsidered. This may include only the hurricane or flood standards that were previously not found acceptable or it may include other hurricane or flood standards that have come into question as a result of new information and data which cast doubt as to the accuracy or reliability of the hurricane or flood model. The Commission shall vote on which hurricane or flood standards are to be reconsidered prior to reconsideration of the hurricane or flood model. The modeling organization may request more time to prepare for reconsideration if it feels that the nature of the review has become more complex and that it needs additional resources, time, and data to respond.

In reconsidering an earlier decision regarding hurricane or flood standards, the Commission shall be guided by new information and data which was not previously provided by the modeling organization. Each hurricane or flood standard will be discussed and voted upon separately in a roll call vote. The Commission Chair will read the title of the first hurricane or flood standard being reconsidered and will call upon the modeling organization to present new information and data and to discuss the compliance of the hurricane or flood model with the hurricane or flood standard. The Commission Chair may call upon the Professional Team to comment after which the Commission Chair will ask Commission members for questions or comments. The Commission Chair will ask for a motion as to whether the hurricane or flood model meets the

hurricane or flood standard under reconsideration. A motion will be made and seconded by Commission members at this time. Prior to voting, the Commission Chair will ask if there is any further discussion. If members have questions or comments, they will be recognized. Once the discussion is completed, the Commission Chair will ask for a roll call vote.

The Commission Chair will then move to the next hurricane or flood standard being reconsidered, and the review process will follow as indicated in the paragraph above. The Commission will have completed its reconsideration of acceptability of the hurricane or flood model when it has completed voting on all hurricane or flood standards being reconsidered. This does not preclude the Commission from revisiting a previous vote on reconsideration of a hurricane or flood standard or revising the voting procedure as noted above. Upon conclusion of voting on all hurricane or flood standards being reconsidered, the Commission Chair will instruct SBA staff to tally the votes. The SBA staff member will indicate whether the hurricane or flood model has been found acceptable by noting that the Commission does or does not find the hurricane or flood model to have met all the hurricane or flood standards being reconsidered. If the Commission finds the hurricane or flood model acceptable under the hurricane or flood standards reconsidered, the Commission Chair will indicate to the modeling organization that the modeling organization will receive a letter as provided in the acceptability process of the *Hurricane Standards Report of Activities* or the *Flood Standards Report of Activities*.

The voting and meeting procedure can be changed only if approved by the Commission members, given a quorum is present. This will require a motion, a second, and approval of a majority by roll call vote.

### ***Planning Workshops***

Planning workshops are for the purpose of discussing, studying, and educating Commission members on new scientific developments and advances in the fields of meteorology, hydrology, hydraulics, statistics, engineering, actuarial science, and computer/information science. The discussions from the planning workshops will be instrumental in planning for future hurricane and flood standards, disclosures, audit requirements, and forms.

The planning workshops will be duly noticed and may require a quorum so that an official vote may be taken on actions resulting from the ideas presented and discussed at the workshop.

The Commission Chair will call the meeting to order and will introduce the ideas for discussion as indicated on the meeting agenda and will solicit any other ideas for discussion from Commission members. The ideas introduced will be discussed, prioritized, and evaluated by the Commission. Included in the discussions will be budget considerations, if any, and further study on the ideas if needed.

### ***Outside Party Input Regarding Hurricane and Flood Standards, Disclosures, Audit Requirements, Forms, or Other Processes Adopted by the Commission***

From time to time, parties other than Commission members, Professional Team members, and SBA staff assigned to the Commission make recommendations for the Commission to consider.

For the Commission to fully and adequately consider input from outside parties, the following process and organizational framework is established for reviewing such input.

The Commission has a clearly defined statutory responsibility to act as a panel of experts to provide the most actuarially sophisticated guidelines and standards for projection of hurricane and flood losses possible, given the current state of actuarial science. The Commission's role is also narrowly defined as to its scope and purpose. As such, input provided by outside parties shall be considered by the Commission at its sole discretion. Subjects that go beyond the purview of the Commission's jurisdiction shall be rejected without consideration based on a decision by the Commission Chair. The Commission Chair may bring the matter to a vote by the Commission.

In order to enable the Commission and the appropriate Committees to evaluate recommended changes, the Commission requires that each recommendation be in the form of an amendment to specific language in the hurricane or flood standard, disclosure, audit requirement, form, or process. The specific amendatory language must be accompanied by a brief statement of the problem being addressed by the amendment and an explanation of how the amendment solves the problem. The problem statement, explanation, and amendatory language shall be received by the Commission at least ten business days prior to the committee or Commission meeting at which the outside party wishes the amendment to be considered.

Consideration of any proposed amendment is at the discretion of the Committee Chair when the input is provided for committee consideration. The proposed amendment may later be accepted or rejected for review by the Commission Chair prior to such input being brought before the Commission for a vote.

While comments and recommendations of a more general nature may be provided by outside parties, such recommendations shall be in the form described above in order to be considered at a committee or Commission meeting called for the purpose of adopting or revising hurricane and flood standards, disclosures, audit requirements, forms, or processes. Nothing in this paragraph prevents a Commission member from proposing alternative language to address an issue raised by an outside party.

Any topics for general discussion shall be addressed to the Commission Chair who will decide, in his/her sole discretion, whether the topic merits discussion by Commission members, when and how the topic will be discussed, and whether or not to accept public comment. The Commission Chair shall reject any topic for discussion that is beyond the scope of the Commission's purview.

**Problem Statement:** A brief statement of the problem being addressed should be provided with all proposed amendatory language.

**Explanation:** The explanation should classify the proposal as general, technical, or editorial and include justification for the modification.

**Amendatory Language:** Proposed amendatory language will assure that all recommended revisions to hurricane and flood standards, disclosures, audit requirements, forms, and processes suggested by outside parties are in a form that allows the Commission and its committee

structure to give appropriate consideration to the substance of a particular proposal with minimum time spent resolving ambiguities, drafting questions, and similar issues.

This framework does not restrict the scope of proposals and allows outside parties the flexibility to present the arguments for their proposal in whatever form and at whatever length they desire.

### ***Budget Consideration***

All new projects that have a fiscal impact should be identified prior to January 1 of the calendar year so that appropriate funding can be obtained through the SBA's budgetary review process.

All new projects shall consist of a proposal, an estimated cost, and a time frame for completion. The Commission shall vote on all new proposals for projects. The FHCF will include in its budget the funding for on-going projects and anticipate the potential for new hurricane and flood model submissions or any fiscal impact that revisions to the acceptability process or the hurricane and flood standards might have on the Commission's budget. The Commission's budget is subject to approval by the SBA Trustees for the appropriate fiscal year.

### ***Sunshine Law***

Section 286.011, F.S., aka the "Sunshine Law" or "open meeting law" applies to the Commission.

**Scope of the Sunshine Law:** In any place where two or more members of the Commission are present, there is the potential for violating the Sunshine Law.

Any communication, whether in person, by telephone, computer, etc., concerning any information on which *foreseeable action* may be taken by the Commission is a "meeting" that must meet the requirements of Florida's Sunshine Law if the communication takes place between two or more Commission members except as provided in s. 627.0628(3)(g), F.S.

**Basic Requirements for Public Meetings:** All meetings subject to the Sunshine Law must be:

1. Open to the public,
2. Noticed,
3. Recorded by a court reporter and minutes preserved. The official minutes of the Commission will consist of a verbatim transcript unless special circumstances arise. In addition, SBA staff may prepare a summary of the meeting that will be added to the transcript and together will comprise the minutes of the meeting.

The SBA staff ensures that all scheduled public meetings of the Commission are filed for public notice in the Florida Administrative Register and a transcript is taken and preserved.

**Trade Secret Violations:** s. 688.002, F.S., defines misappropriation as “disclosure or use of a trade secret of another without express or implied consent by a person who at the time of disclosure or use, knew or had reason to know that her or his knowledge of the trade secret was acquired under circumstances giving rise to a duty to maintain its secrecy or limit its use.”

Section 688.004, F.S., provides for damages as a result of a trade secret violation, “a complainant is entitled to recover damages for misappropriation. Damages can include both the actual loss caused by misappropriation and the unjust enrichment caused by misappropriation that is not taken into account in computing actual loss.”

If a trade secret also meets the definition of a trade secret in s. 812.081, F.S., the following penalty provided in s. 812.081, F.S., for violating the confidentiality of trade secrets could still apply:

*“(2) Any person who, with intent to deprive or withhold from the owner thereof the control of a trade secret, or with an intent to appropriate a trade secret to his or her own use or to the use of another, steals or embezzles an article representing a trade secret or without authority makes or causes to be made a copy of an article representing a trade secret commits a felony of the third degree, punishable as provided in s. 775.082 or s. 775.083.*

*(3) In a prosecution for a violation of the provisions of this section, the fact that the person so charged returned or intended to return the article so stolen, embezzled, or copied is not a defense.”*

## **IV. FINDINGS OF THE COMMISSION**

# FINDINGS OF THE COMMISSION

## Concerning Model Accuracy and Reliability

### *Background*

Sections 627.0628(3)(a), (b), and (f), F.S., instructs the Commission to adopt findings from time to time as to the accuracy or reliability of standards and models, among other things, related to hurricane loss projections used in residential property insurance rate filings, flood loss projections used in rate filings for personal lines residential flood insurance coverage, and probable maximum loss calculations. This section also states that the Commission shall revise previously-adopted actuarial methods, principles, standards, models, or output ranges every odd-numbered year for hurricane loss projections and no less than every four years for flood loss projections. The following findings address the accuracy or reliability of the standards that the Commission has adopted since 1996 and the accuracy or reliability of the computer simulation models that the Commission has reviewed. The Commission thus far has reviewed computer simulation models exclusively because these constitute the only widely accepted approach to estimate residential loss costs, personal residential loss costs, and probable maximum loss levels.

The Commission finds that the computer simulation hurricane and flood models that it reviews are stochastic forecasting models. This means that future hurricane and flood events are stochastically generated and the associated hurricane and flood loss costs are accumulated and hurricane and flood probable maximum loss calculations can be made using the applicable model with the consideration of an insurer's individual or unique exposure data. By generating a sufficient body of hypothetical future hurricane and flood events, the sampling uncertainty in the hurricane and flood output ranges owing to the random variate generation process becomes negligible. The Commission finds that an accepted hurricane or flood model will produce accurate and reliable modeled hurricane or flood loss costs and hurricane or flood probable maximum loss levels for the entire state of Florida given the data and research currently available. Hurricane and flood loss costs and hurricane and flood probable maximum loss levels based on the applicable models are based on actuarially sound and theoretically appropriate techniques that also incorporate scientific evidence, findings, and principles from the areas of meteorology, hydrology, hydraulics, engineering, statistics, and computer/information science.

### *Accurate and Reliable – Defined*

The Commission finds that the computer simulation hurricane models that have been reviewed by the Commission and found acceptable include appropriate model representations to simulate hurricanes and the induced damage on residential property in Florida. The basic features of the hurricane model construction are reflected in the six sections of hurricane standards established and refined since June of 1996:

1. General Standards reflecting the professional status of the hurricane model designers and testers and generic aspects of the hurricane model;
2. Meteorological Standards covering all aspects of this infrequent weather phenomenon;



3. Statistical Standards addressing the statistical foundation of the hurricane model and the sensitivity and uncertainty assessment of hurricane model outputs as a function of hurricane model inputs;
4. Vulnerability Standards assessing the impact of the hurricane winds on residential property;
5. Actuarial Standards assessing the damage impact in insurance terms;
6. Computer/Information Standards providing the overall design, construction, and execution of the hurricane model.

The Commission finds and recognizes that the scientific fields underlying hurricane models continue to evolve providing further insights into property damage and insurance implications. As a direct consequence, the Commission reviews and revises the hurricane standards comprising its *Hurricane Standards Report of Activities* every odd-numbered year. Every odd-numbered year is defined as every year ending in an odd number, i.e., 2009, 2011, 2013, 2015, 2017, etc. The Commission finds that the hurricane standards adopted every odd-numbered year represent the current state of actuarial science regarding computer simulation hurricane modeling for purposes of producing hurricane loss costs and hurricane probable maximum loss levels for residential property in Florida that are accurate and reliable.

The Commission finds that the computer simulation flood models that will be reviewed by the Commission for acceptability include appropriate model representations to simulate floods and the induced damage on personal residential property in Florida. The basic features of the flood model construction are reflected in the seven sections of flood standards established in June of 2017:

1. General Flood Standards reflecting the professional status of the flood model designers and testers and generic aspects of the flood model;
2. Meteorological Flood Standards covering all aspects of coastal flooding including wind and other meteorological elements that drive storm surge;
3. Hydrological and Hydraulic Flood Standards covering all aspects of inland flooding including riverine, lacustrine, and surface water flooding;
4. Statistical Flood Standards addressing the statistical foundation of the flood model and the sensitivity and uncertainty assessment of flood model outputs as a function of flood model inputs;
5. Vulnerability Flood Standards assessing the impact of the coastal and inland flooding on personal residential property;
6. Actuarial Flood Standards assessing the damage impact in insurance terms;
7. Computer/Information Flood Standards providing the overall design, construction, and execution of the flood model.

The Commission finds and recognizes that the scientific fields underlying flood models continue to evolve providing further insights into property damage and insurance implications. As a direct consequence, the Commission reviews and revises the flood standards comprising its *Flood Standards Report of Activities* no less than every four years. The Commission finds that the flood standards adopted no less than every four years represent the current state of actuarial science regarding computer simulation flood modeling for purposes of producing flood loss costs and flood probable maximum loss levels for personal residential property in Florida that are accurate and reliable.

The words “accurate” and “reliable” are used in s. 627.0628, F.S., but are not defined therein. In the context of computer simulation hurricane and flood modeling, “accurate” means that the hurricane and flood models meet the applicable standards that have been developed to assure scientifically-acceptable hurricane and flood loss cost projections and hurricane and flood probable maximum loss levels. However, “accurate” cannot necessarily mean that a hurricane or flood model conforms exactly to known facts since that contradicts the nature of the hurricane and flood modeling process. “Reliable” is defined for computer simulation hurricane and flood models as meaning that the hurricane or flood model will consistently produce statistically similar results upon repeated use without inherent or known bias.

## FINDINGS OF THE COMMISSION

### Concerning Trade Secrets

The Commission finds the following with respect to **Principle #10**, *The trade secret aspects of models or methods being reviewed by the Commission shall be protected*:

1. Organizations that produce a computer simulation hurricane or flood model may have trade secrets regarding the design and construction of that model;
2. Modeling organizations have been unwilling to reveal those trade secrets to the Commission in the context of the public meetings that the Commission holds because their competitors are part of the audience or can get a copy of the publicly available transcript of the meeting;
3. Modeling organizations have been willing to reveal all of their trade secrets if that information can remain confidential and within their control;
4. Since that trade secret information would become publicly available in the context of a meeting in the “Sunshine,” the Commission has authorized:
  - a. a Professional Team to review the hurricane and flood models on-site on behalf of the Commission,
  - b. on-site visits to the modeling organizations by Commission members, and
  - c. closed meetings for the purpose of discussing trade secrets;
5. the law allows an exception from the public records law for trade secrets used in the design and construction of hurricane and flood models;
6. The Commission may require that the modeling organization provide certain documents for direct review by Commission members or the modeling organization may voluntarily provide documents containing trade secrets for the Commission’s review;
7. The law allows for the discussion of trade secrets to be exempt from public meeting requirements.

**V. PROCESS FOR DETERMINING  
THE ACCEPTABILITY OF A  
COMPUTER SIMULATION  
FLOOD MODEL**

## PROCESS FOR DETERMINING THE ACCEPTABILITY OF A COMPUTER SIMULATION FLOOD MODEL

Due to the complex and unique nature of flood and hurricane perils, and recognizing that a modeling organization may submit only a flood model or only a hurricane model, the Commission has determined that the review of flood and hurricane models for acceptability shall be independent of each other. Hence, a flood model and a hurricane model shall be submitted separately and reviewed separately. The Commission has determined, if a model is found acceptable or fails under one set of standards applicable to flood or hurricane, it shall have no bearing or impact on the other type of model's acceptability or failure under the respective set of standards. A modeling organization submitting both a flood model and a hurricane model shall have each model reviewed separately and independently under the respective unique set of standards applicable to flood or hurricane.

It should be understood that if a modeling organization submits both a flood model and a hurricane model, and in the course of a review (e.g., internal review, Professional Team on-site review, Commission review) of the flood model or the hurricane model, an error is discovered that is also likely to co-exist in the hurricane model or the flood model, then it is incumbent on the modeling organization to report this error in accordance with section **III. Review of the Readiness Notification** or **VI. Review by the Commission, F. Discovery of Differences in a Model after a Model has been Determined to be Acceptable by the Commission**, as appropriate. Consequently, the onus is on the modeling organization to make this correction if it exists, in keeping with the independence of the two model reviews.

This section specifies the Commission's process for the determination of acceptability of a computer simulation flood model (model).

After the initial adoption of flood standards (standards) in June 2017, the Commission has determined that prior to November 1 of every other odd-numbered year, it will adopt new standards, revise existing standards, and if necessary, revise this process. The effective date of new or revised standards will be November 1 unless otherwise specified by the Commission. The standards and procedures published in the *Flood Standards Report of Activities as of November 1, 2017*, will not be scheduled for revision until 2021.

The Commission has determined that "significant revisions" to the standards or to the model are those that either change or have potential to change the flood loss costs or flood probable maximum loss levels. On the other hand, any minor revisions to the standards, or any revisions to the model by the modeling organization that do not result in changes to flood loss costs or flood probable maximum loss levels are not considered significant. The Commission may determine in its judgment whether a revision is significant.

The Commission has determined that any modeling organization that desires to have a model reviewed for compliance with the standards adopted by the Commission shall notify the Commission in accordance with the requirements set out below by November 1, 2019.

The Commission has further determined that the period between the effective date of new and revised standards and November 1 of the following odd-numbered year (the deadline for notification by the modeling organization) is a reasonable length of time for any modeling

organization to comply with the standards adopted by the Commission. If the Commission determines that this time frame is not sufficient, based on the nature of the revisions to the standards or based on other circumstances that might necessitate a longer period of time for compliance, then the Commission will adjust this period of time accordingly. If requested by a modeling organization, the Chair shall have the authority to grant a reasonable extension should the Chair determine that an emergency or unusual situation exists that warrants an extension and is determined to be beyond the control of the modeling organization.

## I. Scheduling

The following is an anticipated schedule:

May 2017	Committee meetings
June 2017	Adopt 2017 Standards
October 2017	Adopt revisions to the 2017 Standards and adopt the <i>Flood Standards Report of Activities</i>
November 1, 2017	<i>2017 Flood Standards Report of Activities</i> published
November 1, 2019	Deadline for notification by modeling organization
December 2019	Commission meeting to review submissions
January – April 2020	On-site reviews
April – May 2020	Additional verification reviews, if necessary
May – June 2020	Commission meetings to review models for acceptability under 2017 Standards
August – October 2020	Committee meetings
September 2021	Committee meetings, if necessary
October 2021	Adopt 2021 Standards and the <i>Flood Standards Report of Activities</i>
November 1, 2021	<i>2021 Flood Standards Report of Activities</i> published
November 1, 2023	Deadline for notification by modeling organization
December 2023	Commission meeting to review submissions
January – April 2024	On-site reviews
April – May 2024	Additional verification reviews, if necessary
May – June 2024	Commission meetings to review models for acceptability under 2021 Standards
August – October 2024	Committee meetings
September 2025	Committee meetings, if necessary
October 2025	Adopt 2025 Standards and the <i>Flood Standards Report of Activities</i>
November 1, 2025	<i>2025 Flood Standards Report of Activities</i> published

The Commission will endeavor to expedite the review of a model if the Professional Team is able to verify all standards during the initial on-site review.

## II. Notification Requirements

- A. Notification of Readiness for Review.** Any modeling organization desiring to have its model reviewed for acceptability by the Commission shall notify the Chair of the Commission in writing by November 1, 2019, that the modeling organization is prepared for review. The notification shall consist of (1) a letter to the Commission, (2) a summary statement of compliance with each individual standard, (3) all required disclosure and form information, and (4) a completed Flood Model Submission Checklist.

The notification letter shall include:

1. A reference to the signed Expert Certification Forms GF-1, General Flood Standards, GF-2, Meteorological Flood Standards, GF-3, Hydrological and Hydraulic Flood Standards, GF-4, Statistical Flood Standards, GF-5, Vulnerability Flood Standards, GF-6, Actuarial Flood Standards, GF-7, Computer/Information Flood Standards, and GF-8, Editorial Review;
2. A statement that professionals having credentials and/or experience in the areas of meteorology, hydrology, hydraulics, statistics, structural engineering, actuarial science, and computer/information science have reviewed the model for compliance with the standards; and
3. A statement that the model is ready to be reviewed by the Professional Team. Any caveats to the certifications shall be noted in the letter and accompanied by a detailed explanation.

Notification to the Commission shall include:

1. A summary statement of compliance with each standard and the data and analyses required in the disclosures and forms.
2. A general description of any trade secret information that the modeling organization intends to present to the Professional Team and the Commission.
3. Eight bound copies (duplexed) and a link e-mailed to SBA staff where all required documentation can be downloaded from a single ZIP file. Submission documentation shall be provided in the following manner:
  - a. Form VF-3, Flood Mitigation Measures, Range of Changes in Flood Damage, Form AF-2, Total Flood Statewide Loss Costs, Form AF-3, Personal Residential Standard Flood Loss Costs by ZIP Code, Form AF-4, Flood Output Ranges, and Form AF-6, Flood Probable Maximum Loss for Florida, shall be provided in Excel format;
  - b. Form AF-1, Zero Deductible Personal Residential Standard Flood Loss Costs, shall be provided in both Excel and PDF format;
  - c. The remaining portions of the submission shall be provided in PDF format;



- d. All data file names shall include the abbreviated name of the modeling organization, the standards year, and the form name (when applicable);
  - e. The PDF submission document file shall support highlighting and hyperlinking, and shall be bookmarked by standard, form, and section.
4. Format of the Submission:
- a. Table of Contents shall be included;
  - b. Materials submitted shall be consecutively numbered from the first page (including cover) using a single numbering system from the beginning to the end of the submission and shall include the date and time in the footnote;
  - c. All tables, graphs, and other non-text items shall be consecutively numbered using whole numbers, specifically listed in the Table of Contents, and clearly labeled with abbreviations defined;
  - d. State the standard, disclosure, or form in *italics* and give the response in non-italics. **The Purpose and Audit portions should not be restated.** The modeling organization response shall include a statement in support of compliance following each standard. The response to the standard shall explain how the model meets the requirements of the standard by including (1) a statement in support of compliance with the standard, and if applicable (2) a reference to a disclosure(s), or (3) a general description of trade secret information that will be shown to the Professional Team during the on-site review and how it supports compliance with the standard.

The Disclosure section of each standard is not designed to require trade secret information. Therefore, the response to a disclosure shall not contain a statement similar to “will be shown to the Professional Team” unless a response to the disclosure has been provided and additional test results and documentation will be available for the Professional Team during the on-site review.

If a standard or disclosure has multiple sections, respond to each section separately;

- e. Graphs shall be accompanied by legends and labels for all elements:
  - 1. Individual elements shall be clearly distinguishable, whether presented in original or copy form;
  - 2. Maps shall use three colors – blue, white, and red, including shades of blue and red, with dark blue and dark red designating the lowest and highest quantities, respectively. The color legend and associated map shall use the maximum and minimum values as the range and shall be comprised of an appropriate number of intervals, with at least seven, to provide readability and

no interval shall contain both negative and positive values. Relevant geographic boundaries (e.g., counties, ZIP Codes) shall be shown in black. The maximum and minimum values and their point locations shall be plotted on the maps;

3. For data indexed by latitude and longitude, by county or by ZIP Code, a map with superimposed county and ZIP Code boundaries shall be produced. Additional map specifications are indicated on individual form instructions;
  - f. NA shall be used in cells to signify no exposure;
  - g. All units of measurement for model inputs and outputs shall be clearly identified;
  - h. All model outputs related to flood extent and elevation or depth, velocity, length, windspeed, and pressure are preferred to be in units of feet, feet per second, statute miles, statute miles per hour, and millibars, as appropriate;
  - i. Unless otherwise specified, windfields generated by the model shall be used for completing relevant forms and tables in the submission;
  - j. All forms with the exception of those indicated as a Trade Secret Item shall be included in a submission appendix. If forms designated as a Trade Secret Item are not considered trade secret, those forms are to be included in a submission appendix. A link to the location of the form shall be provided in the corresponding disclosure;
  - k. If used, acronyms shall be defined on their first use in the submission. A list of all acronyms defined in the submission shall be listed and defined in a submission appendix;
  - l. All column headings shall be shown and repeated at the top of each subsequent page for forms and tables.
5. The modeling organization should contact SBA staff for any needed clarification of submission instructions, especially if the instructions necessitate additional assumptions.
6. All modifications, adjustments, assumptions, or other criteria that are included in producing the information required by the Commission in the submission shall be disclosed and will be reviewed.

**B. Notification of Unusual Circumstances.** The modeling organization shall notify the Chair of the Commission in writing, as soon as possible, of any unusual circumstances that may impact the model submission.

### III. Review of the Readiness Notification

Once modeling organization submissions are received by the November 1, 2019 deadline, the Commission will hold a meeting to review the submissions as discussed under the **Commission Structure** section of the *Flood Standards Report of Activities*.

Prior to the Professional Team on-site review and in accordance with the time frame specified by the Commission, the modeling organization shall submit, in electronic format via e-mail correspondence to SBA staff, corrections for the deficiencies identified during this meeting. In response to the deficiencies identified, only revised pages and forms shall be provided with revision marks as specified under **V. Submission Revisions**. If more than ten pages are impacted by the corrections to the deficiencies, then an entire submission shall be submitted (eight bound copies (duplexed) and a link e-mailed to SBA staff where all required documentation can be downloaded from a single ZIP file). All revised file names shall include the revision date, the abbreviated name of the modeling organization, the standards year, and the form name (when applicable) in the file name.

If, in addition to responding to the deficiencies specifically, the modeling organization opts to make further minor corrections elsewhere in their submission, it may do so and shall provide an annotated list of the additional revisions along with the corrections to the deficiencies.

Failure of the modeling organization to correct any deficiencies within the time frame specified shall result in the termination of the review process. The modeling organization will be notified in writing that the review process has been terminated. Upon termination of the review process, the modeling organization shall be required to wait until after the next revision or review of the standards before requesting the Commission to review the model.

In the event that a modeling organization realizes the initial submission or the model has material errors and needs revision prior to the scheduled on-site review, the modeling organization shall immediately notify the Chair of the Commission in writing. The notification shall detail the nature of the errors and revisions to the submission or the model, why it occurred, what is needed or has been done to correct the problem, the time frame needed for making the corrections, and any other relevant documentation necessary to describe both the errors and the corrections.

The Commission Chair shall (1) review the notification and inform the Commission members as soon as possible, and (2) assess, with at least three members of the Professional Team, the severity of the error, and (3) determine whether to postpone the on-site review pending consideration of potential deficiencies and the overall schedule of on-site reviews.

If it is determined to proceed with the originally-scheduled on-site review, the modeling organization shall submit revised documentation no less than fourteen days prior to the scheduled on-site review by the Professional Team. If the modeling organization cannot correct the problems and submit revised documentation fourteen days prior to the scheduled on-site review, then all associated standards shall not be verified during the scheduled on-site review.

#### IV. Professional Team On-Site Review

If a determination has been made that a modeling organization is ready for an on-site review, SBA staff will schedule the on-site review by the Professional Team as discussed under the **On-Site Review** section of the *Flood Standards Report of Activities*.

Trade secret items that are to be presented during the closed meeting portion of the Commission meeting to review models for acceptability shall be presented to the Professional Team for review.

There are two possible outcomes of the on-site review regarding auditing for compliance with the standards.

1. The Professional Team determines that, in its opinion, the model is likely to comply with the standards, and so reports to the Commission.
2. The Professional Team determines that, in its opinion, the model is unlikely to comply with the requirements in one or more standards.
  - a. The Professional Team may react to possible corrections proposed by the modeling organization but will not tell the modeling organization how to correct the non-compliance. If the problems can be remedied while the Professional Team is on-site, the Professional Team will review the corrective actions taken, including revisions to the original November 1, 2019 submission, before determining verification of a standard.
  - b. If the problems cannot be corrected while the Professional Team is on-site, then the modeling organization shall have seven days from the final day of the on-site review to notify the Chair in writing that it will be ready for an additional verification review within thirty days of the notification. The modeling organization shall submit all revised documentation as specified under **V. Submission Revisions**.

SBA staff will assemble the Professional Team or an appropriate subset of the Professional Team for only one additional verification review to ensure that the corrections have been incorporated into the current, running version of the model.

- c. If a discrepancy in the model or model submission is discovered by the modeling organization after the Professional Team has completed its on-site review, then the modeling organization shall without delay notify the Chair in writing describing the discrepancy(s), request an additional verification review, and indicate when it will be ready for the review. The modeling organization shall submit all revised documentation as specified under **V. Submission Revisions**.

If an additional verification review has not been conducted, SBA staff will assemble the Professional Team or an appropriate subset of the Professional Team for an additional verification review to ensure that the corrections have been incorporated into the current, running version of the model.

If an additional verification review has been previously conducted, the Chair shall place the modeling organization's request for another additional verification review on the agenda for a special or regularly scheduled meeting of the Commission.

- d. If any problem necessitates the re-generation of the flood output ranges, the modeling organization shall submit revised flood output ranges to be received by the Commission no less than fourteen days prior to the initial date of the on-site review or additional verification review. If this is not the case, then Standard AF-6, Flood Loss Outputs and Logical Relationships to Risk, shall not be verified during the initial on-site review or additional verification review.

In the event that (1) Form AF-4, Flood Output Ranges, was modified after the initial November 1, 2019 submission and prior to the on-site review, or (2) an additional verification review is required and Form AF-4, Flood Output Ranges, must be re-generated, the modeling organization shall provide the percentage change in flood output ranges from the initial November 1, 2019 submission of Form AF-4, Flood Output Ranges.

In the event that (1) Form AF-5, Logical Relationship to Flood Risk (Trade Secret Item), was modified after the initial November 1, 2019 submission and prior to the on-site review, or (2) an additional verification review is required and Form AF-5, Logical Relationship to Flood Risk (Trade Secret Item), must be re-generated, the modeling organization shall provide the percentage change in logical relationship to risk, from the initial November 1, 2019 submission of Form AF-5, Logical Relationship to Flood Risk (Trade Secret Item).

- e. If the modeling organization disagrees with the Professional Team as to likelihood of compliance, the modeling organization has two options:
  1. It can proceed to the scheduled Commission meeting to review models for acceptability under the 2017 Standards and present its arguments to the Commission to determine acceptability, or
  2. It can withdraw its request for review. Such a withdrawal shall result in the modeling organization waiting until after the next revision or review of the standards before requesting the Commission review its model.

## **V. Submission Revisions**

Revised documentation shall include the revision date on the submission cover page, the Model Identification page, and in each revised page footnote. All revised file names submitted shall include the revision date, the abbreviated name of the modeling organization, the standards year, and the form name (when applicable) in the file name.

Revisions shall be noted with revision marks, i.e., words stricken are deletions (~~deletions~~) and words underlined are additions (additions). If revision marks are provided in color, material deleted and stricken shall be in red, and material added and underlined shall be in blue.

The Professional Team and the Commission Chair will review the new material upon receipt for deficiencies. The Commission Chair shall notify the modeling organization of any deficiencies and the time frame for correction. An additional verification review will not be held until all deficiencies have been addressed. The Professional Team may provide to SBA staff a second pre-visit letter to be sent to the modeling organization outlining specific issues to be addressed during the additional verification review.

If an additional verification review is requested, revised documentation shall be received within thirty days of the request.

Complete final revised documentation shall be received no less than ten days prior to the Commission meeting to review the model for acceptability.

The modeling organization shall e-mail to SBA staff a link where complete final revised documentation with and without revision marks can be downloaded from a single ZIP file. If more than ten pages are revised, eight bound copies (duplexed) of all required documentation with revision marks for all revisions made to the original November 1, 2019 submission shall be provided. If ten pages or fewer (exclusive of the forms in the Appendix) are revised, only eight bound copies (duplexed) of the revised pages and forms (if revised) shall be submitted. The format of the revised documentation shall be as specified under **II. Notification Requirements, A. Notification of Readiness for Review, 3 and 4.**

A note will be posted on the Commission website with instructions for obtaining submission documents. Final submission documents for a model that has been found acceptable by the Commission will be posted on the Commission website ([www.sbafla.com/methodology](http://www.sbafla.com/methodology)).

## **VI. Review by the Commission**

- A. General Review of a Model.** For any modeling organization seeking the Commission's determination of acceptability, the Commission may request a meeting with the modeling organization prior to the Commission's review of the model's compliance with the standards. The meeting would provide for a general discussion about the model or its readiness for review and would also provide an opportunity for the Commission and the modeling organization to address any other issues. This meeting may be conducted concurrently with the meeting to determine acceptability. If trade secrets used in the design and construction of the model are discussed, such discussions shall be held in a closed meeting.
- B. Meeting to Determine Acceptability.** The Commission shall meet at a properly noticed public meeting to determine the acceptability of a model once the modeling organization has provided all required material and the Professional Team has concluded its on-site review or any additional verification review. If the Commission Chair determines that more preparation time is needed by Commission members, the Chair may reschedule the meeting date to review a model for acceptability, taking into consideration public notice requirements, the availability of a quorum of Commission members, the availability of a meeting room, and the availability of the particular modeling organization.

All materials shall be reviewed by the Professional Team prior to presentation to the Commission.

If the Commission determines that meeting one standard makes it impossible to meet a second standard, the conflict shall be resolved by the Commission, and the Commission shall determine which standard shall prevail. If at the meeting a unique or unusual situation arises, the Commission shall determine the appropriate course of action to handle that situation, using its sound discretion and adhering to the legislative findings and intent as expressed in s. 627.0628(1), F.S.

Each modeling organization's model will be reviewed independently of any other modeling organization's model presently applying for review.

Trade secrets used in the design and construction of the model shall be discussed during a closed meeting prior to the Commission voting on the acceptability of the model. No voting regarding the acceptability of a model shall occur during a closed meeting.

**C. Modeling Organization Presentation.** All modeling organizations shall make a presentation to the Commission with respect to the model as used for personal residential ratemaking purposes in Florida. The presentation shall use a medium that is readable by all members of the Commission. The modeling organization presentation is for the purpose of helping the Commission understand outstanding issues, how the modeling organization has resolved various issues, and to explain the basis as to how the model meets the standards. Various issues may relate to:

1. Informational needs of the Commission as provided in the disclosures and forms,
2. The theoretical soundness of the model,
3. Use of reasonable assumptions,
4. Other related aspects dealing with accuracy and reliability.

A modeling organization shall give a detailed overview presentation to the Commission explaining how the model is designed to be theoretically sound, meets the criteria of being accurate and reliable, and indicate which parts of the model are considered proprietary.

Following the overview presentation, the Commission will hold a closed meeting where trade secrets used in the design and construction of the model will be discussed and reviewed.

#### **Closed Meeting Portion**

During the closed meeting where trade secrets used in the design and construction of the model are discussed, the modeling organization shall present temporal evolution of coastal flood characteristics (Standard MF-4, Flood Characteristics (Outputs), Audit 8), temporal evolution of inland flood characteristics, if applicable (Standard HHF-2, Flood

Characteristics (Outputs), Audit 10), Form HHF-3, Coastal Flood Characteristics by Annual Exceedance Probabilities (Trade Secret Item), Form HHF-5, Inland Flood Characteristics by Annual Exceedance Probabilities (Trade Secret Item), Form VF-4, Coastal Flood Mitigation Measures, Mean Coastal Flood Damage Ratios and Coastal Flood Damage/\$1,000 (Trade Secret Item), Form VF-5, Inland Flood Mitigation Measures, Mean Inland Flood Damage Ratios and Inland Flood Damage/\$1,000 (Trade Secret Item), Form AF-5, Logical Relationship to Flood Risk (Trade Secret Item), and trade secret items identified and recommended by the Professional Team during the on-site and additional verification reviews to be shown to the Commission which will be documented in the Professional Team's report to the Commission.

The modeling organization shall provide a detailed discussion of Form VF-4, Coastal Flood Mitigation Measures, Mean Coastal Flood Damage Ratios and Coastal Flood Damage/\$1,000 (Trade Secret Item) and Form VF-5, Inland Flood Mitigation Measures, Mean Inland Flood Damage Ratios and Inland Flood Damage/\$1,000 (Trade Secret Item), in support of acceptability of Standard VF-4, Flood Mitigation Measures, including but not limited to the following:

1. Individual mitigation measures for each flood depth above ground and damage/\$1,000 exhibiting logical mitigation impacts within categories and across structure types,
2. The fully mitigated building results relative to the contributions of the various mitigation measures, and
3. Omission of any individual mitigation measures.

The modeling organization shall provide a detailed discussion of Form AF-5, Logical Relationship to Flood Risk (Trade Secret Item), in support of acceptability of Standard AF-6, Flood Loss Outputs and Logical Relationships to Risk, including but not limited to the following:

1. The logical relationship to flood risk relative to each Notional Set 1-9,
2. Geographic displays (color-coded maps) or graphical displays as appropriate for each Notional Set 1-9,
3. Color-coded contour or high-resolution map of the flood loss costs for slab foundation owners frame buildings (Notional Set 6),
4. Scatter plot of the coastal flood loss costs (y-axis) against distance to closest coast (x-axis) for slab foundation owners frame buildings (Notional Set 6), and
5. Any apparent anomalies in the results in completed Form AF-5, Logical Relationship to Flood Risk (Trade Secret Item).



A hard copy of the modeling organization's prepared presentation and the trade secret forms shall be provided to the Commission and Professional Team members (nineteen hard copies numbered 1 through 19) at the start of the closed meeting. The trade secret forms shall be printed separately rather than as part of the presentation. The hard copies shall be returned to the modeling organization at the conclusion of the closed meeting and prior to anyone leaving the meeting room.

All material presented in the closed meeting shall be complete, e.g., all axes on graphs labeled.

Proprietary comments initially redacted from the Professional Team report shall be made available by the modeling organization to the Commission.

Items that the modeling organization is precluded from releasing due to third party contracts may be excluded.

In order to meet the public meeting notice requirements for the following public meeting portion, two hours shall be scheduled for the closed meeting.

### **Public Meeting Portion**

At the conclusion of the closed meeting, the Commission will resume the public meeting to continue the review of the model for acceptability. The modeling organization presentation for this portion of the meeting shall:

1. Provide an explanation of corrections made for deficiencies noted by the Commission, and
2. Provide an explanation of how the model meets the standards:
  - a. Each standard number and title shall be stated,
  - b. Explanation of how each standard was met, with reference to any appropriate disclosures or forms that support compliance,
  - c. If relevant and non-proprietary, material not provided in the submission which was presented to the Professional Team during the on-site review for verification, and
  - d. Any non-trade secret information that can be provided in order to facilitate a general understanding of the trade secret information presented to the Commission during the closed meeting.

Three to five hours shall be scheduled for review of a model during a public meeting.

A hard copy of the modeling organization's prepared presentation shall be provided to the Commission and Professional Team members (nineteen copies) at the start of the public meeting.

All materials presented to the Commission during the public portions of the meeting to determine acceptability shall be provided to SBA staff in electronic format.

- D. Acceptability and Notification.** To be determined acceptable, the model shall have been found acceptable for all standards. If the model fails to be found acceptable by a majority vote for any one standard, the model shall not be found acceptable. The modeling organization shall have an opportunity to appeal the Commission’s decision as specified under **VI. Review by the Commission, E. Appeal Process to be Used by a Modeling Organization if a Model is Not Found to be Acceptable by the Commission.**

Once the Commission has determined that a model is acceptable in accordance with the procedures in the acceptability process and that all required documentation as specified in the acceptability process has been provided to the Commission, the Chair of the Commission shall provide the modeling organization with a letter confirming the Commission’s action.

The letter shall be in the following format.

Date

(Name and Address of Modeling Organization)

Dear \_\_\_\_\_:

This will confirm the finding of the Florida Commission on Hurricane Loss Projection Methodology on (date), that the (name of modeling organization) model has been determined acceptable for projecting flood loss costs and flood probable maximum loss levels for personal residential rate filings. The determination of acceptability expires on November 1, 2024.

The Commission has determined that the (name and version identification of the model) limited to the options selected in the input form provided in Standard AF-1, Flood Modeling Input Data and Output Reports, Disclosure 4 complies with the standards adopted by the Commission on (date of adoption), and concludes that the (name and version identification of the model) limited to the Florida flood model options selected (Standard AF-1, Flood Modeling Input Data and Output Reports, Disclosure 4) is sufficiently accurate and reliable for projecting flood loss costs and flood probable maximum loss levels for personal residential property in Florida.

On behalf of the Commission, I congratulate you and your colleagues. We appreciate your participation and input in this process.

Sincerely,

(Name), Chair

A copy of the letter shall be provided to the Commissioner of the Office of Insurance Regulation.

**E. Appeal Process to be Used by a Modeling Organization if a Model is Not Found to be Acceptable by the Commission.** If a model is not found to be acceptable by the Commission, the modeling organization shall have up to thirty days to file a written appeal of the Commission's finding. The appeal shall specify the reasons for the appeal, identify the specific standard or standards in question, provide appropriate data and information to justify its position, and may request a follow up reconsideration meeting with the Commission to present any relevant or new information and data to the Commission in either a public or closed meeting format.

Within sixty days of receiving the appeal, the Commission shall hold a public meeting for the purpose of reviewing the appeal documentation, formulate additional questions to be responded to by the modeling organization, and request additional data and information if necessary. If the Commission determines additional data and information is necessary for reconsideration of the model, the Commission's questions, data, and information request shall be provided to the modeling organization in a letter from the Chair no later than ten days after the meeting to consider the appeal request. The modeling organization shall respond to the Commission within ten days of receiving the Commission Chair's letter. Any proprietary responses, data, or information shall be noted by the modeling organization indicating the response will be discussed in a closed session with the Commission.

The Commission will meet at a properly noticed public meeting to reconsider the acceptability of the model under the standards established by the Commission. If the Commission Chair determines that more preparation time is needed by Commission members, the Chair may reschedule the meeting date to reconsider the model for acceptability, taking into consideration public notice requirements, the availability of a quorum of Commission members, the availability of a meeting room, and the availability of the modeling organization.

Once the Commission has completed its reconsideration of acceptability and determined that the model has met all the standards being reconsidered and that all required documentation as specified in the acceptability process has been provided to the Commission, the Chair of the Commission shall provide the modeling organization with a letter confirming the Commission's action as specified under **VI. Review by the Commission, D. Acceptability and Notification.**

If the model fails to be found acceptable by a majority vote for any one standard, the model shall not be found acceptable and the appeal of the modeling organization shall have failed. In this regard, the findings of the Commission shall be final. The modeling organization shall be required to wait until after the next revision or review of the standards before requesting the Commission to review its model.

**F. Discovery of Differences in a Model after a Model has been Determined to be Acceptable by the Commission.** If the modeling organization discovers any differences between the model as found acceptable by the Commission and the model as used by its clients, the modeling organization shall without delay notify the Commission in writing describing the differences and the impact on flood loss costs and flood probable maximum loss levels. The notification shall be accompanied by Form VF-3, Flood

Mitigation Measures, Range of Changes in Flood Damage, Form AF-1, Zero Deductible Personal Residential Standard Flood Loss Costs, Form AF-4, Flood Output Ranges, and Form AF-6, Flood Probable Maximum Loss for Florida. Additionally, the modeling organization shall state the level of the differences based on the classification scheme below as either Type I, Type II, or Type III differences.

For purposes of complying with this requirement, a “difference” is anything that results in a model not being exactly the same as the model found acceptable by the Commission under the standards as adopted in this *Flood Standards Report of Activities*, but does not include interim model updates/revisions as addressed in **VI. Review by the Commission, G. Interim Model Updates after a Model has been Determined to be Acceptable by the Commission**, updates to geographical data or other interim data updates as addressed in **VI. Review by the Commission, H. Interim Updates to Geographical or Other Data after a Model has been Determined to be Acceptable by the Commission**, model updates as addressed in **VI. Review by the Commission, J. Model Update for Consistency of Hurricane and Flood Models after the Model has been Determined to be Acceptable by the Commission**, or other developmental revisions to the model that are of the nature that would be appropriately reviewed according to the standards and procedures in the next *Flood Standards Report of Activities* scheduled for publication in 2021.

Upon receipt of the modeling organization’s notification and documentation as specified above, the Chair shall consult with at least three members of the Professional Team in order to investigate, determine, and verify the impact of the differences as reported by the modeling organization.

Differences in flood loss costs or flood probable maximum loss levels within spreadsheets shall be computed without explicit rounding or truncation of floating point values prior to generating the documentation specified above. The type of differences noted shall be classified as falling into one of the following categories:

Type I: The model is not the exact same model as found acceptable or the submission needs to be revised due to the discovery of inaccuracies or errors, but there are no differences in flood loss costs for any five-digit ZIP Code area and there are no differences in flood probable maximum loss levels for any return period.

Type II: There are differences in one or more flood loss costs for a five-digit ZIP Code area, but such differences do not exceed  $\pm 1\%$  and there are changes in flood probable maximum loss levels for one or more return periods, but such differences do not occur at the rounded third significant digit of the flood probable maximum loss number.

Type III: There are differences in one or more flood loss costs for a five-digit ZIP Code area or there are changes in flood probable maximum loss levels for one or more return periods that exceed the threshold levels set in Type II.

In the case of Type I differences:

1. The Chair, in consultation with at least three members of the Professional Team, shall verify the impact of the differences as reported by the modeling organization, and identify any additional documentation needed by the Commission. In its investigation and review of the issue, the Commission shall focus solely on the need for documentation explaining and describing the differences and ensuring that there is no impact on flood loss costs and flood probable maximum loss levels. The modeling organization's response related to differences noted at the Type I level shall only involve providing adequate documentation and shall not involve any further revisions to the model. The modeling organization shall submit an addendum to the submission for the model previously-found acceptable by the Commission thereby documenting the reasons, causes, and explanations for the differences. The addendum shall also encompass a discussion of why flood loss costs and flood probable maximum loss levels remain valid and have not changed from the previous model which the Commission found acceptable.
2. If the Chair determines that the documentation and explanations provided by the modeling organization are sufficient, no further review is necessary by the Commission. The Chair shall provide a letter to the modeling organization acknowledging the notification of differences and noting that the Commission accepts the modeling organization's addendum to its previous submission. The letter shall note that a change in the model version identification is not required and that the model's acceptability shall expire as originally provided for in **VI. Review by the Commission, K. Expiration of a Model Found Acceptable**, unless additional differences are discovered prior to expiration.
3. If the Chair determines that a new model version identification may be needed or that complexity of the reported differences needs to be addressed by the Commission at a special or regularly scheduled meeting, the Chair shall provide the Commission with detailed recommendations, such as the need for additional documentation or the need for further investigations, the potential need for a revised model version identification, or other appropriate recommendations given the circumstances. Additionally, the Chair shall propose what would constitute adequate documentation and when such documentation shall be provided to the Commission.

At the Commission meeting, the Vice Chair or, if not available to chair the meeting, a Committee Chair appointed by the Chair, shall preside at the meeting. The Chair shall make a motion for approval of the recommendations which shall require a second. The Commission shall then vote on the recommendations of the Chair, and any other alternative recommendations or amendments that are raised in the form of a motion that has been duly made and seconded by another Commission member.

If backup documentation required is of a proprietary nature involving trade secrets, the Commission shall discuss only such items in a closed session. All votes shall be taken in a public meeting.

4. The acceptability of the model shall not be suspended on the basis of Type I differences as long as appropriate documentation is provided to the Commission in a timely fashion. No additional actions or revisions to the model shall be required by the modeling organization with respect to Type I differences.
5. If the modeling organization fails to provide documentation that the Commission deems satisfactory within a time frame specified by the Commission, the acceptability of the model shall be suspended pending submission of the necessary documentation. The Chair shall notify the modeling organization by letter of such suspension. Once the documentation is provided by the modeling organization, the Chair shall review the documentation with at least three members of the Professional Team, and if the Chair determines that the documentation is appropriate, shall send a letter to the modeling organization indicating that the documentation is acceptable and the suspension is lifted.

In the case of Type II differences:

1. The Chair, in consultation with at least three members of the Professional Team, shall determine whether the modeling organization has already revised the model to address the differences to conform to the standards or is capable of addressing the differences within fourteen days after notifying the Commission of the discovery of Type II differences. If the model has been revised or can be revised within the fourteen day time frame, the modeling organization shall submit an addendum to the submission for the model previously-found acceptable thereby documenting the revisions, explaining the reasons for the differences, and providing any necessary backup documentation. If trade secret information is involved, the modeling organization shall include this fact in its notification to the Commission.
2. The Chair shall place the modeling organization's notification on the agenda for a special or regularly scheduled meeting of the Commission. The scheduling of the Commission meeting shall depend on the nature of the differences and the time frame for appropriate revisions to be made. The Chair shall provide Commission members with a copy of the modeling organization's notification and report the status related to the modeling organization's revision plan if on-going actions are required.
3. If the modeling organization has not made the necessary revisions to the model to conform to the standards, the Chair shall provide in advance of the meeting a proposed plan of action for the Commission's consideration. The Vice Chair or, if not available to chair the meeting, a Committee Chair appointed by the Chair, shall preside at the meeting. The Commission shall consider the Chair's proposal and, upon the proposal being moved and seconded, vote on the plan of action of the Chair, and any other alternative recommendations or amendments that are raised in the form of a motion that has been duly made and seconded by another Commission member. All plans of action shall include specific time frames including deadlines and the required documentation regarding the necessary revisions to conform to the standards.

4. Once the modeling organization has made the appropriate revisions within the Commission's specified time frames, as verified by the Chair in consultation with at least three members of the Professional Team, the Chair shall call a special meeting or include an agenda item on the Commission's next regularly scheduled meeting for the purpose of reviewing the revisions to the model needed in order for the model to comply with the standards. The Commission shall review the model as it deems necessary and may go into a closed session for discussion of trade secrets. The Commission shall conduct a minimum of seven votes (one for each grouping of standards) with the option of any member being allowed to request a carve out of a specific standard or standards (without the requirement for a second to such motion).

The basic process adopted in the *Flood Standards Report of Activities* regarding the "Process for Determining the Acceptability of a Computer Simulation Flood Model" in **VI. Review by the Commission, A. General Review of a Model, B. Meeting to Determine Acceptability, C. Modeling Organization Presentation, and D. Acceptability and Notification**, will be followed. The notification letter regarding the acceptability of the model shall be revised to acknowledge the type of differences discovered and the revisions from the original model related to the previously-acceptable model version. The new model version identification as assigned by the modeling organization shall be noted, and the revised model shall supersede the previously-acceptable model. The acceptability of the revised model shall expire at the end of the current cycle as provided for in **VI. Review by the Commission, K. Expiration of a Model Found Acceptable**, unless additional differences are discovered prior to expiration.

5. If the modeling organization fails to make the appropriate revisions within the Commission's specified time frame, the model shall be suspended until the appropriate revisions are made to conform the model such that it meets the standards. The Chair shall send a letter to the modeling organization indicating that the acceptability of the model has been suspended until the Commission votes on the acceptability of the revised model and a new model version identification has been assigned by the modeling organization. Once the Commission has determined acceptability of the revised model, the revised model shall supersede the previously-acceptable model. The acceptability of the revised model shall expire at the end of the current cycle as provided for in **VI. Review by the Commission, K. Expiration of a Model Found Acceptable**, unless additional differences are discovered prior to expiration.

In the case of Type III differences:

1. The acceptability of the model shall be suspended upon receipt of the notification of Type III differences or at any time during a Commission review where the magnitude of such differences are discovered and can be documented. The Chair shall send the modeling organization a letter indicating that the acceptability of the model by the Commission has been suspended immediately upon such notification or discovery and shall remain suspended until the Commission investigates and takes action regarding the modeling organization's steps necessary to address the differences in order to bring the model in compliance with the standards as adopted in this *Flood Standards Report of Activities*.

2. The Chair, in consultation with at least three members of the Professional Team, shall determine whether the modeling organization has already revised the model to address the differences necessary to conform the model to the standards or is capable of addressing the differences within fourteen days of notifying the Commission or discovery of the Type III differences by the Professional Team or Commission. If the model has been revised or can be revised within the fourteen day time frame, the modeling organization shall submit an addendum to the submission for the model previously-found acceptable thereby documenting the revisions, explaining the reasons for the differences, and providing any necessary backup documentation. If trade secret information is involved, the modeling organization shall so indicate in its notification to the Commission.
3. The Chair shall place the modeling organization's notification or discovery by the Professional Team or Commission on the agenda for a special or regularly scheduled meeting of the Commission. The scheduling of the Commission meeting shall depend on the nature of the differences and the time frame for appropriate revisions to be made. The Chair shall provide Commission members with a copy of the modeling organization's notification and report the status related to the modeling organization's revision plan if on-going actions are required.
4. If the modeling organization has not made any revisions to the model to conform to the standards, the Chair shall provide in advance of the meeting a proposed plan of action for the Commission's consideration. The Vice Chair or, if not available to chair the meeting, a Committee Chair appointed by the Chair, shall preside at the meeting. The Commission shall consider the Chair's proposal and, upon the proposal being moved and seconded, vote on the Chair's proposed plan of action, and any other alternative recommendations or amendments that are raised in the form of a motion that has been duly made and seconded by another Commission member. All plans of action shall include specific time frames including deadlines and documentation regarding the needed revisions for the modeling organization in order for the model to conform to the standards.
5. If the modeling organization has already revised the model or once the modeling organization has made the appropriate revisions within the Commission's specified time frames, as verified by the Chair in consultation with at least three members of the Professional Team, the Chair shall call a special meeting or include an agenda item on the Commission's next regularly scheduled meeting for the purpose of reviewing the revisions to the model needed in order for the model to comply with the standards. The Commission shall review the model as it deems necessary and may go into a closed session for a discussion of trade secrets. The Commission shall conduct a minimum of seven votes (one for each grouping of standards) with the option of any member being allowed to request a carve out of a specific standard or standards (without the requirement for a second to such motion).

The basic process adopted in the *Flood Standards Report of Activities* regarding the "Process for Determining the Acceptability of a Computer Simulation Flood Model" in **VI. Review by the Commission, A. General Review of a Model, B. Meeting to**



**Determine Acceptability, C. Modeling Organization Presentation, and D. Acceptability and Notification**, will be followed. The notification letter regarding the acceptability of the model shall be revised to acknowledge the type of differences discovered and the revisions from the original submission related to the previously-acceptable model version. The new model version identification as assigned by the modeling organization shall be noted, and the revised model shall supersede the previously-acceptable model. The acceptability of the revised model shall expire at the end of the current cycle as provided for in **VI. Review by the Commission, K. Expiration of a Model Found Acceptable**, unless additional differences are discovered prior to expiration.

6. If the modeling organization fails to make the appropriate revisions within sixty days of the Commission being notified or the date where the Commission discovered the Type III differences, the acceptability of the model shall be withdrawn subject to the appeal process as specified in **VI. Review by the Commission, E. Appeal Process to be Used by a Modeling Organization if a Model is Not Found to be Acceptable by the Commission**. If there is no appeal or the appeal is unsuccessful, the modeling organization shall be required to wait until the next review cycle as determined by time frames established in the next *Flood Standards Report of Activities* scheduled for publication in 2021.

**G. Interim Model Updates after a Model has been Determined to be Acceptable by the Commission.** If a modeling organization makes updates/revisions to the model where (1) the model update scope and utility is unrelated to flood loss costs or flood probable maximum loss levels for Florida and does not include the Florida flood model component, and (2) there are no changes to the flood loss costs or flood probable maximum loss levels for Florida, the modeling organization shall notify the Chair of the Commission in writing. The notification shall detail the nature of the updates/revisions, the effect on the underlying acceptable model, and the effect on the modeled results.

The notification shall also include Form VF-3, Flood Mitigation Measures, Range of Changes in Flood Damage, Form AF-1, Zero Deductible Personal Residential Standard Flood Loss Costs, Form AF-4, Flood Output Ranges, and Form AF-6, Flood Probable Maximum Loss for Florida, completed for the current accepted model and the proposed updated/revised version of the model, and a percentage change comparison between the two versions to demonstrate no change. The proposed updated/revised model shall be clearly identified with a new/unique model version identification under the modeling organization's model revision policy.

Depending on the nature of the interim updates/revisions, the Chair in consultation with the Professional Team may recommend that the Professional Team conduct an on-site review or a virtual review provided the modeling organization is in agreement and can provide access to full modeling material.

The Chair shall review the notification and inform the Commission members as soon as possible, and assess, with at least three members of the Professional Team, the regression test results. If there is no change in the underlying acceptable model and no change in the

modeled results, the Chair shall send an updated acceptability notification letter to the modeling organization denoting that the interim model updates/revisions do not produce significant differences in flood loss costs and flood probable maximum loss levels from the currently-accepted model and the same expiration date shall apply as for the currently-accepted model. The new model version identification as assigned by the modeling organization shall be noted.

If the Chair, in consultation with at least three members of the Professional Team, determines there is a change in the underlying acceptable model or a change in the modeled results, then the Chair shall send a letter to the modeling organization as soon as practical notifying the modeling organization of a pending review by the Commission. The Chair shall determine the need for a special meeting or whether the issue can be addressed at the next regularly scheduled meeting of the Commission. The purpose of the special Commission meeting shall be to review the interim model updates/revisions and any other aspect of the model which might have changed in order to ensure that the model continues to comply with the standards. The Commission shall conduct a minimum of seven votes (one for each grouping of standards) with the option of any member being allowed to request a carve out of a specific standard or standards (without the requirement for a second to such motion). The basic process adopted in the *Flood Standards Report of Activities* regarding the “Process for Determining the Acceptability of a Computer Simulation Flood Model” in **VI. Review by the Commission, A. General Review of a Model, B. Meeting to Determine Acceptability, C. Modeling Organization Presentation, and D. Acceptability and Notification**, will be followed. The notification letter regarding the acceptability of the model shall be revised to acknowledge the interim model updates/revisions to the previously acceptable model. The new model identification as assigned by the modeling organization shall be noted. Once the Commission has determined acceptability of the revised model, the revised model shall supersede the previously acceptable model. The acceptability of the revised model shall expire at the end of the current cycle as provided for in **VI. Review by the Commission, K. Expiration of a Model Found Acceptable**.

If the revised model’s proposed interim model updates/revisions are not found to be acceptable by the Commission, the Chair shall send a letter to the modeling organization noting such and that the model previously-found to be acceptable by the Commission shall continue to be acceptable and expires as originally provided for in **VI. Review by the Commission, K. Expiration of a Model Found Acceptable**.

The appeal process as specified in **VI. Review by the Commission, E. Appeal Process to be Used by a Modeling Organization if a Model is Not Found to be Acceptable by the Commission**, shall not be applicable. This will require the modeling organization to make any contemplated model updates/revisions for the Commission’s consideration in the next review cycle as determined by time frames established in the next *Flood Standards Report of Activities* scheduled for publication in 2021.

**H. Interim Updates to Geographical or Other Data after a Model has been Determined to be Acceptable by the Commission.** If a modeling organization updates geographic location data within the model or makes other updates to data where the underlying model determined acceptable by the Commission has not been updated or revised, the

modeling organization shall notify the Chair of the Commission in writing. The notification shall detail the nature of the updates and the effect on the modeled results.

The notification shall include Form VF-3, Flood Mitigation Measures, Range of Changes in Flood Damage, Form AF-1, Zero Deductible Personal Residential Standard Flood Loss Costs, Form AF-4, Flood Output Ranges, and Form AF-6, Flood Probable Maximum Loss for Florida, completed for the current accepted model and the proposed updated/revised version of the model, and a percentage change comparison between the two versions. The proposed interim data update designation as assigned by the modeling organization shall be clearly identified.

If a modeling organization updates geographic location data within the model, the modeling organization shall also provide maps showing ZIP Code centroids (previous and updated) for the entire state of Florida. The modeling organization shall provide a sorted list of all ZIP Code centroid movements of one mile or more, the top ten movements (if fewer than ten move at least one mile), and a list of new and retired ZIP Codes. The corresponding primary county for each ZIP Code listed shall be provided. The modeling organization shall provide a list of all ZIP Code related databases used by the model and describe the impact to these databases due to the updated ZIP Codes (including roughness factors, building construction, and ZIP Code specific vulnerability functions).

If backup documentation required is of a proprietary nature involving trade secrets, the Commission shall discuss only such items in a closed session. If trade secret information is involved, the modeling organization shall include this fact in its notification to the Commission.

In situations involving other data updates as indicated in the modeling organization submission in response to Standard GF-1, Scope of the Flood Model and Its Implementation, Disclosure 5, the modeling organization shall describe the impact of the data updates on flood loss costs and flood probable maximum loss levels and indicate why such interim data updates are considered necessary. The modeling organization shall provide a list of all databases used by the model related to the data updates and describe the impact to these databases due to the updates. The Commission shall not consider other interim data updates to the model unless such possible updates have been disclosed by the modeling organization in the submission response to Standard GF-1, Scope of the Flood Model and Its Implementation, Disclosure 5.

The Chair shall review the notification and inform the Commission members as soon as possible, and assess, with at least three members of the Professional Team, the regression test results. If the regression test results confirm that the model has not changed with regard to flood loss costs and flood probable maximum loss levels, the Chair shall send an updated acceptability notification letter to the modeling organization denoting that the interim data updates do not produce significant differences in flood loss costs and flood probable maximum loss levels from the currently-accepted model. The same model version identification and a distinction made for the interim data update(s) as assigned by the modeling organization shall be noted. The acceptability of the model with the interim data update(s) shall expire at the end of the current cycle as provided for in **VI. Review**

**by the Commission, K. Expiration of a Model Found Acceptable.**

If the Chair, in consultation with at least three members of the Professional Team, determines that there are changes due to the geographical data updates reported or other interim data updates as provided for in Standard GF-1, Scope of the Flood Model and Its Implementation, Disclosure 5, then the Chair shall send a letter to the modeling organization as soon as practical notifying the modeling organization of a pending review by the Commission. The Chair shall determine the need for a special meeting or whether the issue can be addressed at the next regularly scheduled meeting of the Commission. The purpose of the special Commission meeting shall be to review the data updates and any other aspect of the model which might have changed in order to ensure that the model continues to comply with the standards. The Commission shall conduct a minimum of seven votes (one for each grouping of standards) with the option of any member being allowed to request a carve out of a specific standard or standards (without the requirement for a second to such motion). The basic process adopted in the *Flood Standards Report of Activities* regarding the “Process for Determining the Acceptability of a Computer Simulation Flood Model” in **VI. Review by the Commission A. General Review of a Model, B. Meeting to Determine Acceptability, C. Modeling Organization Presentation, and D. Acceptability and Notification** will be followed. The notification letter regarding the acceptability of the model shall be revised to acknowledge the nature of the data updates to the previously acceptable model version. The new model version identification and a distinction made for the interim data updates as assigned by the modeling organization shall be noted. Once the Commission has determined acceptability of the revised model, the revised model shall supersede the previously-acceptable model. The acceptability of the revised model shall expire at the end of the current cycle as provided for in **VI. Review by the Commission, K. Expiration of a Model Found Acceptable.**

If the revised model’s proposed data updates are not found to be acceptable by the Commission, the Chair shall send a letter to the modeling organization noting such and that the model previously-found acceptable by the Commission shall continue to be acceptable and shall expire as originally provided for in **VI. Review by the Commission, K. Expiration of a Model Found Acceptable.**

The appeal process as specified in **VI. Review by the Commission, E. Appeal Process to be Used by a Modeling Organization if a Model is Not Found to be Acceptable by the Commission** shall not be applicable. This will require the modeling organization to make the contemplated data updates for consideration by the Commission in the next review cycle as determined by time frames established in the next *Flood Standards Report of Activities* scheduled for publication in 2021.

**I. Review and Acceptance Criteria for Functionally Equivalent Model Platforms.** If a modeling organization has designed its model to operate on two or more platforms, the Commission may find the model as run on the various platforms acceptable under the following circumstances and procedures.

1. The various model platforms shall be submitted for review at one time by the designated submission deadline and shall be capable of being reviewed concurrently

by the Commission, including the Professional Team's on-site review, such that all platforms can be reviewed as to their functional equivalence.

2. Functional equivalence shall be recognized as long as no flood loss costs differ with regard to any platform at the rounded third decimal place (thus there should be no changes in the published Form VF-3, Flood Mitigation Measures, Range of Changes in Flood Damage, Form AF-1, Zero Deductible Personal Residential Standard Flood Loss Costs, and Form AF-4, Flood Output Ranges), and flood probable maximum loss does not differ by more than  $\pm 1\%$  for any flood probable maximum loss level (Form AF-6, Flood Probable Maximum Loss for Florida).
3. The model as implemented on the various platforms shall have the same model version identification with a notation to designate the specific model platform(s). The modeling organization shall specify which platform is the primary platform and which platform(s) are the functionally equivalent platform(s). This information shall be disclosed in the modeling organization submission in response to Standard GF-1, Scope of the Flood Model and Its Implementation, Disclosure 1.
4. The modeling organization shall not be allowed to make separate submissions during a review cycle and any difference between model platforms shall be required to be fully described in the modeling organization's original submission.
5. The only differences in modeled results shall be demonstrated to be solely due to the nature of the model platform(s) or any other technological constraint that would account for no more than the designated variations noted above.

Once the Commission has determined functional equivalence of the model platform(s), the Chair shall send an acceptability notification letter to the modeling organization designating specifically which model platform(s) were found to be functionally equivalent and acceptable by the Commission.

- J. Model Update for Consistency of Hurricane and Flood Models after the Model has been Determined to be Acceptable by the Commission.** If the modeling organization proposes to update a hurricane or flood model previously determined acceptable by the Commission as a result of changes to the other model, the modeling organization shall notify the Chair of the Commission in writing. The notification shall detail the nature of the proposed updates, the effect on the modeled results (i.e., the impact on flood loss costs and flood probable maximum loss levels), and include all submission materials that are impacted. If trade secret information is involved, the modeling organization shall include this fact in the notification to the Commission.

Depending on the nature of the updates, the Chair in consultation with at least three members of the Professional Team, will review the notification and materials provided to determine whether to process the proposed updates immediately or defer until the next scheduled review cycle. Depending on the nature of the update, the Chair may recommend that the Professional Team conduct an on-site review or a virtual review provided the modeling organization is in agreement and can provide access to full modeling material.

If the Chair, in consultation with at least three members of the Professional Team, determines that the documentation and explanations provided by the modeling organization are sufficient, no further review is necessary by the Commission. The Chair shall provide an updated acceptability notification letter to the modeling organization acknowledging the update notification and noting that the model update produces minor differences in flood loss costs and flood probable maximum loss levels from the current accepted model, that the Commission accepts the modeling organization's addendum to its previous submission, and that the same expiration date shall apply as for the current accepted model.

If the Chair, in consultation with at least three members of the Professional Team, determines there are significant differences in the underlying acceptable model or there are significant differences in the modeled results, then the Chair shall send a letter to the modeling organization as soon as practical notifying the modeling organization of a pending review by the Commission. The Chair shall determine the need for a special meeting or whether the issue can be addressed at the next regularly scheduled meeting of

the Commission. The purpose of the special Commission meeting shall be to review the model update and any other aspect of the model which might have changed in order to ensure that the model continues to comply with the standards. The Commission shall conduct a minimum of seven votes (one for each grouping of standards) with the option of any member being allowed to request a carve out of a specific standard or standards (without the requirement for a second to such motion). The basic process adopted in the *Flood Standards Report of Activities* regarding the "Process for Determining the Acceptability of a Computer Simulation Flood Model" in **VI. Review by the Commission, A. General Review of a Model, B. Meeting to Determine Acceptability, C. Modeling Organization Presentation, and D. Acceptability and Notification** will be followed.

The notification letter regarding the acceptability of the model shall be revised to acknowledge the model update to the previously acceptable model. The new model identification as assigned by the modeling organization shall be noted. Once the Commission has determined acceptability of the revised model, the revised model shall supersede the previously acceptable model. The acceptability of the revised model shall expire at the end of the current cycle as provided for in **VI. Review by the Commission, K. Expiration of a Model Found Acceptable.**

If the revised model's proposed model update is not found to be acceptable by the Commission, the Chair shall send a letter to the modeling organization noting such and that the model previously-found acceptable by the Commission shall continue to be acceptable and expires as originally provided for in **VI. Review by the Commission, K. Expiration of a Model Found Acceptable.**

The appeal process as specified in **VI. Review by the Commission, E. Appeal Process to be Used by a Modeling Organization if a Model is Not Found to be Acceptable by the Commission** shall not be applicable. This will require the modeling organization to

make any contemplated model update for the Commission's consideration in the next review cycle as determined by time frames established in the next *Flood Standards Report of Activities* scheduled for publication in 2021.

- K. Expiration of a Model Found Acceptable.** The determination of acceptability of a model found acceptable under the standards contained in the *Flood Standards Report of Activities as of November 1, 2017*, expires on November 1, 2024.

## Flood Model Submission Checklist

A. Please indicate by checking below that the following has been included in your model submission documentation to the Florida Commission on Hurricane Loss Projection Methodology.

Yes	No	Item
		1. Letter to the Commission
		a. Refers to the signed Expert Certification forms and states that professionals having credentials and/or experience in the areas of meteorology, hydrology, hydraulics, statistics, structural engineering, actuarial science, and computer/information science have reviewed the model for compliance with the standards
		b. States model is ready to be reviewed by the Professional Team
		c. Any caveats to the above statements noted with a detailed explanation
		2. Summary statement of compliance with each individual standard and the data and analyses required in the disclosures and forms
		3. General description of any trade secret information the modeling organization intends to present to the Professional Team and the Commission
		4. Flood Model Identification
		5. Eight bound copies (duplexed)
		6. Link e-mailed to SBA staff containing all required documentation that can be downloaded from a single ZIP file
		a. Submission document and Form AF-1, Zero Deductible Personal Residential Standard Flood Loss Costs in PDF format
		b. PDF submission file supports highlighting and hyperlinking, and is bookmarked by standard, form, and section
		c. Data file names include abbreviated name of modeling organization, standards year, and form name (when applicable)
		d. Forms VF-3, Flood Mitigation Measures Range of Changes in Flood Damage, AF-1, Zero Deductible Personal Residential Standard Flood Loss Costs, AF-2, Total Flood Statewide Loss Costs, AF-3, Personal Residential Standard Flood Loss Costs by ZIP Code, AF-4, Flood Output Ranges, and Form AF-6, Flood Probable Maximum Loss for Florida in Excel format
		e. Forms VF-4, Coastal Flood Mitigation Measures, Mean Coastal Flood Damage Ratios and Coastal Flood Damage/\$1,000 (Trade Secret Item), VF-5, Inland Flood Mitigation Measures, Mean Inland Flood Damage Ratios and Inland Flood Damage/\$1,000 (Trade Secret Item), and AF-5, Logical Relationship to Flood Risk (Trade Secret Item) in Excel format if not considered as Trade Secret
		7. All hyperlinks to the locations of forms are functional
		8. Table of Contents
		9. Materials consecutively numbered from beginning to end starting with the first page (including cover) using a single numbering system, including date and time in footnote
		10. All tables, graphs, and other non-text items consecutively numbered using whole numbers, listed in Table of Contents, and clearly labeled with abbreviations defined
		11. All column headings shown and repeated at the top of every subsequent page for forms and tables



Yes	No	Item
		12. Standards, disclosures, and forms in <i>italics</i> , modeling organization responses in non-italics
		13. All graphs and maps conform to guidelines in <b>II. Notification Requirements A.4.e</b>
		14. All units of measurement clearly identified with appropriate units used
		15. All forms included in submission appendix except Trade Secret Items. If forms designated as a Trade Secret Item are not considered as trade secret, those forms are to be included in the submission appendix
		16. Hard copy documentation identical to electronic version
		17. Signed Expert Certification Forms GF-1 to GF-8
		18. All acronyms listed and defined in submission appendix

B. Explanation of “No” responses indicated above. (Attach additional pages if needed.)

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\_\_\_\_\_  
Model Name and Identification

\_\_\_\_\_  
Modeler Signature

\_\_\_\_\_  
Date

## **VI. ON-SITE REVIEW**

## ON-SITE REVIEW BY PROFESSIONAL TEAM

### *General Purpose*

The purpose of the on-site review is to evaluate the compliance of the flood model with the flood standards. The on-site review is conducted in conjunction with the **Process for Determining the Acceptability of a Computer Simulation Flood Model**. It is not intended to provide a preliminary peer review of the flood model. The goal of the Professional Team's efforts is to provide the Commission with a clear and thorough report of the flood model as required in the acceptability process, subject to non-disclosure conditions. All modifications, adjustments, assumptions, or other criteria that were included in producing the information required by the Commission in the flood model submission shall be disclosed to the Professional Team to be reviewed.

The Professional Team will begin the review with a briefing to modeling organization personnel to discuss the review schedule and to describe the subsequent review process.

The on-site review by the Professional Team involves the following:

1. Due diligence review of information submitted by the modeling organization.
2. On-site tests of the flood model under the control and supervision of the Professional Team. The objective is to observe the flood model in operation and the results it produces during a "real time" run. This is necessary in order to avoid the possibility that the modeling organization could recalibrate the flood model solely for producing desirable results.
3. Verification that information provided by the modeling organization in the disclosures and forms is valid and is an accurate and fairly complete description of the flood model.
4. Review for compliance with the flood standards.
5. Review of trade secret items.

Feedback regarding compliance of the flood model with the flood standards will be provided to the modeling organization throughout the review process.

### *Preparation for On-Site Review*

The Professional Team assists the Commission and SBA staff in determining if a modeling organization is ready for an on-site review.

The Professional Team assists the modeling organization in preparing for the on-site review by providing to SBA staff a detailed pre-visit letter (to be sent to the modeling organization) outlining specific issues to be addressed by the modeling organization unique to the flood model submission. The Professional Team makes every effort to identify substantial issues with the flood model or the flood model submission to allow the modeling organization adequate time to

prepare for the on-site review. As the Professional Team continues to prepare for the review, it may discover issues not originally covered in the pre-visit letter prior to the on-site review. Such issues will be introduced at the opening briefing of the on-site review. The discovery of errors in the flood model by the Professional Team is a possible outcome of the review. It is the responsibility of the modeling organization to assure the validity and correctness of the flood model and the flood model submission.

**Telephone Conference Call:** After the Commission has determined the modeling organization is ready to continue in the review process and prior to the on-site review, at the request of the Commission or the modeling organization, SBA staff will arrange a telephone conference call between the modeling organization and the Professional Team or a subset of the Professional Team. The purpose of the call is to review the pre-visit letter, material, data files, and personnel that need to be on-site during the review. This does not preclude the Professional Team from asking for additional information during the on-site review that was not discussed during the conference call or included in the pre-visit letter. The call allows the modeling organization and the Professional Team the opportunity to clarify any concerns or to ask questions regarding the upcoming on-site review. This call is the only scheduled opportunity for the modeling organization to clarify any questions directly with the Professional Team prior to the on-site review.

**Scheduling:** SBA staff is responsible for scheduling on-site review dates. Each modeling organization will be notified at least two weeks prior to the scheduled review. The actual length of the review may vary depending on the preparedness of the modeling organization and the depth of the inquiry needed for the Professional Team to obtain an understanding of the flood model. The Commission expects flood models under consideration to be well-prepared for a review by the Professional Team. In particular, it is suggested that a modeling organization conduct a detailed self-audit to assure that it is ready for the Professional Team review.

**Presentation of Materials:** The modeling organization shall have all necessary materials and data on-site for review. All material referenced in the flood model submission as “will be shown to the Professional Team” and all material that the modeling organization intends to present to the Commission, including trade secret items, shall be presented to the Professional Team during the on-site review.

The modeling organization shall provide upon arrival of the Professional Team, and **before the review can officially commence**, seven printed copies of:

1. The modeling organization’s presentations,
2. The tables required in CI-1F, Flood Model Documentation, Audit 7,
3. All figures with scales for the  $x$ - and  $y$ -axes labeled that are not so labeled in the flood model submission. The figures should be labeled with the same figure number as given in the flood model submission,
4. Form HHF-3, Coastal Flood Characteristics by Annual Exceedance Probabilities (Trade Secret Item),

5. Form HHF-5, Inland Flood Characteristics by Annual Exceedance Probabilities (Trade Secret Item),
6. Form VF-4, Coastal Flood Mitigation Measures, Mean Coastal Flood Damage Ratios and Coastal Flood Damage/\$1,000 (Trade Secret Item),
7. Form VF-5, Inland Flood Mitigation Measures, Mean Inland Flood Damage Ratios and Inland Flood Damage/\$1,000 (Trade Secret Item), and
8. Form AF-5, Logical Relationship to Flood Risk (Trade Secret Item), all nine worksheets, color-coded contour or high-resolution map of the flood loss costs for slab foundation owners frame buildings (Notional Set 6), and scatter plot of the flood loss costs (y-axis) against distance to closest coast (x-axis) for slab foundation owners frame buildings (Notional Set 6).

The modeling organization shall also provide upon arrival of the Professional Team, and ***before the review can officially commence***, electronic spreadsheets of all forms where no cell contains an explicitly rounded or truncated value. The electronic files shall be provided on seven removable drives. The Professional Team will review and process the electronic files only on the removable drives.

The Professional Team will review selected computer/information components in conjunction with the review of various flood standards. Computer/information components shall be readily available and reviewable interactively allowing simultaneous visualization by all Professional Team members.

Access to critical articles or materials referenced in the flood model submission or during the on-site review shall be available on-site in hard copy or electronic form for the Professional Team.

The Professional Team shall be provided access to internet connections through the Professional Team members' personal computers for reference work that may be required during the on-site review.

The modeling organization should be prepared to have available for the Professional Team's consideration, all insurance claims data received, and be prepared to describe any processes used to develop or validate the flood model that incorporates this data.

The modeling organization should be prepared to provide for the Professional Team's review, all engineering data (e.g., post-event site investigations, laboratory or field testing results), and be prepared to describe any processes used to develop or validate the flood model that incorporates this data.

### ***Professional Team Report***

After completing its review of the flood standards the Professional Team will conduct an exit briefing with the modeling organization. During this briefing, the Professional Team will provide a preliminary draft of the Professional Team report. The modeling organization has the right to

expunge any trade secret information. The modeling organization will also have the opportunity to check for any factual errors. The Professional Team will consider modeling organization suggestions for changes in its draft to correct factual errors. If the modeling organization and the Professional Team dispute a particular item as a factual error, then the report would adopt the phrasing, “In the opinion of the Professional Team, ...”

The preliminary draft of the Professional Team report shall be made available to the Commission at the closed meeting where trade secrets used in the design and construction of the flood model are discussed. Any material deemed proprietary will be designated as trade secret. The preliminary draft will be placed in a sealed envelope marked “Confidential” with the date, time, and Professional Team leader’s signature across the seal. The draft will be kept by the modeling organization and returned to the Professional Team leader during the closed meeting to discuss trade secrets. At the conclusion of the closed meeting, the draft will be returned to the modeling organization.

The Professional Team report will include:

1. A list of participants,
2. Any changes made to the flood model submission that were reviewed by the Professional Team during the on-site review. These changes shall be provided to the Commission in the revised flood model submission at least ten days prior to the Commission meeting to review the flood model for acceptability,
3. A verification that any deficiencies identified by the Commission have been resolved,
4. A copy of the pre-visit letter,
5. A verification of compliance with the flood standards,
6. A description of material reviewed in support of compliance with the flood standards,
7. A list of materials needed in preparation for an additional verification review, if applicable,
8. A list of trade secret items that the Professional Team recommends be presented to the Commission during the closed meeting portion of the Commission meeting to review flood models for acceptability, and
9. A statement indicating where proprietary information has been removed.

After leaving the modeling organization’s premises, the Professional Team, in coordination with SBA staff, will finalize its report and provide it to Commission members in advance of the meeting to review the flood model for acceptability. Any disparate opinions among Professional Team members concerning compliance with the flood standards will be duly noted and explained in the final report.

### ***Additional Verification Review***

It is possible that a subset of the flood standards or changes made to the flood disclosures, forms, and trade secret items may require further review by the Professional Team or a subset of the Professional Team. In such cases, SBA staff will arrange an additional verification review, in accordance with the acceptability process, to verify those flood standards.

In preparation for an additional verification review, the Professional Team shall include in their report an initial set of materials needed for preparation prior to the re-visit. Non-trade secret materials shall be received by SBA staff no later than seven days prior to the additional verification review. Trade secret materials requested shall be provided at the onset of the additional verification review. Additional materials may be requested on-site by the Professional Team in order to verify the flood standards.

### ***Trade Secret Information***

While on-site, the Professional Team members are expected to have access to trade secret data and information. It is the responsibility of the modeling organization to identify to all Professional Team members what is a trade secret and is not to be made public.

All written documentation provided by the modeling organization to the Commission is considered a public document with the exception of documents provided during the closed meeting where trade secrets used in the design and construction of the flood model are discussed.

The modeling organization shall provide any additional information directly to the Commission rather than give it to Professional Team members to be brought back with them. Documents that the modeling organization indicates are trade secret that are viewed by Professional Team members are not public documents.

Any notes made by Professional Team members containing trade secrets will be expunged by the modeling organization and placed in a sealed envelope marked "Confidential" with the date, time, and Professional Team member's signature across the seal. The notes will be kept by the modeling organization and returned to the Professional Team member during the closed meeting to discuss trade secrets. At the conclusion of the closed meeting, all notes will be returned to the modeling organization.

Trade secrets of the modeling organization learned by a Professional Team member shall not be discussed with Commission members.

Professional Team members shall agree to respect the trade secret nature of the flood model and not use trade secret information in any way detrimental to the interest of the modeling organization.

Professional Team members shall not discuss other flood and hurricane models being evaluated while they are on-site reviewing a particular flood model.

### ***On-Site Review Results***

The Professional Team will present the results of the on-site review to the Commission and answer questions related to their review.

The job of the Professional Team is to verify information and make observations. It is not part of the Professional Team's responsibilities to opine or draw conclusions about the appropriateness of a particular flood model or a component part of a flood model.

Refer to the **Process for Determining the Acceptability of a Computer Simulation Flood Model** for additional information regarding the on-site review.



# PROFESSIONAL TEAM

## *Composition and Selection of the Professional Team*

A team of professional individuals, known as the Professional Team, conducts on-site reviews of modeling organizations seeking a determination of acceptability by the Commission. The Professional Team consists of individuals having professional credentials in the following disciplines with each area represented by one or more individuals:

- Actuarial Science
- Statistics
- Meteorology
- Hydrology and Hydraulics
- Computer/Information Science
- Coastal Engineering.

SBA staff selects the Professional Team members, and the SBA enters into contracts with each individual selected.

Selection of the Professional Team members is an aggressive recruiting process to seek out qualified individuals who are capable of working closely with the Commission and who are available during specified time frames in order that the Commission can meet its deadline(s). Consideration is given to the following factors:

- Professional credentials, qualifications, and specialized experience
- Reasonableness of fees
- Availability and commitment to the Commission
- References
- Lack of conflicts of interest.

## *Responsibilities of the Professional Team*

**Team Leader:** SBA staff designates one member of the Professional Team as the team leader. The team leader is responsible for coordinating the activities of the Professional Team and overseeing the development of reports to the Commission.

### **Team Members:**

1. Participate in preparations and discussions with the Commission and SBA staff prior to the on-site review.
2. Study, review, and develop an understanding of responses and materials provided to the Commission by the modeling organizations.
3. Participate with the Commission and SBA staff in developing, reviewing, and revising flood model tests and evaluations.

4. While on-site, verify, evaluate, and observe the techniques and assumptions used in the flood model for each member's area of expertise.
5. Identify and observe how various assumptions affect the flood model so as to identify to the Commission various sensitive components and aspects of the flood model.
6. Discuss the flood model with the modeling organization's professional staff to gain a clear understanding and confidence in the operation of the flood model and its description as provided to the Commission.
7. Participate in the administration of on-site tests.
8. Participate in the preparation of written reports and presentations to the Commission.

### ***Responsibilities of SBA Staff***

The Professional Team reports to designated SBA staff. SBA staff supervises the Professional Team and coordinates their pre-on-site planning activities, on-site reviews and activities, and post-on-site activities.

These responsibilities include:

1. Setting up meetings with Professional Team members individually and as a group. These meetings include conference calls and other meetings depending on circumstances and needs of the Commission.
2. Coordinating and scheduling on-site reviews.
3. Working with the Commission and Professional Team members in developing, reviewing, and revising flood model tests and evaluations.
4. Overseeing the supervision and administration of specified on-site tests and evaluations.
5. Working with the modeling organization to determine which professionals with the modeling organization should be available during the on-site review.
6. Briefing and de-briefing the Professional Team members prior to, during, and after the on-site review.
7. Coordinating the preparation of written reports and presentations to the Commission.
8. Coordinating the reimbursement of expenses per s. 112.061, F.S., for Professional Team members, Commission members, and SBA staff.

**VII. 2017 FLOOD STANDARDS,  
DISCLOSURES, AUDIT  
REQUIREMENTS, AND FORMS**

# Florida Commission on Hurricane Loss Projection Methodology

## Flood Model Identification

Name of Flood Model: \_\_\_\_\_

Flood Model Version Identification: \_\_\_\_\_

Interim Flood Model Update Version Identification: \_\_\_\_\_

\_\_\_\_\_

Flood Model Platform Name and Identifications: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Interim Data Update Designation: \_\_\_\_\_

Name of Modeling Organization: \_\_\_\_\_

Street Address: \_\_\_\_\_

City, State, ZIP Code: \_\_\_\_\_

Mailing Address, if different from above: \_\_\_\_\_

\_\_\_\_\_

Contact Person: \_\_\_\_\_

Phone Number: \_\_\_\_\_ Fax Number: \_\_\_\_\_

E-mail Address: \_\_\_\_\_

Date: \_\_\_\_\_

## Flood Model Submission Data

The following input data have been provided to the modeling organization on the enclosed CD.

### Input Data

Name	Description
NotionalInput17_Flood.xlsx	Notional structures and location grids for Form AF-1, Zero Deductible Personal Residential Standard Flood Loss Costs and Form AF-5, Logical Relationship to Flood Risk (Trade Secret Item)
VFEventFormsInput17.xlsx	Sample personal residential exposure data for 26 flood depths and 8 reference structures defined in Forms VF-1, Coastal Flood with Damaging Wave Action and VF-2, Inland Flood by Flood Depth
2017FormAF1.xlsx	Standard flood loss cost data format for Form AF-1, Zero Deductible Personal Residential Standard Flood Loss Costs
2017FormAF3.xlsx	Standard flood loss costs data format for Form AF-3, Personal Residential Standard Flood Loss Costs by ZIP Code
2017FormAF4.xlsx	Flood output ranges format for Form AF-4, Flood Output Ranges
2017FormAF5.xlsx	Logical relationship to flood risk exhibits format for Form AF-5, Logical Relationship to Flood Risk (Trade Secret Item)

Output shall be provided in specified output files as listed below. XXX denotes the abbreviated name of the modeling organization.

### Output Data

Name	Description
XXX17FormVF3.xlsx	Output data from Form VF-3, Flood Mitigation Measures, Range of Changes in Flood Damage
XXX17FormVF4.xlsx	Output data from Form VF-4, Coastal Flood Mitigation Measures, Mean Coastal Flood Damage Ratios and Coastal Flood Damage/\$1,000 (Trade Secret Item)
XXX17FormVF5.xlsx	Output data from Form VF-5, Inland Flood Mitigation Measures, Mean Inland Flood Damage Ratios and Inland Flood Damage/\$1,000 (Trade Secret Item)
XXX17FormAF1.xlsx and XXX17FormAF1.pdf	Underlying flood loss cost data from Form AF-1, Zero Deductible Personal Residential Standard Flood Loss Costs
XXX17FormAF2.xlsx	Output data from Form AF-2, Total Flood Statewide Loss Costs
XXX17FormAF3.xlsx	Output data from Form AF-3, Personal Residential Standard Flood Loss Costs by ZIP Code

Name	Description
XXX17FormAF4.xlsx	Flood output range exhibits from Form AF-4, Flood Output Ranges
XXX17FormAF5.xlsx	Output data from Form AF-5, Logical Relationship to Flood Risk (Trade Secret Item)
XXX17FormAF6.xlsx	Output data from Form AF-6, Flood Probable Maximum Loss for Florida

The modeling organization shall run various scenario flood events through the flood model on the input exposure data. The referenced output forms shall be completed and flood loss files provided in Excel and PDF format as specified.

Forms designated as a Trade Secret Item are to be provided if not considered as trade secret.

The file names shall include the abbreviated name of the modeling organization, the flood standards year, and the form name. Revised files shall also include the revision date.

## Notional Set 1 – Deductible Sensitivity

Name	Policy Form/Occupancy	Construction	Year Built	Number of Stories	Building Limit (A)	Personal Property Limit (B)	Event Deductible
Frame Owners	Owners	Frame	Unknown	Unknown	100,000	40,000	0%
Frame Owners	Owners	Frame	Unknown	Unknown	100,000	40,000	\$1,000
Frame Owners	Owners	Frame	Unknown	Unknown	100,000	40,000	\$1,500
Frame Owners	Owners	Frame	Unknown	Unknown	100,000	40,000	2% A
Frame Owners	Owners	Frame	Unknown	Unknown	100,000	40,000	5% A
Frame Owners	Owners	Frame	Unknown	Unknown	100,000	40,000	10% A
Masonry Owners	Owners	Masonry	Unknown	Unknown	100,000	40,000	0
Masonry Owners	Owners	Masonry	Unknown	Unknown	100,000	40,000	\$1,000
Masonry Owners	Owners	Masonry	Unknown	Unknown	100,000	40,000	\$1,500
Masonry Owners	Owners	Masonry	Unknown	Unknown	100,000	40,000	2% A
Masonry Owners	Owners	Masonry	Unknown	Unknown	100,000	40,000	5% A
Masonry Owners	Owners	Masonry	Unknown	Unknown	100,000	40,000	10% A
Manufactured Homes	Manufactured Homes	Manufactured Homes	Unknown	1	50,000	25,000	0%
Manufactured Homes	Manufactured Homes	Manufactured Homes	Unknown	1	50,000	25,000	\$1,000
Manufactured Homes	Manufactured Homes	Manufactured Homes	Unknown	1	50,000	25,000	\$1,500
Manufactured Homes	Manufactured Homes	Manufactured Homes	Unknown	1	50,000	25,000	2% A
Manufactured Homes	Manufactured Homes	Manufactured Homes	Unknown	1	50,000	25,000	5% A
Manufactured Homes	Manufactured Homes	Manufactured Homes	Unknown	1	50,000	25,000	10% A
Frame Renters	Renters	Frame	Unknown	Unknown	-	25,000	0
Frame Renters	Renters	Frame	Unknown	Unknown	-	25,000	\$1,000
Frame Renters	Renters	Frame	Unknown	Unknown	-	25,000	\$1,500
Frame Renters	Renters	Frame	Unknown	Unknown	-	25,000	2% B
Frame Renters	Renters	Frame	Unknown	Unknown	-	25,000	5% B
Frame Renters	Renters	Frame	Unknown	Unknown	-	25,000	10% B
Masonry Renters	Renters	Masonry	Unknown	Unknown	-	25,000	0%
Masonry Renters	Renters	Masonry	Unknown	Unknown	-	25,000	\$1,000
Masonry Renters	Renters	Masonry	Unknown	Unknown	-	25,000	\$1,500
Masonry Renters	Renters	Masonry	Unknown	Unknown	-	25,000	2% A
Masonry Renters	Renters	Masonry	Unknown	Unknown	-	25,000	5% A
Masonry Renters	Renters	Masonry	Unknown	Unknown	-	25,000	10% A
Frame Condo Unit	Condo Unit	Frame	Unknown	Unknown	10% B	50,000	0
Frame Condo Unit	Condo Unit	Frame	Unknown	Unknown	10% B	50,000	\$1,000
Frame Condo Unit	Condo Unit	Frame	Unknown	Unknown	10% B	50,000	\$1,500
Frame Condo Unit	Condo Unit	Frame	Unknown	Unknown	10% B	50,000	2% B
Frame Condo Unit	Condo Unit	Frame	Unknown	Unknown	10% B	50,000	5% B
Frame Condo Unit	Condo Unit	Frame	Unknown	Unknown	10% B	50,000	10% B
Masonry Condo Unit	Condo Unit	Masonry	Unknown	Unknown	10% B	50,000	0%
Masonry Condo Unit	Condo Unit	Masonry	Unknown	Unknown	10% B	50,000	\$1,000
Masonry Condo Unit	Condo Unit	Masonry	Unknown	Unknown	10% B	50,000	\$1,500
Masonry Condo Unit	Condo Unit	Masonry	Unknown	Unknown	10% B	50,000	2% B
Masonry Condo Unit	Condo Unit	Masonry	Unknown	Unknown	10% B	50,000	5% B
Masonry Condo Unit	Condo Unit	Masonry	Unknown	Unknown	10% B	50,000	10% B

## Notional Set 2 – Policy Form Sensitivity

Name	Policy Form/Occupancy	Construction	Year Built	Number of Stories	Building Limit (A)	Personal Property Limit (B)	Deductible
Frame Owners	Owners	Frame	Unknown	Unknown	100,000	40,000	0%
Masonry Owners	Owners	Masonry	Unknown	Unknown	100,000	40,000	0%
Frame Renters	Renters	Frame	Unknown	Unknown	-	25,000	0%
Masonry Renters	Renters	Masonry	Unknown	Unknown	-	25,000	0%
Frame Condo Unit	Condo Unit	Frame	Unknown	Unknown	10% B	50,000	0%
Masonry Condo Unit	Condo Unit	Masonry	Unknown	Unknown	10% B	50,000	0%

### Notional Set 3 – Policy Form/Construction Sensitivity

Name	Policy Form/Occupancy	Construction	Year Built	Number of Stories	Building Limit (A)	Personal Property Limit (B)	Deductible
Frame Owners	Owners	Frame	Unknown	Unknown	100,000	40,000	0%
Masonry Owners	Owners	Masonry	Unknown	Unknown	100,000	40,000	0%
Manufactured Homes	Manufactured Homes	Manufactured Homes	Unknown	1	50,000	25,000	0%

### Notional Set 4 – Coverage Sensitivity

Name	Policy Form/Occupancy	Construction	Year Built	Number of Stories	Building Limit (A)	Personal Property Limit (B)	Time Element	Deductible
Frame Owners	Owners	Frame	Unknown	Unknown	100,000	40,000	20% A	0%
Masonry Owners	Owners	Masonry	Unknown	Unknown	100,000	40,000	20% A	0%
Manufactured Homes	Manufactured Homes	Manufactured Homes	Unknown	1	50,000	25,000	20% A	0%
Frame Renters	Renters	Frame	Unknown	Unknown	-	25,000	40% B	0%
Masonry Renters	Renters	Masonry	Unknown	Unknown	-	25,000	40% B	0%
Frame Condo Unit	Condo Unit	Frame	Unknown	Unknown	10% B	50,000	40% B	0%
Masonry Condo Unit	Condo Unit	Masonry	Unknown	Unknown	10% B	50,000	40% B	0%

### Notional Set 5 – Year Built Sensitivity

Name	Policy Form/Occupancy	Construction	Year Built	Number of Stories	Building Limit (A)	Personal Property Limit (B)	Deductible
Frame Owners	Owners	Frame	1960	Unknown	100,000	40,000	0%
Frame Owners	Owners	Frame	1981	Unknown	100,000	40,000	0%
Frame Owners	Owners	Frame	2010	Unknown	100,000	40,000	0%
Frame Owners	Owners	Frame	2012	Unknown	100,000	40,000	0%
Masonry Owners	Owners	Masonry	1960	Unknown	100,000	40,000	0%
Masonry Owners	Owners	Masonry	1981	Unknown	100,000	40,000	0%
Masonry Owners	Owners	Masonry	2010	Unknown	100,000	40,000	0%
Masonry Owners	Owners	Masonry	2012	Unknown	100,000	40,000	0%
Manufactured Homes	Manufactured Homes	Manufactured Homes	1974	1	50,000	25,000	0%
Manufactured Homes	Manufactured Homes	Manufactured Homes	1992	1	50,000	25,000	0%
Manufactured Homes	Manufactured Homes	Manufactured Homes	2004	1	50,000	25,000	0%
Manufactured Homes	Manufactured Homes	Manufactured Homes	2012	1	50,000	25,000	0%
Frame Renters	Renters	Frame	1960	Unknown	-	25,000	0%
Frame Renters	Renters	Frame	1981	Unknown	-	25,000	0%
Frame Renters	Renters	Frame	2010	Unknown	-	25,000	0%
Frame Renters	Renters	Frame	2012	Unknown	-	25,000	0%
Masonry Renters	Renters	Masonry	1960	Unknown	-	25,000	0%
Masonry Renters	Renters	Masonry	1981	Unknown	-	25,000	0%
Masonry Renters	Renters	Masonry	2010	Unknown	-	25,000	0%
Masonry Renters	Renters	Masonry	2012	Unknown	-	25,000	0%
Frame Condo Unit	Condo Unit	Frame	1960	Unknown	10% B	50,000	0%
Frame Condo Unit	Condo Unit	Frame	1981	Unknown	10% B	50,000	0%
Frame Condo Unit	Condo Unit	Frame	2010	Unknown	10% B	50,000	0%
Frame Condo Unit	Condo Unit	Frame	2012	Unknown	10% B	50,000	0%
Masonry Condo Unit	Condo Unit	Masonry	1960	Unknown	10% B	50,000	0%
Masonry Condo Unit	Condo Unit	Masonry	1981	Unknown	10% B	50,000	0%
Masonry Condo Unit	Condo Unit	Masonry	2010	Unknown	10% B	50,000	0%
Masonry Condo Unit	Condo Unit	Masonry	2012	Unknown	10% B	50,000	0%



## Notional Set 6 – Foundation Type Sensitivity

Name	Policy Form/Occupancy	Construction	Year Built	Number of Stories	Building Limit (A)	Personal Property Limit (B)	Deductible	Foundation Type
Basement	Owners	Frame	1980	1	100,000	40,000	0%	1 Story Basement
Slab Foundation	Owners	Frame	1980	1	100,000	40,000	0%	Slab-on-Grade
Elevate 1	Owners	Frame	1980	1	100,000	40,000	0%	Elevated with Closed Area
Elevate 2	Owners	Frame	1980	1	100,000	40,000	0%	Elevated with BreakAway Wall
Elevate 3	Owners	Frame	1980	1	100,000	40,000	0%	Elevated with Open Area
Weak	Manufactured Homes	Manufactured Homes	1974	1	50,000	25,000	0%	Untied Foundation
Medium	Manufactured Homes	Manufactured Homes	1992	1	50,000	25,000	0%	Unknown
Strong	Manufactured Homes	Manufactured Homes	2004	1	50,000	25,000	0%	Tied Foundation

## Notional Set 7 – Condo Unit Floor Sensitivity

Name	Policy Form/Occupancy	Construction	Year Built	Number of Stories	Building Limit (A)	Personal Property Limit (B)	Deductible	Floor of Interest
Condo Unit A	Condo Unit	Concrete	1980	5	10% B	50,000	0%	1
Condo Unit A	Condo Unit	Concrete	1980	5	10% B	50,000	0%	2
Condo Unit A	Condo Unit	Concrete	1980	5	10% B	50,000	0%	3
Condo Unit A	Condo Unit	Concrete	1980	5	10% B	50,000	0%	4
Condo Unit B	Condo Unit	Concrete	1980	10	10% B	50,000	0%	1
Condo Unit B	Condo Unit	Concrete	1980	10	10% B	50,000	0%	2
Condo Unit B	Condo Unit	Concrete	1980	10	10% B	50,000	0%	3
Condo Unit B	Condo Unit	Concrete	1980	10	10% B	50,000	0%	4

## Notional Set 8 – Number of Stories Sensitivity

Name	Policy Form/Occupancy	Construction	Year Built	Number of Stories	Building Limit (A)	Personal Property Limit (B)	Deductible
Frame Owners	Owners	Frame	Unknown	1	100,000	40,000	0%
Frame Owners	Owners	Frame	Unknown	2	100,000	40,000	0%
Masonry Owners	Owners	Masonry	Unknown	1	100,000	40,000	0%
Masonry Owners	Owners	Masonry	Unknown	2	100,000	40,000	0%
Frame Renters	Renters	Frame	Unknown	1	-	25,000	0%
Frame Renters	Renters	Frame	Unknown	2	-	25,000	0%
Masonry Renters	Renters	Masonry	Unknown	1	-	25,000	0%
Masonry Renters	Renters	Masonry	Unknown	2	-	25,000	0%

## Notional Set 9 – Lowest Floor Elevation of Residential Structure Sensitivity

Name	Policy Form/Occupancy	Construction	Year Built	Number of Stories	Building Limit (A)	Personal Property Limit (B)	Deductible	First Floor Height Above Ground
Frame Owners	Owners	Frame	1980	1	100,000	40,000	0%	2 ft
Frame Owners	Owners	Frame	1980	1	100,000	40,000	0%	4 ft
Frame Owners	Owners	Frame	1980	1	100,000	40,000	0%	6 ft
Frame Owners	Owners	Frame	1980	1	100,000	40,000	0%	8 ft
Masonry Owners	Owners	Masonry	1980	1	100,000	40,000	0%	2 ft
Masonry Owners	Owners	Masonry	1980	1	100,000	40,000	0%	4 ft
Masonry Owners	Owners	Masonry	1980	1	100,000	40,000	0%	6 ft
Masonry Owners	Owners	Masonry	1980	1	100,000	40,000	0%	8 ft
Manufactured Homes	Manufactured Homes	Manufactured Homes	2004	1	50,000	25,000	0%	2 ft
Manufactured Homes	Manufactured Homes	Manufactured Homes	2004	1	50,000	25,000	0%	4 ft
Manufactured Homes	Manufactured Homes	Manufactured Homes	2004	1	50,000	25,000	0%	6 ft
Manufactured Homes	Manufactured Homes	Manufactured Homes	2004	1	50,000	25,000	0%	8 ft
Frame Renters	Renters	Frame	1980	1	-	25,000	0%	2 ft
Frame Renters	Renters	Frame	1980	1	-	25,000	0%	4 ft
Frame Renters	Renters	Frame	1980	1	-	25,000	0%	6 ft
Frame Renters	Renters	Frame	1980	1	-	25,000	0%	8 ft
Masonry Renters	Renters	Masonry	1980	1	-	25,000	0%	2 ft
Masonry Renters	Renters	Masonry	1980	1	-	25,000	0%	4 ft
Masonry Renters	Renters	Masonry	1980	1	-	25,000	0%	6 ft
Masonry Renters	Renters	Masonry	1980	1	-	25,000	0%	8 ft
Frame Condo Unit	Condo Unit	Frame	1980	3	10% B	50,000	0%	2 ft
Frame Condo Unit	Condo Unit	Frame	1980	3	10% B	50,000	0%	4 ft
Frame Condo Unit	Condo Unit	Frame	1980	3	10% B	50,000	0%	6 ft
Frame Condo Unit	Condo Unit	Frame	1980	3	10% B	50,000	0%	8 ft
Masonry Condo Unit	Condo Unit	Masonry	1980	3	10% B	50,000	0%	2 ft
Masonry Condo Unit	Condo Unit	Masonry	1980	3	10% B	50,000	0%	4 ft
Masonry Condo Unit	Condo Unit	Masonry	1980	3	10% B	50,000	0%	6 ft
Masonry Condo Unit	Condo Unit	Masonry	1980	3	10% B	50,000	0%	8 ft

*Figure 1*

## Florida County Codes

<b>County Code</b>	<b>County Name</b>	<b>County Code</b>	<b>County Name</b>	<b>County Code</b>	<b>County Name</b>
001	Alachua	049	Hardee	093	Okeechobee
003	Baker	051	Hendry	095	Orange
005	Bay	053	Hernando	097	Osceola
007	Bradford	055	Highlands	099	Palm Beach
009	Brevard	057	Hillsborough	101	Pasco
011	Broward	059	Holmes	103	Pinellas
013	Calhoun	061	Indian River	105	Polk
015	Charlotte	063	Jackson	107	Putnam
017	Citrus	065	Jefferson	109	St. Johns
019	Clay	067	Lafayette	111	St. Lucie
021	Collier	069	Lake	113	Santa Rosa
023	Columbia	071	Lee	115	Sarasota
027	De Soto	073	Leon	117	Seminole
029	Dixie	075	Levy	119	Sumter
031	Duval	077	Liberty	121	Suwannee
033	Escambia	079	Madison	123	Taylor
035	Flagler	081	Manatee	125	Union
037	Franklin	083	Marion	127	Volusia
039	Gadsden	085	Martin	129	Wakulla
041	Gilchrist	086	Miami-Dade	131	Walton
043	Glades	087	Monroe	133	Washington
045	Gulf	089	Nassau		
047	Hamilton	091	Okaloosa		

**Note:** These codes are derived from the Federal Information Processing Standards (FIPS) Codes.

Figure 2

## State of Florida By County

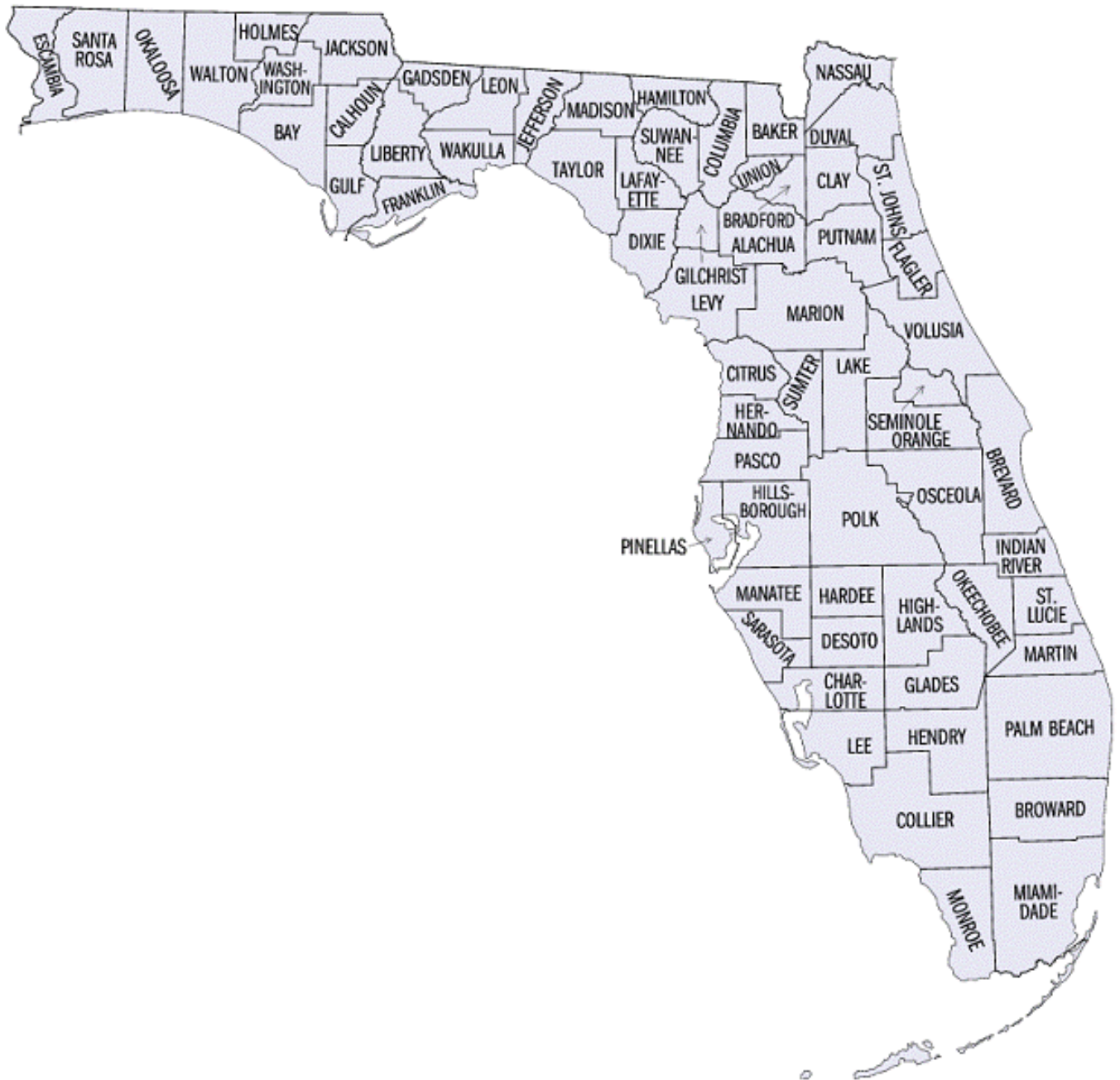
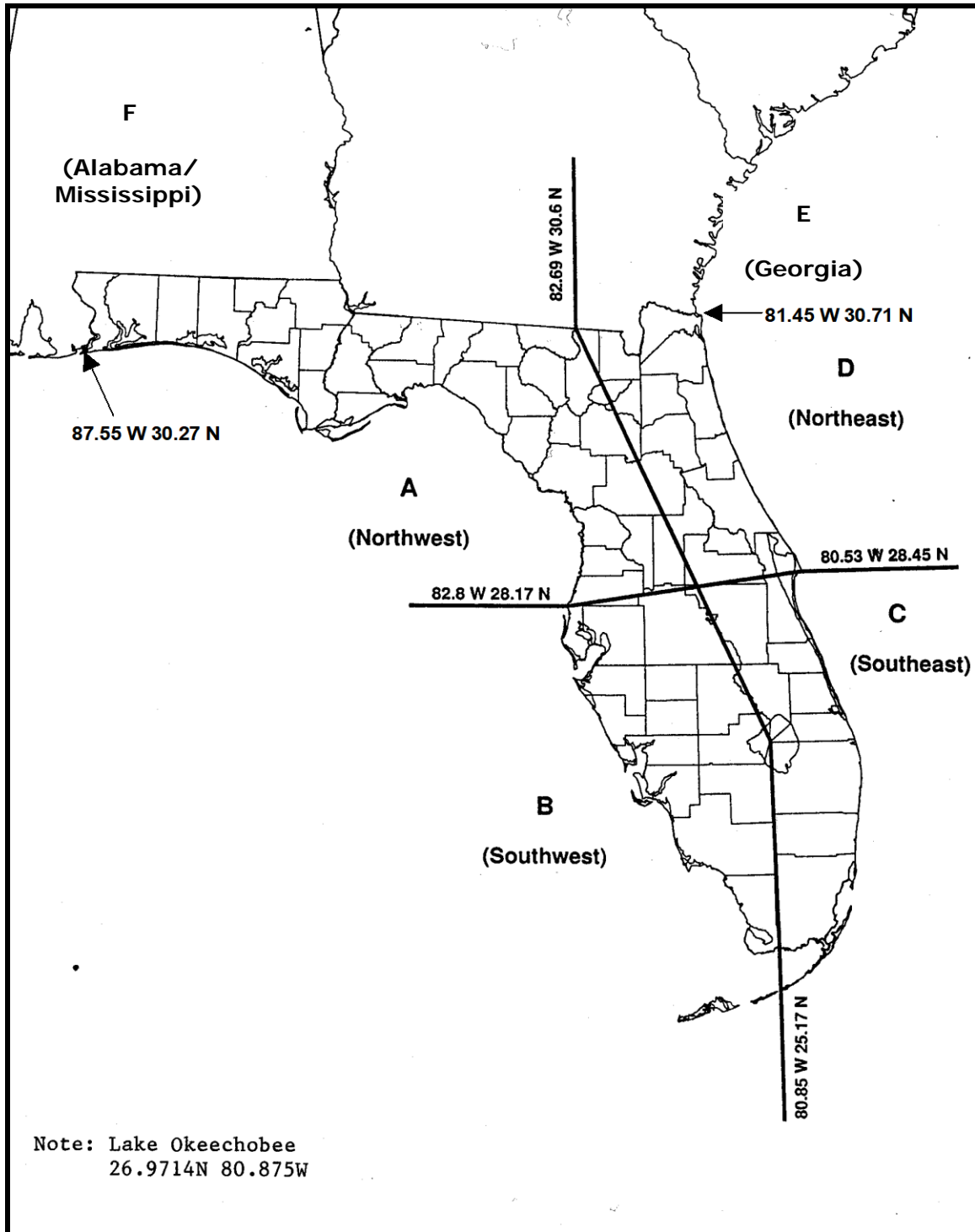


Figure 3

## State of Florida and Neighboring States By Region



## GENERAL FLOOD STANDARDS

### GF-1 Scope of the Flood Model and Its Implementation

- PI** A. *The flood model shall project loss costs and probable maximum loss levels for primary damage to insured personal residential property from flood events.*
- CS** B. *The modeling organization shall maintain a documented process to assure continual agreement and correct correspondence of databases, data files, and computer source code to slides, technical papers, and modeling organization documents.*
- CS** C. *All software and data (1) located within the flood model, (2) used to validate the flood model, (3) used to project modeled flood loss costs and flood probable maximum loss levels, and (4) used to create forms required by the Commission in the Flood Standards Report of Activities shall fall within the scope of the Computer/Information Flood Standards and shall be located in centralized, model-level file areas.*
- Statistics** D. *Differences between historical and modeled flood losses shall be reasonable, given available flood loss data.*

**Purpose:** This standard yields a high level view of the scope of the flood model to be reviewed, namely projecting flood loss costs and flood probable maximum loss levels for primary damage to insured personal residential property from flood events. The definition of flood as used in this standard is based on Section 627.715(1)(b), Florida Statutes. The scope of the flood model applies to all types of flooding determined to be scientifically feasible at a location (that is, where frequencies and severities of such events are available and can be projected) and is not limited to any specific subsets or types of flood peril.

**Relevant Form:** GF-1, General Flood Standards Expert Certification

### Disclosures

- PI** 1. Specify the flood model version identification. If the flood model submitted for review is implemented on more than one platform, specify each flood model platform. Specify which platform is the primary platform and verify how any other platforms produce the same flood model output results or are otherwise functionally equivalent as provided for in the “Process for Determining the Acceptability of a Computer Simulation Flood Loss Model” in VI. Review by the Commission, I. Review and Acceptance Criteria for Functionally Equivalent Model Platforms.

- Surge  
Waves  
Flood  
Meteorology  
Vulnerability  
Actuarial  
CS 2. Provide a comprehensive summary of the flood model. This summary should include a technical description of the flood model, including each major component of the flood model used to project loss costs and probable maximum loss levels for insured primary damage to personal residential property from flood events causing damage in Florida. Describe the theoretical basis of the flood model and include a description of the methodology, particularly the meteorology components, the hydrology and hydraulic components, the vulnerability components, and the insured flood loss components used in the flood model. The description should be complete and is not to reference unpublished work.
- CS 3. Provide a flowchart that illustrates interactions among major flood model components. [See MF-4.5](#)
- All teams 4. Provide a comprehensive list of complete references pertinent to the submission by flood standard grouping using professional citation standards.
- (NA) PI 5. Provide a list and description of any potential interim updates to underlying data relied upon by the flood model. State whether the time interval for the update has a possibility of occurring during the period of time the flood model could be found acceptable by the Commission under the review cycle in this *Flood Standards Report of Activities*.
- Actuarial 6. Identify and describe the modeling-organization-specified, predetermined, and comprehensive exposure dataset used for projecting personal residential flood loss costs and flood probable maximum loss levels.

## Audit

1. All primary technical papers that describe the underlying flood model theory and implementation (where applicable) should be available for review in hard copy or electronic form. Modeling-organization-specific publications cited must be available for review in hard copy or electronic form.
2. Compliance with the process prescribed in Standard GF-1.B in all stages of the flood modeling process will be reviewed.
3. Items specified in Standard GF-1.C will be reviewed as part of the Computer/Information Flood Standards.
4. Maps, databases, and data files relevant to the modeling organization's submission will be reviewed.
5. Justification for the differences in modeled versus historical flood losses will be reviewed, recognizing that flood loss data may be limited to internal or proprietary datasets.

6. The following information related to changes in the flood model, since the initial submission for each subsequent revision of the submission, will be reviewed.
  - A. Flood model changes:
    1. A summary description of changes that affect, or are believed to affect, the personal residential flood loss costs or flood probable maximum loss levels,
    2. A list of all other changes, and
    3. The rationale for each change.
  - B. Percentage difference in average annual zero deductible statewide flood loss costs based on a modeling-organization-specified, predetermined, and comprehensive exposure dataset for:
    1. All changes combined, and
    2. Each individual flood model component and subcomponent change.
  - C. Color-coded maps by rating area or zone reflecting the percentage difference in average annual zero deductible statewide flood loss costs based on the modeling-organization-specified, predetermined, and comprehensive exposure dataset for each flood model component change:
    1. Between the initial submission and the revised submission, and
    2. Between any intermediate revisions and the revised submission.
7. The modeling-organization-specified, predetermined, and comprehensive exposure dataset used for projecting personal residential flood loss costs and flood probable maximum loss levels will be reviewed.



## **GF-2 Qualifications of Modeling Organization Personnel and Consultants Engaged in Development of the Flood Model**

- PI** A. *Flood model construction, testing, and evaluation shall be performed by modeling organization personnel or consultants who possess the necessary skills, formal education, and experience to develop the relevant components for flood loss projection methodologies.*
- PI** B. *The flood model and flood model submission documentation shall be reviewed by modeling organization personnel or consultants in the following professional disciplines with requisite experience: hydrology and hydraulics (advanced degree or licensed Professional Engineer(s) with experience in coastal and inland flooding), meteorology (advanced degree), statistics (advanced degree), structural engineering (licensed Professional Engineer(s) with experience in coastal and inland flooding), actuarial science (Associate or Fellow of Casualty Actuarial Society or Society of Actuaries), and computer/information science (advanced degree or equivalent experience and certifications). These individuals shall certify Expert Certification Forms GF-1 through GF-7 as applicable.*

Purpose: Professional disciplines with requisite experience necessary to develop the flood model are to be represented among modeling organization staff and consultants. Academic or professional designations are required but not necessarily sufficient for the personnel involved in flood model development, implementation, and preparation of material for review by the Commission.

Relevant Forms: GF-1, General Flood Standards Expert Certification  
GF-2, Meteorological Flood Standards Expert Certification  
GF-3, Hydrological and Hydraulic Flood Standards Expert Certification  
GF-4, Statistical Flood Standards Expert Certification  
GF-5, Vulnerability Flood Standards Expert Certification  
GF-6, Actuarial Flood Standards Expert Certification  
GF-7, Computer/Information Flood Standards Expert Certification

### **Disclosures**

#### 1. Organization Background

- PI** A. Describe the ownership structure of the modeling organization engaged in the development of the flood model. Describe affiliations with other companies and the nature of the relationship, if any. Indicate if the organization has changed its name and explain the circumstances.

- Surge Waves Flood** B. If the flood model is developed by an entity other than the modeling organization, describe its organizational structure and indicate how proprietary rights and control over

the flood model and its components are exercised. If more than one entity is involved in the development of the flood model, describe all involved.

- PI C. If the flood model is developed by an entity other than the modeling organization, describe the funding source for the development of the flood model.
- PI D. Describe any services other than flood modeling provided by the modeling organization.
- PI E. Indicate if the modeling organization has ever been involved directly in litigation or challenged by a governmental authority where the credibility of one of its U.S. flood model versions for projection of flood loss costs or flood probable maximum loss levels was disputed. Describe the nature of each case and its conclusion.

## 2. Professional Credentials

- CS with input from all teams A. Provide in a tabular format (a) the highest degree obtained (discipline and university), (b) employment or consultant status and tenure in years, and (c) relevant experience and responsibilities of individuals currently involved in the acceptability process or in any of the following aspects of the flood model:
  1. Meteorology
  2. Hydrology and Hydraulics
  3. Statistics
  4. Vulnerability
  5. Actuarial Science
  6. Computer/Information Science
- CS B. Provide visual business workflow documentation connecting all personnel related to flood model design, testing, execution, maintenance, and decision-making.

## 3. Independent Peer Review

- Surge Waves Flood A. Provide reviewer names and dates of external independent peer reviews that have been performed on the following components as currently functioning in the flood model:
  1. Meteorology
  2. Hydrology and Hydraulics
  3. Statistics
  4. Vulnerability
  5. Actuarial Science
  6. Computer/Information Science
- PI B. Provide documentation of independent peer reviews directly relevant to the modeling organization responses to the flood standards, disclosures, or forms. Identify any unresolved or outstanding issues as a result of these reviews.
- PI C. Describe the nature of any on-going or functional relationship the organization has with any of the persons performing the independent peer reviews.

- PI 4. Provide a list of rating agencies and insurance regulators that have reviewed the flood model. Include the dates and purpose of the reviews.
- PI 5. Provide a completed Form GF-1, General Flood Standards Expert Certification. Provide a link to the location of the form [insert hyperlink here].
- Surge 6. Provide a completed Form GF-2, Meteorological Flood Standards Expert Certification. Provide a link to the location of the form [insert hyperlink here].
- Flood 7. Provide a completed Form GF-3, Hydrological and Hydraulic Flood Standards Expert Certification. Provide a link to the location of the form [insert hyperlink here].
- Statistics 8. Provide a completed Form GF-4, Statistical Flood Standards Expert Certification. Provide a link to the location of the form [insert hyperlink here].
- Vulnerability 9. Provide a completed Form GF-5, Vulnerability Flood Standards Expert Certification. Provide a link to the location of the form [insert hyperlink here].
- Actuarial 10. Provide a completed Form GF-6, Actuarial Flood Standards Expert Certification. Provide a link to the location of the form [insert hyperlink here].
- CS 11. Provide a completed Form GF-7, Computer/Information Flood Standards Expert Certification. Provide a link to the location of the form [insert hyperlink here].

## **Audit**

1. The professional vitae of personnel and consultants engaged in the development of the flood model and responsible for the current flood model and the submission will be reviewed. Background information on the professional credentials and the requisite experience of individuals providing testimonial letters in the submission will be reviewed.
2. Forms GF-1, General Flood Standards Expert Certification, GF-2, Meteorological Flood Standards Expert Certification, GF-3, Hydrological and Hydraulic Flood Standards Expert Certification, GF-4, Statistical Flood Standards Expert Certification, GF-5, Vulnerability Flood Standards Expert Certification, GF-6, Actuarial Flood Standards Expert Certification, GF-7, Computer/Information Flood Standards Expert Certification, and all independent peer reviews of the flood model under consideration will be reviewed. Signatories on the individual forms will be required to provide a description of their review process.
3. Incidents where modeling organization personnel or consultants have been found to have failed to abide by the standards of professional conduct adopted by their profession will be discussed.
4. For each individual listed under Disclosure 2.A, specific information as to any consulting activities and any relationship with an insurer, reinsurer, trade association, governmental entity, consumer group, or other advocacy group within the previous four years will be reviewed.

## GF-3 Insured Exposure Location

- CS** A. ZIP Codes used in the flood model shall not differ from the United States Postal Service publication date by more than 48 months at the date of submission of the flood model. ZIP Code information shall originate from the United States Postal Service.
- Meteorology CS** B. Horizontal location information used by the modeling organization shall be verified by the modeling organization for accuracy and timeliness and linked to the personal residential structure where available. The publication date of the horizontal location data shall be no more than 48 months prior to the date of submission of the flood model. The horizontal location information data source shall be documented and updated.
- ???** C. If any hazard or any flood model vulnerability components are dependent on databases pertaining to location, the modeling organization shall maintain a logical process for ensuring these components are consistent with the horizontal location database updates.
- CS** D. Geocoding methodology shall be justified.
- ???** E. Use and conversion of horizontal and vertical projections and datum references shall be consistent and justified.

Purpose: Flood model outputs, including flood loss costs and flood probable maximum loss levels, are sensitive to insured exposure locations and topography. Accurate insured exposure locations are necessary for projecting flood loss costs and flood probable maximum loss levels. Appropriate methods must be used when converting location information to latitude-longitude, when associating the elevation, and when aggregating results to the ZIP Code level.

Relevant Form: GF-1, General Flood Standards Expert Certification

### Disclosures

1. List the current location databases used by the flood model and the flood model components to which they relate. Provide the effective dates corresponding to the location databases.
2. Describe in detail how invalid ZIP Codes, parcels, addresses, and other location information are handled.
3. Describe any methods used for subdividing or disaggregating the location input data and the treatment of any variations for populated versus unpopulated areas.

- CS 4. Describe the data, methods, and process used in the flood model to convert between street addresses and geocode locations (latitude-longitude).
- CS 5. Describe the use of geographic information systems (GIS) in the process of converting among street address and geocode locations, and the generation of insured exposure locations.
- CS 6. List and provide a brief description of each database used in the flood model for determining geocode location.
- CS 7. Describe the process for updating flood model geocode locations as location databases are updated.
- 8. Describe in detail the methods by which ground elevation data at the insured exposure location (e.g., building) is associated with the location databases and how this associated data is used in the flood model.
- 9. For each parameter used in the flood model, provide the horizontal and vertical projections and datum references, if applicable. If any horizontal or vertical datum conversions are required, provide conversion factors and describe the conversion methodology used.

### **Audit**

- 1. Geographic displays of the spatial distribution of insured exposures will be reviewed. The treatment of any variations for populated versus unpopulated areas will be reviewed.
- 2. Third party vendor information, if applicable, and a complete description of the process used to create, validate, and justify geographic grids will be reviewed.
- 3. The treatment of exposures over water or other uninhabitable terrain will be reviewed.
- 4. The process for geocoding complete and incomplete street addresses will be reviewed.
- 5. Flood model geocode location databases will be reviewed.

## **GF-4 Independence of Flood Model Components**

***The meteorology, hydrology and hydraulics, vulnerability, and actuarial components of the flood model shall each be theoretically sound without compensation for potential bias from other components.***

Purpose: The primary components of the flood model ought to be individually sound and operate independently. In other words, the flood model should not allow adjustments to one component to compensate for deficiencies in other components (compensation which could inflate or reduce flood loss costs and flood probable maximum loss levels). A flood model would not meet this standard if an artificial calibration adjustment has been made to improve the match of historical and flood model results for a specific flood event. In addition to each component of the flood model meeting its respective flood standards, the interrelationship of the flood model components as a whole must be reasonable, logical, and justifiable.

Relevant Form: GF-1, General Flood Standards Expert Certification

### **Audit**

1. The flood model components will be reviewed for adequately portraying flood phenomena and effects (damage, flood loss costs, and flood probable maximum loss levels). Attention will be paid to an assessment of (1) the theoretical soundness of each component, (2) the basis of the integration of each component into the flood model, and (3) consistency between the results of one component and another.

## GF-5 Editorial Compliance

***The flood model submission and any revisions provided to the Commission throughout the review process shall be reviewed and edited by a person or persons with experience in reviewing technical documents who shall certify on Form GF-8, Editorial Review Expert Certification, that the flood model submission has been personally reviewed and is editorially correct.***

Purpose: A quality control process with regard to creating, maintaining, and reviewing all documentation associated with the flood model is to be maintained.

Person(s) with experience in reviewing technical documents for grammatical correctness, typographical accuracy, and accurate citations, charts, or graphs must have reviewed the flood model submission and certify that the flood model submission is in compliance with the acceptability process.

Relevant Forms: GF-1, General Flood Standards Expert Certification  
GF-2, Meteorological Flood Standards Expert Certification  
GF-3, Hydrological and Hydraulic Flood Standards Expert Certification  
GF-4, Statistical Flood Standards Expert Certification  
GF-5, Vulnerability Flood Standards Expert Certification  
GF-6, Actuarial Flood Standards Expert Certification  
GF-7, Computer/Information Flood Standards Expert Certification  
GF-8, Editorial Review Expert Certification

### Disclosures

1. Describe the process used for document control of the flood model submission. Describe the process used to ensure that the paper and electronic versions of specific files are identical in content.
2. Describe the process used by the signatories on the Expert Certification Forms GF-1 through GF-7 to ensure that the information contained under each set of flood standards is accurate and complete.
3. Provide a completed Form GF-8, Editorial Review Expert Certification. Provide a link to the location of the form [insert hyperlink here].

### Audit

1. An assessment that the person who has reviewed the flood model submission has experience in reviewing technical documentation and that such person is familiar with the flood model submission requirements as set forth in the *Flood Standards Report of Activities as of November 1, 2017* will be made.

2. Attestation that the flood model submission has been reviewed for grammatical correctness, typographical accuracy, completeness, and no inclusion of extraneous data or materials will be assessed.
3. Confirmation that the flood model submission has been reviewed by the signatories on the Expert Certification Forms GF-1 through GF-7 for accuracy and completeness will be assessed.
4. The modification history for flood model submission documentation will be reviewed.
5. A flowchart defining the process for form creation will be reviewed.
6. Form GF-8, Editorial Review Expert Certification, will be reviewed.



## Form GF-1: General Flood Standards Expert Certification

Purpose: This form identifies the signatory or signatories who have reviewed the current submission for compliance with the General Flood Standards (GF-1 – GF-5) in accordance with the stated provisions.

I hereby certify that I have reviewed the current submission of \_\_\_\_\_  
(Name of Flood Model)

Version \_\_\_\_\_ for compliance with the 2017 Flood Standards adopted by the Florida Commission on Hurricane Loss Projection Methodology and hereby certify that:

1. The flood model meets the General Flood Standards (GF-1 – GF-5);
2. The disclosures and forms related to the General Flood Standards section are editorially and technically accurate, reliable, unbiased, and complete;
3. My review was completed in accordance with the professional standards and code of ethical conduct for my profession;
4. My review involved ensuring the consistency of the content in all sections of the submission; and
5. In expressing my opinion I have not been influenced by any other party in order to bias or prejudice my opinion.

Name	Professional Credentials (Area of Expertise)
Signature (original submission)	Date
Signature (response to deficiencies, if any)	Date
Signature (revisions to submission, if any)	Date
Signature (final submission)	Date

An updated signature and form are required following any modification of the flood model and any revision of the original submission. If a signatory differs from the original signatory, provide the printed name and professional credentials for any new signatories. Additional signature lines shall be added as necessary with the following format:

Signature (revisions to submission)	Date
-------------------------------------	------

Note: A facsimile or any properly reproduced signature will be acceptable to meet this requirement.

Include Form GF-1, General Flood Standards Expert Certification, in a submission appendix.

## Form GF-2: Meteorological Flood Standards Expert Certification

Purpose: This form identifies the signatory or signatories who have reviewed the current submission for compliance with the Meteorological Flood Standards (MF-1 – MF-5) in accordance with the stated provisions.

I hereby certify that I have reviewed the current submission of \_\_\_\_\_  
 (Name of Flood Model)

Version \_\_\_\_\_ for compliance with the 2017 Flood Standards adopted by the Florida Commission on Hurricane Loss Projection Methodology and hereby certify that:

1. The flood model meets the Meteorological Flood Standards (MF-1 – MF-5);
2. The disclosures and forms related to the Meteorological Flood Standards section are editorially and technically accurate, reliable, unbiased, and complete;
3. My review was completed in accordance with the professional standards and code of ethical conduct for my profession; and
4. In expressing my opinion I have not been influenced by any other party in order to bias or prejudice my opinion.

Name	Professional Credentials (Area of Expertise)
------	--

Signature (original submission)	Date
---------------------------------	------

Signature (response to deficiencies, if any)	Date
--	------

Signature (revisions to submission, if any)	Date
---	------

Signature (final submission)	Date
------------------------------	------

An updated signature and form are required following any modification of the flood model and any revision of the original submission. If a signatory differs from the original signatory, provide the printed name and professional credentials for any new signatories. Additional signature lines shall be added as necessary with the following format:

Signature (revisions to submission)	Date
-------------------------------------	------

Note: A facsimile or any properly reproduced signature will be acceptable to meet this requirement.

Include Form GF-2, Meteorological Flood Standards Expert Certification, in a submission appendix.

**Form GF-3: Hydrological and Hydraulic Flood Standards  
Expert Certification**

Purpose: This form identifies the signatory or signatories who have reviewed the current submission for compliance with the Hydrological and Hydraulic Flood Standards (HHF-1 – HHF-4) in accordance with the stated provisions.

I hereby certify that I have reviewed the current submission of \_\_\_\_\_  
(Name of Flood Model)

Version \_\_\_\_\_ for compliance with the 2017 Flood Standards adopted by the Florida Commission on Hurricane Loss Projection Methodology and hereby certify that:

1. The flood model meets the Hydrological and Hydraulic Flood Standards (HHF-1 – HHF-4);
2. The disclosures and forms related to the Hydrological and Hydraulic Flood Standards section are editorially and technically accurate, reliable, unbiased, and complete;
3. My review was completed in accordance with the professional standards and code of ethical conduct for my profession; and
4. In expressing my opinion I have not been influenced by any other party in order to bias or prejudice my opinion.

\_\_\_\_\_  
Name

\_\_\_\_\_  
Professional Credentials (Area of Expertise)

\_\_\_\_\_  
Signature (original submission)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature (response to deficiencies, if any)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature (revisions to submission, if any)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature (final submission)

\_\_\_\_\_  
Date

An updated signature and form are required following any modification of the flood model and any revision of the original submission. If a signatory differs from the original signatory, provide the printed name and professional credentials for any new signatories. Additional signature lines shall be added as necessary with the following format:

\_\_\_\_\_  
Signature (revisions to submission)

\_\_\_\_\_  
Date

Note: A facsimile or any properly reproduced signature will be acceptable to meet this requirement.

Include Form GF-3, Hydrological and Hydraulic Flood Standards Expert Certification, in a submission appendix.

## Form GF-4: Statistical Flood Standards Expert Certification

Purpose: This form identifies the signatory or signatories who have reviewed the current submission for compliance with the Statistical Flood Standards (SF-1 – SF-5) in accordance with the stated provisions.

I hereby certify that I have reviewed the current submission of \_\_\_\_\_  
 (Name of Flood Model)

Version \_\_\_\_\_ for compliance with the 2017 Flood Standards adopted by the Florida Commission on Hurricane Loss Projection Methodology and hereby certify that:

1. The flood model meets the Statistical Flood Standards (SF-1 – SF-5);
2. The disclosures and forms related to the Statistical Flood Standards section are editorially and technically accurate, reliable, unbiased, and complete;
3. My review was completed in accordance with the professional standards and code of ethical conduct for my profession; and
4. In expressing my opinion I have not been influenced by any other party in order to bias or prejudice my opinion.

\_\_\_\_\_  
Name

\_\_\_\_\_  
Professional Credentials (Area of Expertise)

\_\_\_\_\_  
Signature (original submission)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature (response to deficiencies, if any)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature (revisions to submission, if any)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature (final submission)

\_\_\_\_\_  
Date

An updated signature and form are required following any modification of the flood model and any revision of the original submission. If a signatory differs from the original signatory, provide the printed name and professional credentials for any new signatories. Additional signature lines shall be added as necessary with the following format:

\_\_\_\_\_  
Signature (revisions to submission)

\_\_\_\_\_  
Date

Note: A facsimile or any properly reproduced signature will be acceptable to meet this requirement.

Include Form GF-4, Statistical Flood Standards Expert Certification, in a submission appendix.

## Form GF-5: Vulnerability Flood Standards Expert Certification

Purpose: This form identifies the signatory or signatories who have reviewed the current submission for compliance with the Vulnerability Flood Standards (VF-1 – VF-4) in accordance with the stated provisions.

I hereby certify that I have reviewed the current submission of \_\_\_\_\_  
 (Name of Flood Model)

Version \_\_\_\_\_ for compliance with the 2017 Flood Standards adopted by the Florida Commission on Hurricane Loss Projection Methodology and hereby certify that:

1. The flood model meets the Vulnerability Flood Standards (VF-1 – VF-4);
2. The disclosures and forms related to the Vulnerability Flood Standards section are editorially and technically accurate, reliable, unbiased, and complete;
3. My review was completed in accordance with the professional standards and code of ethical conduct for my profession; and
4. In expressing my opinion I have not been influenced by any other party in order to bias or prejudice my opinion.

\_\_\_\_\_  
Name

\_\_\_\_\_  
Professional Credentials (Area of Expertise)

\_\_\_\_\_  
Signature (original submission)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature (response to deficiencies, if any)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature (revisions to submission, if any)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature (final submission)

\_\_\_\_\_  
Date

An updated signature and form are required following any modification of the flood model and any revision of the original submission. If a signatory differs from the original signatory, provide the printed name and professional credentials for any new signatories. Additional signature lines shall be added as necessary with the following format:

\_\_\_\_\_  
Signature (revisions to submission)

\_\_\_\_\_  
Date

Note: A facsimile or any properly reproduced signature will be acceptable to meet this requirement.

Include Form GF-5, Vulnerability Flood Standards Expert Certification, in a submission appendix.

## Form GF-6: Actuarial Flood Standards Expert Certification

Purpose: This form identifies the signatory or signatories who have reviewed the current submission for compliance with the Actuarial Flood Standards (AF-1 – AF-6) in accordance with the stated provisions.

I hereby certify that I have reviewed the current submission of \_\_\_\_\_  
 (Name of Flood Model)

Version \_\_\_\_\_ for compliance with the 2017 Flood Standards adopted by the Florida Commission on Hurricane Loss Projection Methodology and hereby certify that:

1. The flood model meets the Actuarial Flood Standards (AF-1 – AF-6);
2. The disclosures and forms related to the Actuarial Flood Standards section are editorially and technically accurate, reliable, unbiased, and complete;
3. My review was completed in accordance with the Actuarial Standards of Practice and Code of Conduct; and
4. In expressing my opinion I have not been influenced by any other party in order to bias or prejudice my opinion.

\_\_\_\_\_  
Name

\_\_\_\_\_  
Professional Credentials (Area of Expertise)

\_\_\_\_\_  
Signature (original submission)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature (response to deficiencies, if any)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature (revisions to submission, if any)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature (final submission)

\_\_\_\_\_  
Date

An updated signature and form are required following any modification of the flood model and any revision of the original submission. If a signatory differs from the original signatory, provide the printed name and professional credentials for any new signatories. Additional signature lines shall be added as necessary with the following format:

\_\_\_\_\_  
Signature (revisions to submission)

\_\_\_\_\_  
Date

Note: A facsimile or any properly reproduced signature will be acceptable to meet this requirement.

Include Form GF-6, Actuarial Flood Standards Expert Certification, in a submission appendix.

## Form GF-7: Computer/Information Flood Standards Expert Certification

**Purpose:** This form identifies the signatory or signatories who have reviewed the current submission for compliance with the Computer/Information Flood Standards (CIF-1 – CIF-7) in accordance with the stated provisions.

I hereby certify that I have reviewed the current submission of \_\_\_\_\_  
(Name of Flood Model)

Version \_\_\_\_\_ for compliance with the 2017 Flood Standards adopted by the Florida Commission on Hurricane Loss Projection Methodology and hereby certify that:

1. The flood model meets the Computer/Information Flood Standards (CIF-1 – CIF-7);
2. The disclosures and forms related to the Computer/Information Flood Standards section are editorially and technically accurate, reliable, unbiased, and complete;
3. My review was completed in accordance with the professional standards and code of ethical conduct for my profession; and
4. In expressing my opinion I have not been influenced by any other party in order to bias or prejudice my opinion.

\_\_\_\_\_  
Name

\_\_\_\_\_  
Professional Credentials (Area of Expertise)

\_\_\_\_\_  
Signature (original submission)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature (response to deficiencies, if any)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature (revisions to submission, if any)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature (final submission)

\_\_\_\_\_  
Date

An updated signature and form are required following any modification of the flood model and any revision of the original submission. If a signatory differs from the original signatory, provide the printed name and professional credentials for any new signatories. Additional signature lines shall be added as necessary with the following format:

\_\_\_\_\_  
Signature (revisions to submission)

\_\_\_\_\_  
Date

**Note:** A facsimile or any properly reproduced signature will be acceptable to meet this requirement.

Include Form GF-7, Computer/Information Flood Standards Expert Certification, in a submission appendix.

## Form GF-8: Editorial Review Expert Certification

**Purpose:** This form identifies the signatory or signatories who have reviewed the current submission for compliance with the Notification Requirements and General Flood Standard GF-5, Editorial Compliance, in accordance with the stated provisions.

I hereby certify that I have reviewed the current submission of \_\_\_\_\_  
 (Name of Flood Model)

Version \_\_\_\_\_ for compliance with the “Process for Determining the Acceptability of a Computer Simulation Flood Loss Model” adopted by the Florida Commission on Hurricane Loss Projection Methodology in its *Flood Standards Report of Activities as of November 1, 2017*, and hereby certify that:

1. The flood model submission is in compliance with the Notification Requirements and General Flood Standard GF-5, Editorial Compliance;
2. The disclosures and forms related to each flood standards section are editorially accurate and contain complete information and any changes that have been made to the submission during the review process have been reviewed for completeness, grammatical correctness, and typographical errors;
3. There are no incomplete responses, charts or graphs, inaccurate citations, or extraneous text or references;
4. The current version of the flood model submission has been reviewed for grammatical correctness, typographical errors, completeness, the exclusion of extraneous data/information and is otherwise acceptable for publication; and
5. In expressing my opinion I have not been influenced by any other party in order to bias or prejudice my opinion.

Name	Professional Credentials (Area of Expertise)
Signature (original submission)	Date
Signature (response to deficiencies, if any)	Date
Signature (revisions to submission, if any)	Date
Signature (final submission)	Date

An updated signature and form are required following any modification of the flood model and any revision of the original submission. If a signatory differs from the original signatory, provide the printed name and professional credentials for any new signatories. Additional signature lines shall be added as necessary with the following format:

Signature (revisions to submission)	Date
-------------------------------------	------

**Note:** A facsimile or any properly reproduced signature will be acceptable to meet this requirement.

Include Form GF-8, Editorial Review Expert Certification, in a submission appendix.



# METEOROLOGICAL FLOOD STANDARDS

Waves

## MF-1 Flood Event Data Sources

Meteorology  
Vulnerability  
Actuarial

- A. The modeling of floods in Florida shall involve meteorological, hydrological, hydraulic, and other relevant data sources required to model coastal and inland flooding.**
- B. The flood model shall incorporate relevant data sources in order to account for meteorological, hydrological, and hydraulic events and circumstances occurring either inside or outside of Florida that result in, or contribute to, flooding in Florida.**
- C. Coastal and inland flood model calibration and validation shall be justified based upon historical data consistent with peer reviewed or publicly developed data sources.**
- (NA) D. Any trends, weighting, or partitioning shall be justified and consistent with current scientific and technical literature.**

**Purpose:** Storm surge is the dominant source of coastal flooding, and precipitation is the dominant source of inland flooding. The modeling of coastal flooding requires explicit consideration of wind and other meteorological elements that drive storm surge. The phenomena to be represented encompass surge, waves, and related processes. The modeling of inland flooding may either explicitly represent precipitation, or the role of precipitation may be represented implicitly in the analysis. Inland flooding includes riverine, lacustrine, and surface water flooding.

It is important that utilized data sources associated with each type of flooding be documented and the stochastic flood event data sources be scientifically defensible. If other flood sub-perils are included, they are to be identified.

This standard is applicable to both coastal and inland flooding.

**Relevant Forms:** GF-2, Meteorological Flood Standards Expert Certification  
GF-3, Hydrological and Hydraulic Flood Standards Expert Certification  
HHF-2, Coastal Flood Characteristics by Annual Exceedance Probability  
HHF-3, Coastal Flood Characteristics by Annual Exceedance Probabilities (Trade Secret Item)  
HHF-4, Inland Flood Characteristics by Annual Exceedance Probability  
HHF-5, Inland Flood Characteristics by Annual Exceedance Probabilities (Trade Secret Item)  
AF-2, Total Flood Statewide Loss Costs

## Disclosures

1. Specify relevant data sources, their release dates, and the time periods used to develop and implement flood frequencies for coastal and inland flooding into the flood model.  
**Surge  
Inland  
Waves**
2. Where the flood model incorporates modification, partitioning, or adjustment of the historical data leading to differences between modeled climatological and historical data, justify each modification and describe how it is incorporated.  
**Surge  
Inland  
Waves**
3. Describe any assumptions or calculations used in the flood model relating to future conditions (e.g., sea level rise, changes in precipitation patterns, changes in storm frequency or severity).  
**NA  
(Surge  
will  
write)**
4. If precipitation is explicitly modeled for either inland or coastal flooding, then describe the underlying data and how they are used as inputs to the flood model.  
**Meteorology**
5. Provide citations to all data sources used to develop and support bottom friction for storm surge modeling, including publicly developed or peer reviewed information.  
**Surge**
6. State whether the model includes flooding other than coastal and inland flooding. State whether the other flooding types are independent of the minimum required sub-perils of coastal and inland flooding.  
**NA  
(Surge  
will  
write)**

## Audit

1. The modeling organization's data sources will be reviewed.
2. Justification for any modification, partitioning, or adjustment to historical data and the impact on flood model parameters and characteristics will be reviewed.
3. The method and process used for calibration and validation of the flood model, including adjustments to input parameters, will be reviewed.

## MF-2 Flood Parameters (Inputs)

Surge  
Flood  
Waves

**A. The flood model shall be developed with consideration given to flood parameters that are scientifically appropriate for modeling coastal and inland flooding. The modeling organization shall justify the use of all flood parameters based on information documented in current scientific and technical literature.**

Surge  
Flood  
Waves

**B. Differences in the treatment of flood parameters between historical and stochastic events shall be justified.**

Surge  
Flood

**C. Grid cell size(s) used in the flood model shall be justified.**

Waves

Purpose: Flood parameters are inputs to the flood model and are needed by the flood model to define or determine the nature, severity, and physical characteristics associated with coastal and inland flooding.

Relevant Forms: GF-2, Meteorological Flood Standards Expert Certification  
GF-3, Hydrological and Hydraulic Flood Standards Expert Certification  
SF-1, Distributions of Stochastic Flood Parameters (Coastal, Inland)

### Disclosures

Surge  
Flood  
Waves

1. For coastal and inland flood model components, identify and justify the various flood parameters used in the flood model.

Surge  
Flood  
Waves

2. For coastal and inland flood model components, describe the dependencies among flood model parameters and specify any assumed mathematical dependencies among these parameters.

Surge  
Flood  
Waves

3. For coastal and inland flood model components, describe the dependencies that exist among the flood model components.

Surge  
Flood  
Waves

4. Identify whether physical flood parameters are modeled as random variables, functions, or fixed values for the stochastic flood event generation. Provide rationale for the choice of parameter representations.

Surge  
Flood  
Waves

5. Describe if and how any physical flood parameters are treated differently in the historical and stochastic flood event sets, and provide rationale.

Meteorology

6. If there is explicit modeling of precipitation-driven flooding, then describe how rainfall extent, duration, and rate are modeled. If the effects of precipitation are implicitly incorporated into the flood model, describe the method and implementation.

Surge  
Waves

7. For coastal flood analyses, describe how the coastline is segmented (or partitioned) in determining the parameters for flood frequency used in the flood model.

- Surge  
Waves
8. For coastal flooding, describe how astronomical tides are incorporated and combined with storm surge to obtain storm tide.
- Surge  
Flood  
Waves
9. Describe if and how any flood parameters change or evolve during an individual flood life cycle (e.g., astronomical tide, representation of Manning's roughness varying with flood depth).
- Waves
10. For coastal modeling, describe any wave assumptions, calculations or proxies and their impact on flood elevations.
- Surge  
Flood  
Waves
11. Provide the source, resolution, datum, and accuracy of the topography and bathymetry throughout the flood model domain.
- Surge  
Waves
12. Describe the grid geometry used in the coastal flood model.

### **Audit**

1. All flood parameters used in the flood model will be reviewed.
2. For explicit representation of precipitation, data sources, calibration, and evaluation will be reviewed.
3. For implicit representation of precipitation, justification, data sources, method, and implementation will be reviewed.
4. Graphical depictions of flood parameters as used in the flood model will be reviewed. Descriptions and justification of the following will be reviewed:
  - a. The dataset basis for any fitted distributions, the methods used, and any smoothing techniques employed,
  - b. The modeled dependencies among correlated parameters in the flood model and how they are represented, and
  - c. The dependencies between the coastal and inland flooding analyses.
5. Scientific literature cited in Standard GF-1, Scope of the Flood Model and Its Implementation, may be reviewed to determine applicability.
6. The initial and boundary conditions for coastal flood events will be reviewed.

## MF-3 Wind and Pressure Fields for Storm Surge

- Meteorology **A. Modeling of wind and pressure fields shall be employed to drive storm surge models due to tropical cyclones.**
- Meteorology **B. The wind and pressure fields shall be based on current scientific and technical literature or developed using scientifically defensible methods.**
- Meteorology Surge **C. The modeling of wind and pressure fields that drive coastal flood models shall be conducted over a sufficiently large domain that storm surge height is converged.**
- Meteorology **D. The features of modeled wind and pressure fields shall be consistent with those of historical storms affecting Florida.**

Purpose: Wind is the dominant feature of tropical cyclones that drives storm surge, and storm surge is frequently the dominant component of the associated flooding. The representation of the windfield and related pressure field is, therefore, crucial to storm surge modeling, as is the propagation of these fields along storm tracks, which determines their duration over ocean waters relevant for surges affecting Florida.

Relevant Forms: GF-2, Meteorological Flood Standards Expert Certification  
AF-2, Total Flood Statewide Loss Costs

### Disclosures

- Meteorology 1. Describe the modeling of the wind and pressure fields for tropical cyclones. State and justify the choice of the parametric forms and the parameter values.
- Meteorology 2. Provide the historical data used to estimate parameters and to develop stochastic storm sets.
- Meteorology 3. Provide a rotational ( $y$ -axis) versus radial ( $x$ -axis) plot of the average or default wind and pressure fields for tropical cyclones. Provide such plots for non-tropical cyclones, if non-tropical cyclones are modeled explicitly.
- Meteorology 4. If windfields are modeled above the surface and translated to the surface to drive storm surge, then describe this translation; e.g., via planetary boundary layer models or empirical surface wind reduction factors and inflow angles. Discuss the associated uncertainties.
- Meteorology 5. Describe how storm translation is accounted for when computing surface windfields.
- Meteorology Surge 6. Describe how storm surge due to non-tropical cyclones is accounted for in the flood model. If it is not accounted for, explain why.
- Surge Meteorology 7. Describe and justify the averaging time of the windspeeds used to drive the storm surge model.

- Surge 8. Describe the process for verifying storm surge height convergence as a function of domain size.

### **Audit**

1. All external data sources that affect the modeled wind and pressure fields associated with storm surge will be identified and their appropriateness reviewed.
2. Calibration and evaluation of wind and pressure fields will be reviewed. Scientific comparisons of simulated wind and pressure fields to historical storms will be reviewed.
3. The sensitivity of flood extent and depth results to changes in the representation of wind and pressure fields will be reviewed.
4. The over-land evolution of simulated wind and pressure fields and its impact on the simulated flooding will be reviewed.
5. The derivation of surface water wind stress from surface windspeed will be reviewed. If a sea-surface drag coefficient is employed, how it is related to the surface windspeed will be reviewed. A comparison of the sea-surface drag coefficient to coefficients from current scientific and technical literature will be reviewed.
6. The uncertainties in the factors used to convert from a reference windfield to a geographic distribution of surface winds and the impact of the resulting winds upon the storm surge will be reviewed and compared with current scientific and technical literature.

## MF-4 Flood Characteristics (Outputs)

Surge  
Waves  
Flood A. ***Flood extent and elevation or depth generated by the flood model shall be consistent with observed historical floods affecting Florida.***

Surge  
Waves  
Flood B. ***Methods for deriving flood extent and elevation or depth shall be scientifically defensible and technically sound.***

Waves C. ***Methods for modeling or approximating wave conditions in coastal flooding shall be scientifically defensible and technically sound.***

Surge  
Waves  
Flood D. ***Modeled flood characteristics shall be sufficient for the calculation of flood damage.***

Vulnerability

Purpose: Flood characteristics are outputs of the coastal and inland flood models, such as flood extent and elevation or depth. In addition to providing input to other flood model components, flood characteristics are used for flood model evaluation and calibration by comparison to observations. Flood characteristics should be determined using scientifically sound information and methods, and they must be representative of historical floods in Florida. Differences between flood model characteristics and relevant historical Florida flood data must be documented and justified.

Relevant Forms: GF-2, Meteorological Flood Standards Expert Certification  
GF-3, Hydrological and Hydraulic Flood Standards Expert Certification  
HHF-1, Historical Event Flood Extent and Elevation or Depth Validation Maps  
HHF-2, Coastal Flood Characteristics by Annual Exceedance Probability  
HHF-3, Coastal Flood Characteristics by Annual Exceedance Probabilities (Trade Secret Item)

### Disclosures

Surge  
Waves 1. Demonstrate that the coastal flood model component incorporates flood parameters necessary for simulating storm-surge-related flood damage in Florida. Provide justification for validation using any historical events not specified in Form HHF-1, Historical Event Flood Extent and Elevation or Depth Validation Maps.

Waves 2. For coastal flooding, describe how the presence, size, and transformation of waves are modeled or approximated.

Surge 3. For coastal modeling, describe if and how the flood model accounts for flood velocity, flood duration, flood-induced erosion, floodborne debris, salinity, and contaminated floodwaters.

Surge  
Waves  
Flood 4. Describe if and how the coincidence and interaction of inland and coastal flooding is modeled.

Surge  
Waves  
Flood  
Vulnerability

5. Provide a flowchart illustrating how the characteristics of each flood model component are utilized in other components of the flood model.

Surge  
Waves  
Flood

6. Describe and justify the appropriateness of the databases and methods used for the calibration and validation of flood extent and elevation or depth.

Surge  
Waves  
Flood

7. Describe any variations in the treatment of the flood model flood extent and elevation or depth for stochastic versus historical floods, and justify this variation.

Surge  
Waves

8. Provide a completed Form HHF-2, Coastal Flood Characteristics by Annual Exceedance Probability. Provide a link to the location of the form [insert hyperlink here].

Surge

9. Describe the effects of storm size, bathymetry, and windspeed on storm surge height for the coastal flood model.

Waves

10. Describe the effects of windspeed, depth, fetch, and wind duration on locally generated wave heights or wave proxies for the coastal flood model.

## Audit

1. The method and supporting material for determining flood extent and elevation or depth for coastal flooding will be reviewed.

2. Any modeling-organization-specific research performed to calculate the flood extent and elevation or depth and wave conditions will be reviewed, along with the associated databases.

3. Historical data used as the basis for the flood model flood extent and elevation or depth will be reviewed. Historical data used as the basis for the flood model flood velocity, as available, will be reviewed.

4. The comparison of the calculated characteristics with historical flood events will be reviewed. The selected locations and corresponding storm events will be reviewed to verify sufficient representation of the varied geographic areas. If a single storm is used for both coastal and inland flooding validation, then its appropriateness will be reviewed.

5. Consistency of the flood model stochastic flood extent and elevation or depth with reference to the historical flood databases will be reviewed. Consistency of the flood model stochastic flood velocity, as available, with reference to the historical flood databases will be reviewed.

6. Form HHF-2, Coastal Flood Characteristics by Annual Exceedance Probability, and Form HHF-3, Coastal Flood Characteristics by Annual Exceedance Probabilities (Trade Secret Item), will be reviewed.

7. Modeled frequencies will be compared with the observed spatial distribution of flood frequencies across Florida using methods documented in current scientific and technical literature. The comparison of modeled to historical statewide and regional coastal flood frequencies as provided in Form HHF-2, Coastal Flood Characteristics by Annual



Exceedance Probability, and Form HHF-3, Coastal Flood Characteristics by Annual Exceedance Probabilities (Trade Secret Item), will be reviewed.

8. Temporal evolution of coastal flood characteristics will be reviewed. (Trade Secret Item to be provided during the closed meeting portion of the Commission meeting to review the flood model for acceptability.)
9. Comparisons of the flood flow calculated in the flood model with records from United States Geological Survey (USGS) or Florida Water Management District (FWMD) gauging stations will be reviewed.
10. Calculation of relevant characteristics in the flood model, such as flood extent, elevation or depth, and waves, will be reviewed. The methods by which each flood model component utilizes the characteristics of other flood model components will be reviewed.
11. The modeled coincidence and interaction of inland and coastal flooding will be reviewed. If it is not modeled, justification will be reviewed.

## MF-5 Flood Probability Distributions

- Surge  
Flood** A. *Flood probability, its geographic variation, and the associated flood extent and elevation or depth shall be scientifically defensible and shall be consistent with flooding observed for Florida.*
- Surge** B. *Flood probability distributions for storm tide affected areas shall include tropical, and if modeled, non-tropical events.*
- Waves** C. *Probability distributions for coastal wave conditions, if modeled, shall arise from the same events as the storm tide modeling.*
- Surge  
Waves  
Flood** D. *Any additional probability distributions of flood parameters and modeled characteristics shall be consistent with historical floods for Florida resulting from coastal and inland flooding.*

**Purpose:** The probabilities of flood occurrence, flood extent and elevation or depth, vary geographically across Florida. Meteorological phenomena affecting coastal flood probabilities are tropical cyclone and non-tropical cyclone surge, waves driven by the cyclones, and tides. The phenomena affecting inland flood probabilities are precipitation in Florida and precipitation in adjacent states (e.g., the Chattahoochee River watershed in North Georgia contributing to Apalachicola River flooding). The determination of flood probability distributions may employ explicit modeling of all these phenomena. Alternatively, the effects of non-tropical surge, waves, tides, and precipitation may be treated implicitly, if the approach is scientifically justifiable. Regardless of the modeling approach, the probability distributions of flood parameters and characteristics should be consistent with documentation in official meteorological, hydrological, and hydraulic databases and with historical floods affecting Florida.

**Relevant Forms:** GF-2, Meteorological Flood Standards Expert Certification  
GF-3, Hydrological and Hydraulic Flood Standards Expert Certification  
HHF-2, Coastal Flood Characteristics by Annual Exceedance Probability  
HHF-3, Coastal Flood Characteristics by Annual Exceedance Probabilities (Trade Secret Item)  
SF-1, Distributions of Stochastic Flood Parameters (Coastal, Inland)

### Disclosures

- (NA)  
Surge** 1. Describe how non-tropical and tropical event coastal storm tide flood probability distributions are combined, if applicable. Provide an example demonstrating the process.
- Surge  
Waves  
Flood** 2. Provide the rationale for each of the probability distributions used for relevant flood parameters and characteristics.

- Surge  
Flood
3. Demonstrate that simulated flood elevation or depth frequencies are consistent with historical frequencies.

### **Audit**

1. The consistency in accounting for similar flood parameters and characteristics across Florida and segments in adjacent states will be reviewed.
2. The method and supporting material for generating stochastic coastal and inland flood events will be reviewed.
3. Any modeling-organization-specific research performed to develop the functions used for simulating flood model characteristics or to develop flood databases will be reviewed.
4. Form SF-1, Distributions of Stochastic Flood Parameters (Coastal, Inland), will be reviewed.
5. Comparisons of modeled flood probabilities and characteristics for coastal and inland flooding against the available historical record will be reviewed. Modeled probabilities from any subset, trend, or fitted function will be reviewed, compared, and justified against this historical record. In the case of partitioning, modeled probabilities from the partition and its complement will be reviewed and compared with the complete historical record.

# HYDROLOGICAL AND HYDRAULIC FLOOD STANDARDS

## HHF-1 Flood Parameters (Inputs)

- Flood** A. *Treatment of land use and land cover (LULC) effects shall be consistent with current scientific and technical literature. Any LULC database used shall be consistent with the National Land Cover Database (NLCD) 2006 or later. Use of alternate datasets shall be justified.*
- Flood** B. *Treatment of soil effects on inland flooding shall be consistent with current scientific and technical literature.*

Purpose: Inland flooding includes riverine, lacustrine, and surface water flooding.

Flood parameters are inputs to the flood model and are needed by the flood model to determine the nature, severity, and physical characteristics associated with inland flooding. The appropriate use and consideration of flood parameters in the calculation of inland flood directly impacts the predicted flood damage. The effects of LULC and soil type are necessary considerations in the calculation of rainfall runoff and the evaluation of other hydrologic parameters, such as infiltration, which influence inland flooding.

Relevant Forms: GF-3, Hydrological and Hydraulic Flood Standards Expert Certification  
SF-1, Distributions of Stochastic Flood Parameters (Coastal, Inland)

### Disclosures

- Flood** 1. For inland flood analyses associated with riverine and lacustrine flooding, describe how the rivers, lakes, and associated floodplains are segmented (or partitioned) in determining the parameters for flood frequency used in the flood model.
- Flood** 2. For inland flood analyses associated with surface water flooding, describe how the affected area is segmented (or partitioned) in determining the parameters for flood frequency used in the flood model.
- Flood** 3. Describe any assumptions or calculations used in the inland flood model relating to initial and boundary conditions (e.g., groundwater levels, lake levels, river discharges, tides, soil moisture).
- Flood** 4. Provide the grid resolution or other area partitioning used to model the inland flood extent and depth and how the hydrological and hydraulic characteristics are determined on these scales.
- Flood** 5. Describe any assumptions or calculations used in the inland flood model relating to flood-induced erosion or topographic changes.

**Flood** 6. Provide citations to all data sources used to develop and support the land-use evaluation methodology, including publicly-developed or peer-reviewed information.

**Flood** 7. Provide the collection and publication dates of the LULC and soil data used in the flood model, and justify the applicability and timeliness of the data for Florida.

**Flood** 8. Describe the methodology used to convert LULC information into a spatial distribution of hydrological parameters, including roughness coefficients, throughout the flood model domain.

**Flood** 9. Describe the methods used to account for soil infiltration and percolation rates and soil moisture conditions in the inland flood model, if applicable. Provide citations to all data sources used to develop and support the soil infiltration and percolation rates and soil moisture conditions methodology, including publicly-developed or peer-reviewed information.

### **Audit**

1. The initial and boundary conditions for flood events will be reviewed.
2. Any modeling-organization-specific methodology used to incorporate LULC information into the flood model will be reviewed.
3. Any modeling-organization-specific research performed to develop the soil infiltration and percolation rates or soil moisture conditions used in the flood model will be reviewed, if applicable.

## HHF-2 Flood Characteristics (Outputs)

- Flood** A. *Flood extent and elevation or depth generated by the flood model shall be consistent with observed historical floods affecting Florida.*
- Flood** B. *Methods for deriving flood extent and depth shall be scientifically defensible and technically sound.*
- Flood** C. *Modeled flood characteristics shall be sufficient for the calculation of flood damage.*

**Purpose:** The extent and depth of inland flooding predicted by the flood model are fundamental factors in assessing flood damage to buildings. Variations in the extent or depth can significantly change the estimated damage. Flood characteristics other than extent and depth can also be used to determine flood damage. While the data for historical flood events may be limited, the comparison of predicted characteristics to available historical information should be made and can help inform the methods and approaches to calculating flood damage.

**Relevant Forms:** GF-2, Meteorological Flood Standards Expert Certification  
GF-3, Hydrological and Hydraulic Flood Standards Expert Certification  
HHF-1, Historical Event Flood Extent and Elevation or Depth Validation Maps  
HHF-4, Inland Flood Characteristics by Annual Exceedance Probability  
HHF-5, Inland Flood Characteristics by Annual Exceedance Probabilities (Trade Secret Item)

### Disclosures

- Flood** 1. Provide comparisons of the modeled and historical flood extents and elevations or depths for the storm events listed in Form HHF-1, Historical Event Flood Extent and Elevation or Depth Validation Maps. For any storms where sufficient data are not available, the modeling organization may substitute an alternate historical storm of their choosing. Describe how each substituted storm provides similar coastal and inland flooding characteristics to the storm being replaced.
- Flood** 2. Demonstrate that the inland flood model component incorporates flood parameters necessary for simulating inland flood damage and accommodates the varied geographic, geologic, hydrologic, hydraulic, and LULC conditions in Florida. Provide justification for validation using any historical events not specified in Form HHF-1, Historical Event Flood Extent and Elevation or Depth Validation Maps.

- Flood** 3. For each of the storm events in Form HHF-1, Historical Event Flood Extent and Elevation or Depth Validation Maps, resulting in inland flooding, provide a comparison of the modeled flood flow to recorded flow data from selected United States Geological Survey (USGS) or Florida Water Management District (FWMD) gauging stations. Provide the rationale for gauging station selections.
- Flood** 4. Identify all hydrological and hydraulic variables that affect the flood extent, elevation, depth, and other flood characteristics.
- Flood** 5. For inland flood modeling, describe if and how the flood model accounts for flood velocity, flood duration, flood-induced erosion, floodborne debris, and contaminated floodwaters.
- Flood** 6. Describe the effect of any assumptions or calculations relating to initial and boundary conditions on the flood characteristics.
- Flood** 7. Describe and justify the appropriateness of the databases and methods used for the calibration and validation of flood extent and elevation or depth.
- Flood** 8. Describe any variations in the treatment of the flood model flood extent and elevation or depth for stochastic versus historical floods, and justify this variation.
- Flood** 9. Provide a completed Form HHF-1, Historical Event Flood Extent and Elevation or Depth Validation Maps. Provide a link to the location of the form [insert hyperlink here].
- Flood** 10. Provide a completed Form HHF-4, Inland Flood Characteristics by Annual Exceedance Probability. Provide a link to the location of the form [insert hyperlink here].

### **Audit**

1. The method and supporting material for determining flood extent and elevation or depth for inland flooding will be reviewed.
2. Any modeling-organization-specific research performed to calculate the inland flood extent and elevation or depth will be reviewed along with the associated databases.
3. Any modeling-organization-specific research performed to derive the hydrological characteristics associated with the topography, LULC distributions, and soil conditions for the flood extent and elevation or depth will be reviewed.
4. Historical data used as the basis for the flood model flood extent and elevation or depth will be reviewed. Historical data used as the basis for the flood model flood flow and velocity, if applicable, will be reviewed.
5. The comparison of the calculated characteristics with historical inland flood events will be reviewed. The selected locations and corresponding storm events will be reviewed to verify sufficient representation of the varied geographic areas.

6. Consistency of the flood model stochastic flood extent and elevation or depth with reference to the historical flood databases will be reviewed. Consistency of the flood model stochastic flood flow and velocity, if applicable, with reference to the historical flood databases will be reviewed.
7. Form HHF-1, Historical Event Flood Extent and Elevation or Depth Validation Maps, will be reviewed.
8. For the historical flood events given in Form HHF-1, Historical Event Flood Extent and Elevation or Depth Validation Maps, the flood characteristics, including temporal and spatial variations contributing to modeled flood damage, will be reviewed.
9. Modeled frequencies will be compared with the observed spatial distribution of flood frequencies across Florida using methods documented in current scientific and technical literature. The comparison of modeled to historical statewide and regional inland flood frequencies as provided in Form HHF-4, Inland Flood Characteristics by Annual Exceedance Probability, and Form HHF-5, Inland Flood Characteristics by Annual Exceedance Probabilities (Trade Secret Item), will be reviewed.
10. Temporal evolution of inland flood characteristics will be reviewed, if applicable. (Trade Secret Item to be provided during the closed meeting portion of the Commission meeting to review the flood model for acceptability.)
11. Calculation of relevant characteristics in the inland flood model, such as flood extent and elevation or depth, will be reviewed. The methods by which each flood model component utilizes the characteristics of other flood model components will be reviewed.



### HHF-3 Modeling of Major Flood Control Measures

**Surge Flood** A. *The flood model's treatment of major flood control measures and their performance shall be consistent with available information and current state-of-the-science.*

**Surge Flood** B. *The modeling organization shall have a documented procedure for reviewing and updating information about major flood control measures and if justified, shall update the flood model flood control databases.*

**Surge Flood** C. *Treatment of the potential failure of major flood control measures shall be based upon current scientific and technical literature, empirical studies, or engineering analyses.*

Purpose: Major flood control measures are those measures undertaken outside the building footprint and on a larger scale, to reduce the presence, depth or energy of flow or waves that affect personal residential structures. The presence of major flood control measures can reduce the flood damage to buildings. The failure of major flood control measures during a flooding event can cause damage to buildings equal to or in excess of the damage that would occur if the measures were not present. The evaluation of impacts of major flood control measures may include, but not be limited to, considering dams, levees, and floodwalls, and the associated location, dimensions, strength, and performance thereof.

Relevant Form: GF-3, Hydrological and Hydraulic Flood Standards Expert Certification

#### Disclosures

- Surge Flood** 1. List the major flood control measures incorporated in the flood model and the sources of all data employed.
- Surge Flood** 2. Describe the methodology to account for major flood control measures in the flood model and indicate if these measures can be set (either to on or off) in the flood model.
- Surge Flood** 3. Describe if and how major flood control measures that require human intervention are incorporated into the flood model.
- Surge Flood** 4. Describe and justify the methodology used to account for the potential failure or alteration of major flood control measures in the flood model and if the level of failure can be adjusted in the flood model.
- Surge Flood** 5. Provide an example of the flood extent and elevation or depth showing the potential impact of a major flood control measure failure.

## **Audit**

1. Treatment of major flood control measures incorporated in the flood model will be reviewed.
2. The documented procedure addressing the updating of major flood control measures as necessary will be reviewed.
3. The methodology and justification used to account for the potential failure or alteration of major flood control measures in the flood model will be reviewed.
4. Examples of flood extent and depth showing the potential impact of major flood control measures failures will be reviewed.
5. If the flood model incorporates major flood control measures that require human intervention, the methodology used in the flood model will be reviewed.

## HHF-4 Logical Relationships Among Flood Parameters and Characteristics

- Flood** A. *At a specific location, water surface elevation shall increase with increasing terrain roughness at that location, all other factors held constant.*
- Flood** B. *Rate of discharge shall increase with increase in steepness in the topography, all other factors held constant.*
- Flood** C. *Inland flood extent and depth associated with riverine and lacustrine flooding shall increase with increasing discharge, all other factors held constant.*
- Surge Flood** D. *The coincidence of storm tide and inland flooding shall not decrease the flood extent and depth, all other factors held constant.*

Purpose: The parameters used in the inland flood model and the resulting characteristics calculated by the flood model, such as flood extent, elevation, and depth, are related through logical relationships. Consideration and evaluation of these logical relationships can help inform the methods and approaches to calculate flood damage and identify errors in the calculations.

Relevant Form: GF-3, Hydrological and Hydraulic Flood Standards Expert Certification

### Disclosures

- Flood** 1. Provide a sample graph of water surface elevation and discharge versus time associated with inland flooding for modeling-organization-defined locations within each region in Florida identified in *Figure 4*. Discuss how the flood characteristics exhibit logical relationships.
- Flood** 2. Describe the analysis performed in order to demonstrate the logical relationships in this standard.

### Audit

- 1. The analysis performed to demonstrate the logical relationships will be reviewed.
- 2. Methods (including any software) used in verifying the logical relationships will be reviewed.

## Form HHF-1: Historical Event Flood Extent and Elevation or Depth Validation Maps

**Purpose:** While the data for historical flood events may be limited, the comparison of predicted characteristics to available historical information should be made and can help inform the methods and approaches to calculating flood damage. This form illustrates the flood model's ability to simulate historical flood events.

A. Provide color-coded contour or high-resolution maps with appropriate base map data illustrating modeled flood extents and elevations or depths for the following historical Florida flood events:

Hurricane Andrew (1992)  
Hurricane Ivan (2004)  
Hurricane Jeanne (2004)  
Hurricane Wilma (2005)  
Tropical Storm Fay (2008)  
Unnamed Storm in East Florida (May 2009)  
Unnamed Storm in Panhandle (July 2013)  
Storm chosen by modeling organization

For any storms where sufficient data are not available, the modeling organization may substitute an alternate historical storm of their choosing.

B. Plot the locations and values associated with validation points (e.g., maximum flood elevations or depths from observations such as gauge data, high-water marks) on each contour or high-resolution map for the historical events.

C. Provide sources of the validation data.

D. Indicate the resolution of the flood model elevation or depth grid used on each contour or high-resolution map.

E. Demonstrate the consistency of the modeled flood extent and elevation or depth with observed flood extent and elevation or depth for each historical event.

F. Explain any differences between the modeled flood extent and elevation or depth and the historical floods observations. Include an explanation if the differences are impacted by major flood control measures.

G. If additional assumptions are necessary to complete this form, provide the rationale for the assumptions as well as a detailed description of how they are included.

H. Include Form HHF-1, Historical Event Flood Extent and Elevation or Depth Validation Maps, in a submission appendix.

## Form HHF-2: Coastal Flood Characteristics by Annual Exceedance Probability

**Purpose:** The graphical and visual depiction of flood characteristics predicted by the flood model can better inform the evaluation of the flood model results. This form illustrates the simulations of key coastal flood characteristics at a range of locations for an annual exceedance probability.

- A. Define one study area subject to coastal flooding within each of the five Florida geographic regions identified in *Figure 4*. The extent of each study area shall be determined by the modeling organization and shall be large enough to encompass at least one county. The modeling organization shall create the underlying grid for this form.
- B. Provide, for each study area, color-coded contour or high-resolution maps showing the modeled flood extent and elevation or depth corresponding to 0.01 annual exceedance probability. Flood extent and elevation or depth shall incorporate waves or wave proxies, if modeled. For locations subject to both coastal and inland flooding, this information should reflect only coastal flooding.
- C. Include Form HHF-2, Coastal Flood Characteristics by Annual Exceedance Probability, in a submission appendix.

## Form HHF-3: Coastal Flood Characteristics by Annual Exceedance Probabilities (Trade Secret Item)

**Purpose:** The graphical and visual depiction of flood characteristics predicted by the flood model can better inform the evaluation of the flood model results. This form illustrates the simulations of key coastal flood characteristics at a range of locations and annual exceedance probabilities.

A. Provide, for each study area defined in Form HHF-2, Coastal Flood Characteristics by Annual Exceedance Probability, the following information. For locations subject to both coastal and inland flooding, this information should reflect only coastal flooding.

1. Study area color-coded contour or high-resolution maps showing modeled flood extent and elevation or depth corresponding to the 0.1, 0.02, 0.01, and 0.002 annual exceedance probabilities. Flood extent and elevation or depth shall incorporate waves or wave proxies, if modeled.
2. Graphs and tables showing flood model results at 10 or more locations within the study area and representative of the range of flood conditions in the study area. The following flood characteristics shall be included for the 0.1, 0.02, 0.01, and 0.002 annual exceedance probabilities:
  - a. Stillwater flood elevations,
  - a. Coastal wave heights or wave proxies,
  - b. If the flood vulnerability model requires explicit representation of flood-induced erosion effects, the erosion depth (original ground elevation minus eroded ground elevation),
  - c. If the flood vulnerability model requires explicit representation of flow velocity effects, the flow velocities, and
  - d. If the flood vulnerability model requires explicit representation of flood inundation duration effects, the duration of flood inundation.

## Form HHF-4: Inland Flood Characteristics by Annual Exceedance Probability

**Purpose:** The graphical and visual depiction of flood characteristics predicted by the flood model can better inform the evaluation of the flood model results. This form illustrates the simulations of key inland flood characteristics at a range of locations for an annual exceedance probability.

- A. Define one study area subject to inland flooding within each of the five Florida geographic regions identified in *Figure 4*. The extent of each study area shall be determined by the modeling organization and shall be large enough to encompass at least one county. The modeling organization shall create the underlying grid for this form.
- B. Provide, for each study area, color-coded contour or high-resolution maps showing the modeled flood extent and elevation or depth corresponding to the 0.01 annual exceedance probability. Flood extent and elevation or depth shall incorporate the effects of flood-induced erosion, if modeled. For locations subject to both inland and coastal flooding, this information should reflect only inland flooding.
- C. Include Form HHF-4, Inland Flood Characteristics by Annual Exceedance Probability, in a submission appendix.

**Form HHF-5: Inland Flood Characteristics by Annual Exceedance Probabilities (Trade Secret Item)**

**Purpose:** The graphical and visual depiction of flood characteristics predicted by the flood model can better inform the evaluation of the flood model results. This form illustrates the simulations of key inland flood characteristics at a range of locations and annual exceedance probabilities.

- A. Provide, for each study area defined in Form HHF-4, Inland Flood Characteristics by Annual Exceedance Probability, the following information. For locations subject to both inland and coastal flooding, this information should reflect only inland flooding.
1. Study area color-coded contour or high-resolution maps showing modeled flood extent and elevation or depth corresponding to the 0.1, 0.02, 0.01, and 0.002 annual exceedance probabilities. Flood extent and elevation or depth shall incorporate the effects of flood-induced erosion, if modeled.
  2. Graphs and tables, based on the underlying gridded data, showing flood model results at 10 or more locations within the study area and representative of the range of flood conditions in the study area. The following flood characteristics shall be included for the 0.1, 0.02, 0.01, and 0.002 annual exceedance probabilities:
    - a. Flood elevations,
    - a. Flood depths,
    - b. If the flood vulnerability model requires explicit representation of flood-induced erosion effects, the erosion depth (original ground elevation minus eroded ground elevation),
    - c. If the flood vulnerability model requires explicit representation of flow velocity effects, the flow and flow velocities, and
    - d. If the flood vulnerability model requires explicit representation of flood inundation duration effects, the duration of flood inundation.



Figure 4

## State of Florida By Region



## STATISTICAL FLOOD STANDARDS

### SF-1 Modeled Results and Goodness-of-Fit

***A. The use of historical data in developing the flood model shall be supported by rigorous methods published in current scientific and technical literature.***

***B. Modeled results and historical observations shall reflect statistical agreement using current scientific and statistical methods for the academic disciplines appropriate for the various flood model components or characteristics.***

Purpose: Many aspects of flood model development and implementation involve fitting a probability distribution to historical data for use in generating stochastic floods. Such fitted models must be checked to ensure that the distributions are reasonable. The chi-square goodness-of-fit test may not be sufficiently rigorous for demonstrating the reasonableness of models of historical data.

Relevant Forms: GF-4, Statistical Flood Standards Expert Certification  
HHF-1, Historical Event Flood Extent and Elevation or Depth Validation Maps  
SF-1, Distributions of Stochastic Flood Parameters (Coastal, Inland)  
SF-2, Examples of Flood Loss Exceedance Estimates (Coastal and Inland Combined)

### Disclosures

1. Provide a completed Form SF-1, Distributions of Stochastic Flood Parameters (Coastal, Inland). Identify the form of the probability distributions used for each function or variable, if applicable. Identify statistical techniques used for estimation and the specific goodness-of-fit evaluations applied along with appropriate metrics. Describe whether the fitted distributions provide a reasonable agreement with available historical data. Provide a link to the location of the form [insert hyperlink here].
2. Provide the date of loss of the insurance claims data used for validation and verification of the flood model.
3. Provide an assessment of uncertainty in flood probable maximum loss levels and in flood loss costs for flood output ranges using confidence intervals or other scientific characterizations of uncertainty.
4. Justify any differences between the historical and modeled results using current scientific and statistical methods in the appropriate disciplines.

5. Provide graphical comparisons of modeled and historical data and goodness-of-fit evaluations. Examples to include are flood frequencies, flow, elevations or depths, and available damage.
6. Provide a completed Form SF-2, Examples of Flood Loss Exceedance Estimates (Coastal and Inland Combined). Provide a link to the location of the form [insert hyperlink here].

### **Audit**

1. Forms SF-1, Distributions of Stochastic Flood Parameters (Coastal, Inland), and SF-2, Examples of Flood Loss Exceedance Estimates (Coastal and Inland Combined), will be reviewed. Justification for the distributions selected, including for example, citations to published literature or analyses of specific historical data, will be reviewed.
2. The modeling organization characterization of uncertainty for damage estimates, annual flood loss, flood probable maximum loss levels, and flood loss costs will be reviewed.

## SF-2 Sensitivity Analysis for Flood Model Output

*The modeling organization shall have assessed the sensitivity of temporal and spatial outputs with respect to the simultaneous variation of input variables using current scientific and statistical methods in the appropriate disciplines and shall have taken appropriate action.*

Purpose: Sensitivity analysis involves the quantification of the magnitude and direction of the output (e.g., flood extent and depth, flood loss cost) as a function of the input variables in the flood model and provides critical insight into the behavior of the flood model.

Relevant Form: GF-4, Statistical Flood Standards Expert Certification

### Disclosures

1. Identify the most sensitive aspects of the flood model and the basis for making this determination.
2. Identify other input variables that impact the magnitude of the output when the input variables are varied simultaneously. Describe the degree to which these sensitivities affect output results and illustrate with an example.
3. Describe how other aspects of the flood model may have a significant impact on the sensitivities in output results and the basis for making this determination.
4. Describe and justify action or inaction as a result of the sensitivity analyses performed.

### Audit

1. The modeling organization's sensitivity analysis for the flood model will be reviewed in detail. Statistical techniques used to perform sensitivity analysis will be reviewed. The results of the sensitivity analysis displayed in graphical format (e.g., contour or high-resolution plots with temporal animation) will be reviewed.

### **SF-3 Uncertainty Analysis for Flood Model Output**

***The modeling organization shall have performed an uncertainty analysis on the temporal and spatial outputs of the flood model using current scientific and statistical methods in the appropriate disciplines and shall have taken appropriate action. The analysis shall identify and quantify the extent that input variables impact the uncertainty in flood model output as the input variables are simultaneously varied.***

Purpose: Uncertainty analysis involves the quantification of the variability of the output (e.g., flood extent and depth, flood loss cost) as a function of the input variables in the flood model and provides critical insight into the behavior of the flood model.

Relevant Form: GF-4, Statistical Flood Standards Expert Certification

#### **Disclosures**

1. Identify the major contributors to the uncertainty in flood model outputs and the basis for making this determination. Provide a full discussion of the degree to which these uncertainties affect output results and illustrate with an example.
2. Describe how other aspects of the flood model may have a significant impact on the uncertainties in output results and the basis for making this determination.
3. Describe and justify action or inaction as a result of the uncertainty analyses performed.

#### **Audit**

1. The modeling organization uncertainty analysis for the flood model will be reviewed in detail. Statistical techniques used to perform uncertainty analysis will be reviewed. The results of the uncertainty analysis displayed in graphical format (e.g., contour or high-resolution plots with temporal animation) will be reviewed.

## **SF-4 Flood Model Loss Cost Convergence by Geographic Zone**

*At a modeling-organization-determined level of aggregation utilizing a minimum of 30 geographic zones encompassing the entire state, the contribution to the error in flood loss cost estimates attributable to the sampling process shall be negligible for the modeled coastal and inland flooding combined.*

Purpose: The intent of this standard is to ensure that sufficient runs of the simulation have been made or a suitable sampling design invoked so that the contribution to the error of the flood loss cost estimates due to its probabilistic nature is negligible considering the computational effort involved. To be negligible, the standard error of flood loss cost estimator within each identified geographic zone should be less than 5% of the flood loss cost estimate unless otherwise justified.

Relevant Form: GF-4, Statistical Flood Standards Expert Certification

### **Disclosures**

1. Describe the sampling plan used to obtain the average annual flood loss costs and flood output ranges. For a direct Monte Carlo simulation, indicate steps taken to determine sample size. For an importance sampling design or other sampling scheme, describe the underpinnings of the design and how it achieves the required performance.
2. Describe the nature and results of the convergence tests performed to validate the expected flood loss projections generated. If a set of simulated flood events or simulation trials was used to determine these flood loss projections, specify the convergence tests that were used and the results. Specify the number of flood events or trials that were used.

### **Audit**

1. An exhibit of the standard error by each geographic zone will be reviewed.

## SF-5 Replication of Known Flood Losses

*The flood model shall estimate incurred flood losses in an unbiased manner on a sufficient body of past flood events, including the most current data available to the modeling organization. This standard applies to personal residential exposures. The replications shall be produced on an objective body of flood loss data by county or an appropriate level of geographic detail.*

Purpose: This standard applies to the combined effects of flood hazard, vulnerability functions, and loss estimation. Given a past flood event and a book of insured properties at the time of the flood event, the flood model is required to be able to provide expected flood losses.

Relevant Form: GF-4, Statistical Flood Standards Expert Certification

### Disclosure

1. Describe the nature and results of the analyses performed to validate the flood loss projections generated for personal residential losses. Include analyses for the events listed in Form HHF-1, Historical Event Flood Extent and Elevation or Depth Validation Maps.

### Audit

1. The following information for each flood event will be reviewed:
  - a. The validity of the flood model assessed by comparing projected flood losses produced by the flood model to available flood losses incurred by insurers at both the state and county level,
  - b. The version of the flood model used to calculate modeled flood losses for each flood event provided,
  - c. A general description of the data and its sources,
  - d. A disclosure of any material mismatch of exposure and flood loss data problems, or other material consideration,
  - e. The date of the exposures used for modeling and the date of the flood event,
  - f. An explanation of differences in the actual and modeled flood parameters,
  - g. A listing of the differences between the modeled and observed flood conditions used in validating a particular flood event,

- h. The type of coverage applied in each flood event to address:
    - (1) Personal residential structures
    - (2) Manufactured homes
    - (3) Condominiums
    - (4) Contents
    - (5) Time element,
  - i. The treatment of demand surge or loss adjustment expenses in the actual flood losses or the modeled flood losses, and
  - j. The treatment of wind losses in the actual flood losses or the modeled flood losses.
2. The following documentation will be reviewed:
- 1. Publicly available documentation and data referenced in the flood model submission in hard copy or electronic form,
  - 2. Modeling-organization-specific documentation and data used in validation of flood losses,
  - 3. An analysis that identifies and explains anomalies observed in the validation data, and
  - 4. User input data for each insurer and flood event detailing specific assumptions made with regard to exposed personal residential property.
3. The confidence intervals used to gauge the comparison between historical and modeled flood losses will be reviewed.
4. The results for more than one flood event will be reviewed to the extent data are available.





## Form SF-2: Examples of Flood Loss Exceedance Estimates (Coastal and Inland Combined)

Purpose: This form provides the modeling organization flood loss exceedance estimates for coastal and inland flood losses combined.

- A. Provide estimates of the annual aggregate personal residential insured flood losses for various probability levels using a modeling-organization-specified, predetermined, and comprehensive exposure dataset justified by the modeling organization. Provide the total average annual flood loss for the loss exceedance distribution. If the modeling methodology does not allow the flood model to produce a viable answer for certain return periods, state so and why.
- B. Include Form SF-2, Examples of Flood Loss Exceedance Estimates (Coastal and Inland Combined), in a submission appendix.

### **Part A**

Return Period (Years)	Annual Probability of Exceedance	Estimated Flood Loss Modeling Organization Exposure Dataset
Top Event	N/A	_____
10,000	0.0001	_____
5,000	0.0002	_____
2,000	0.0005	_____
1,000	0.0010	_____
500	0.0020	_____
250	0.0040	_____
100	0.0100	_____
50	0.0200	_____
20	0.0500	_____
10	0.1000	_____
5	0.2000	_____

### **Part B**

Mean (Total Average Annual Flood Loss)	_____
Median	_____
Standard Deviation	_____
Interquartile Range	_____
Sample Size	_____

## VULNERABILITY FLOOD STANDARDS

### **VF-1 Derivation of Personal Residential Structure Flood Vulnerability Functions**

- A. Development of the personal residential structure flood vulnerability functions shall be based on two or more of the following: (1) rational structural analysis, (2) post-event site investigations, (3) technical literature, (4) expert opinion, (5) laboratory or field testing, and (6) insurance claims data. Personal residential structure flood vulnerability functions shall be supported by historical and other relevant data.***
- B. The derivation of personal residential structure flood vulnerability functions and their associated uncertainties shall be theoretically sound and consistent with fundamental engineering principles.***
- C. Residential building stock classification shall be representative of Florida construction for personal residential structures.***
- D. The following flood characteristics shall be used in the derivation of personal residential structure flood vulnerability functions: depth above ground, and in coastal areas, damaging wave action.***
- E. The following primary building characteristics shall be used or accounted for in the derivation of personal residential structure vulnerability functions: lowest floor elevation relative to ground, foundation type, construction materials, and year of construction.***
- F. Flood vulnerability functions shall be separately derived for personal residential building structures and manufactured homes.***

Purpose: Both flood and building characteristics affect personal residential structure flood vulnerability functions. The development of personal residential structure flood vulnerability functions is to be supported by historical or other relevant data.

In coastal areas, the effects of damaging wave action must be incorporated into personal residential structure flood vulnerability functions by explicit wave modeling or by wave proxies.

The data and methods used to develop personal residential structure flood vulnerability functions, and their associated uncertainties, affect the modeled flood loss costs and flood probable maximum loss levels. Their development and documentation are essential parts of the flood model.

The adoption and enforcement of statewide and county building codes and floodplain management regulations affect the flood vulnerability functions.

Relevant Forms: GF-5, Vulnerability Flood Standards Expert Certification  
VF-1, Coastal Flood with Damaging Wave Action  
VF-2, Inland Flood by Flood Depth  
AF-1, Zero Deductible Personal Residential Standard Flood Loss Costs  
AF-5, Logical Relationship to Flood Risk (Trade Secret Item)

## Disclosures

1. Provide a flowchart documenting the process by which the personal residential structure flood vulnerability functions are derived and implemented.
2. Describe the assumptions, data, methods, and processes used for the development of the personal residential structure flood vulnerability functions.
3. As applicable, describe the nature and extent of actual insurance claims data used to develop the personal residential structure flood vulnerability functions. Describe in detail what is included, such as, number of policies, number of insurers, dates of loss, and number of units of dollar exposure, separated into personal residential building structures and manufactured homes.
4. Summarize post-event site investigations, including the sources, and provide a brief description of the resulting use of these data in the development or validation of personal residential structure flood vulnerability functions.
5. Describe how the personal residential structure flood vulnerability functions incorporate depth of flooding (above ground and above lowest floor) and damaging wave action (in coastal areas). For coastal areas, define the thresholds indicating the presence of damaging wave action for personal residential building structures and manufactured homes. Describe the area over which vulnerability functions for damaging wave action or wave proxies are applied.
6. State if the following flood characteristics are considered in the development of the personal residential structure flood vulnerability functions, and if so, how; if not, explain why:
  - a. Flood velocity,
  - b. Flood duration,
  - c. Flood-induced erosion,
  - d. Flood-borne debris,
  - e. Salinity (saltwater versus freshwater flooding), and
  - f. Contaminated floodwaters.
7. Describe how the personal residential structure flood vulnerability functions incorporate the following primary building characteristics:
  - a. Lowest floor elevation relative to ground,
  - b. Foundation type,

- c. Primary construction materials, and
  - d. Year of construction.
8. State if the following building characteristics are considered in the development of the personal residential structure flood vulnerability functions, and if so, how; if not, explain why:
  - a. Number of stories,
  - b. Use of each story (e.g., habitable space, parking, storage, other),
  - c. Presence of basement,
  - d. Replacement value of building,
  - e. Structure value by story,
  - f. Square footage of living area, and
  - g. Other construction characteristics, as applicable.
9. Describe the process by which local construction practices, statewide and county building code, and floodplain management regulation adoption and enforcement are considered in the development of personal residential structure flood vulnerability functions.
10. Provide the total number of personal residential structure flood vulnerability functions available for use in the flood model. Describe which structure flood vulnerability functions are used for personal residential building structures, manufactured homes, condo unit owners, and apartment renters.
11. Describe the assumptions, data, methods, and processes used to develop personal residential structure flood vulnerability functions when:
  - a. personal residential construction types are unknown, or
  - b. one or more primary building characteristics are unknown, or
  - c. building input characteristics are conflicting.
12. Describe similarities and differences in how the personal residential structure flood vulnerability functions are developed and applied for coastal and inland flooding.
13. Provide a completed Form VF-1, Coastal Flood with Damaging Wave Action. Provide a link to the location of the form [insert hyperlink here].
14. Provide a completed Form VF-2, Inland Flood by Flood Depth. Provide a link to the location of the form [insert hyperlink here].

## **Audit**

1. All personal residential structure flood vulnerability functions will be reviewed.
2. Vulnerability functions for waves or wave proxies will be reviewed. Modeling organization thresholds for damaging wave action will be reviewed. The area over which vulnerability functions for damaging waves or wave proxies are applied will be reviewed.

3. Validation of the personal residential structure flood vulnerability functions and associated uncertainties will be reviewed.
4. Historical data in the original form will be reviewed with explanations for any changes made and descriptions of how missing or incorrect data were handled. For historical data used to develop personal residential structure flood vulnerability functions, the goodness-of-fit of the data will be reviewed. Complete reports detailing flooding conditions and damage suffered for any laboratory or field testing data used will be reviewed. A variety of different personal residential structure construction classes will be selected from the complete rational structural analyses and calculations to be reviewed. Laboratory or field tests and original post-event site investigation reports will be reviewed. Other technical literature and expert opinion summaries will be reviewed. Insurance claims data will be reviewed.
5. All papers, reports, and studies used in the continual development of the personal residential structure flood vulnerability functions must be available for review in hard copy or electronic form.
6. Multiple samples of personal residential structure flood vulnerability functions for personal residential structures and manufactured homes will be reviewed. The magnitude of logical changes among these items for given flood events and validation materials will be reviewed.
7. Justification for the personal residential structure construction classes and characteristics used will be reviewed.
8. Documentation and justification for all modifications to the personal residential structure flood vulnerability functions due to statewide and county building codes, floodplain management regulations, and their enforcement will be reviewed. If year of construction and/or geographical location of the personal residential structure is used as a surrogate for building code, floodplain management regulation, and their enforcement, complete supporting information for the number of year of construction groups used as well as the year(s) and/or geographical region(s) of construction that separates particular group(s) will be reviewed.
9. The effects on personal residential structure flood vulnerability from local and regional construction characteristics, statewide and county building codes, and floodplain management regulations will be reviewed, including whether current statewide and county building codes are reflected.
10. How the claim practices of insurance companies are accounted for when claims data for those insurance companies are used to develop or to verify personal residential structure flood vulnerability functions will be reviewed. Examples include the level of damage the insurer considers a loss to be a total loss, claim practices of insurers with respect to concurrent causation, or the impact of public adjusting.
11. The percentage of damage at or above which the flood model assumes a total structure loss will be reviewed.
12. Documentation and justification for the method of derivation and data on which the personal residential structure flood vulnerability functions are based will be reviewed.

13. If modeled, the treatment of water intrusion in personal residential structure flood vulnerability functions will be reviewed.
14. Form VF-1, Coastal Flood with Damaging Wave Action, will be reviewed.
15. Form VF-2, Inland Flood by Flood Depth, will be reviewed.

## **VF-2 Derivation of Personal Residential Contents Flood Vulnerability Functions**

- A. Development of the personal residential contents flood vulnerability functions shall be based on some combination of the following: (1) post-event site investigations, (2) technical literature, (3) expert opinion, (4) laboratory or field testing, and (5) insurance claims data. Contents flood vulnerability functions shall be supported by historical and other relevant data.***
- B. The relationship between personal residential structure and contents flood vulnerability functions shall be reasonable.***

**Purpose:** Personal residential contents flood vulnerability functions and flood losses are affected by various flood, contents, and building characteristics. The development of personal residential contents flood vulnerability functions is to be supported by historical or other relevant data.

In coastal areas, the effects of damaging wave action must be incorporated into personal residential contents flood vulnerability functions by explicit wave modeling or by wave proxies.

The development of personal residential contents flood vulnerability functions is to be documented with respect to the methods and sources.

A reasonable representation of contents flood vulnerability is necessary in order to address policies that cover contents losses.

**Relevant Forms:** GF-5, Vulnerability Flood Standards Expert Certification  
AF-5, Logical Relationship to Flood Risk (Trade Secret Item)

### **Disclosures**

1. Provide a flowchart documenting the process by which the personal residential contents flood vulnerability functions are derived and implemented.
2. Describe the relationship between personal residential contents and personal residential structure flood vulnerability functions.
3. Describe any assumptions, data, methods, and processes used to develop and validate the personal residential contents flood vulnerability functions.
4. As applicable, describe the nature and extent of actual insurance claims data used to develop the personal residential contents flood vulnerability functions. Describe in detail what is included, such as, number of policies, number of insurers, dates of loss, and number of units of dollar exposure, separated into personal residential building structures and manufactured homes.



5. Provide the total number of personal residential contents flood vulnerability functions available for use in the flood model. Describe whether different contents flood vulnerability functions are used for personal residential building structures, manufactured homes, unit location for condo owners and apartment renters, and various building classes.
6. Describe any relationships between flood characteristics and personal residential contents flood vulnerability functions.
7. State the minimum threshold, if any, at which personal residential contents flood damage is calculated (e.g., personal residential contents flood damage is estimated for personal residential structure damage greater than  $x$  percent or flood depth greater than  $y$  inches). Provide documentation of assumptions and available validation data to verify the approach used.
8. Describe similarities and differences in how personal residential contents flood vulnerability functions are developed and applied for coastal and inland flooding.
9. Describe the assumptions, data, methods, and processes used to develop personal residential contents flood vulnerability functions when:
  - a. personal residential construction types are unknown, or
  - b. one or more primary building characteristics are unknown, or
  - c. building input characteristics are conflicting.

## **Audit**

1. All personal residential contents flood vulnerability functions will be reviewed.
2. Validation of the personal residential contents flood vulnerability functions and associated uncertainties will be reviewed.
3. Documentation and justification of the following aspects or assumptions related to personal residential contents flood vulnerability functions will be reviewed:
  - a. The method of derivation and data,
  - b. Variability of personal residential contents flood damage by personal residential structure classification and characteristics,
  - c. Variability of personal residential contents flood damage by flood characteristics, and
  - d. Personal residential contents flood damage for various occupancies.
4. Historical data in the original form will be reviewed with explanations for any changes made and descriptions of how missing or incorrect data were handled. For historical data used to develop personal residential contents flood vulnerability functions, the goodness-of-fit of the data will be reviewed. Complete reports detailing flood conditions and damage suffered for any test data used will be reviewed. Original post-event site investigation reports will be reviewed. Other technical literature and expert opinion summaries will be reviewed. Insurance claims data will be reviewed.

5. All papers, reports, and studies used in the continual development of the personal residential contents flood vulnerability functions must be available for review in hard copy or electronic form.

## **VF-3 Derivation of Personal Residential Time Element Flood Vulnerability Functions**

***A. Development of the personal residential time element flood vulnerability functions shall be based on one or more of the following: (1) post-event site investigations, (2) technical literature, (3) expert opinion, (4) laboratory or field testing, and (5) insurance claims data.***

***B. The relationship among personal residential structure, contents, and time element flood vulnerability functions shall be reasonable.***

Purpose: Personal residential time element flood vulnerability functions and flood losses are affected by various flood, contents, and building characteristics, as well as external factors that affect the ability to repair or replace a structure. The development of personal residential time element flood vulnerability functions is to be supported by historical or other relevant data.

In coastal areas, the treatment of damaging wave action in personal residential time element flood vulnerability functions may be important.

The development of personal residential time element flood vulnerability functions is to be documented with respect to the methods and sources.

A reasonable representation of personal residential time element flood vulnerability is necessary in order to address policies that cover personal residential time element losses.

Policies can provide varying types of personal residential time element coverage and insurance policies may pay for personal residential time element claims irrespective of flood damage to the insured property.

Relevant Forms: GF-5, Vulnerability Flood Standards Expert Certification  
AF-5, Logical Relationship to Flood Risk (Trade Secret Item)

### **Disclosures**

1. Provide a flowchart documenting the process by which the personal residential time element flood vulnerability functions are derived and implemented.
2. Describe the assumptions, data, methods, and processes used to develop and validate personal residential time element flood vulnerability functions.
3. Describe the relationships among personal residential structure, contents, and time element vulnerability functions.

4. As applicable, describe the nature and extent of actual insurance claims data used to develop the personal residential time element flood vulnerability functions. Describe in detail what is included, such as number of policies, number of insurers, dates of loss, and number of units of dollar exposure, separated into personal residential building structures and manufactured homes.
5. Provide the total number of personal residential time element flood vulnerability functions available for use in the flood model. Describe whether different time element flood vulnerability functions are used for personal residential building structures, manufactured homes, unit location for condo owners and apartment renters, and various building classes.
6. Describe similarities and differences in how personal residential time element flood vulnerability functions are developed and applied for coastal and inland flooding.
7. Describe whether and how personal residential structure classification and characteristics, and flood characteristics, are incorporated into the personal residential time element flood vulnerability functions.
8. Describe whether and how personal residential time element flood vulnerability functions take into consideration the damage to local and regional infrastructure, or personal residential time element vulnerability resulting from a governmental mandate associated with flood events (e.g., evacuation and re-entry mandates).
9. Describe the assumptions, data, methods, and processes used to develop personal residential time element flood vulnerability functions when:
  - a. personal residential construction types are unknown, or
  - b. one or more primary building characteristics are unknown, or
  - c. building input characteristics are conflicting.

## **Audit**

1. All personal residential time element flood vulnerability functions will be reviewed.
2. Validation of the personal residential time element flood vulnerability functions and associated uncertainties will be reviewed.
3. Documentation and justification of the following aspects or assumptions related to personal residential time element flood vulnerability functions will be reviewed:
  - a. The method of derivation and underlying data,
  - b. Variability of personal residential time element flood vulnerability by personal residential structure classification and characteristics,
  - c. Variability of personal residential time element flood vulnerability by flood characteristics,
  - d. Personal residential time element flood vulnerability for various occupancies, and
  - e. The methods used to estimate the time required to repair or replace the property due to flooding.

4. Historical data in the original form will be reviewed with explanations for any changes made and descriptions of how missing or incorrect data were handled. To the extent historical data are used to develop personal residential time element flood vulnerability functions, the goodness-of-fit of the data will be reviewed. Complete reports detailing flooding conditions and damage suffered for any test data used will be reviewed. Original post-event site investigation reports will be reviewed. Other technical literature and expert opinion summaries will be reviewed. Insurance claims data will be reviewed.
5. If included, the methodology and validation for determining the extent of infrastructure flood damage and governmental mandate and their effect on personal residential time element flood vulnerability will be reviewed.

## VF-4 Flood Mitigation Measures

- A. Modeling of flood mitigation measures to improve flood resistance of personal residential structures, the corresponding effects on flood vulnerability, and their associated uncertainties shall be theoretically sound and consistent with fundamental engineering principles. These measures shall include design, construction, and retrofit techniques that affect the flood resistance or flood protection of personal residential structures. The modeling organization shall justify all flood mitigation measures considered by the flood model.**
- B. Application of flood mitigation measures that affect the performance of personal residential structures and the damage to contents shall be justified as to the impact on reducing flood damage whether done individually or in combination.**

Purpose: Flood mitigation measures are those measures undertaken at an individual building level, usually within the building footprint, and may include the following:

- Elevating the structure
- Adding flood openings to enclosure walls
- Wet and/or dry floodproofing
- Permanent elevation or protection of equipment and utilities
- Flood barriers
- Pumps.

Multiple flood mitigation measures will be considered and their combined effect on flood damage must be estimated.

Relevant Forms: GF-5, Vulnerability Flood Standards Expert Certification  
VF-3, Flood Mitigation Measures, Range of Changes in Flood Damage  
VF-4, Coastal Flood Mitigation Measures, Mean Coastal Flood Damage Ratios and Coastal Flood Damage/\$1,000 (Trade Secret Item)  
VF-5, Inland Flood Mitigation Measures, Mean Inland Flood Damage Ratios and Inland Flood Damage/\$1,000 (Trade Secret Item)  
AF-5, Logical Relationship to Flood Risk (Trade Secret Item)

### Disclosures

1. Provide a completed Form VF-3, Flood Mitigation Measures, Range of Changes in Flood Damage. Provide a link to the location of the form [insert hyperlink here].
2. Provide a description of all flood mitigation measures used by the flood model, whether or not they are listed in Form VF-3, Flood Mitigation Measures, Range of Changes in Flood Damage.

3. Describe how personal residential time element losses are affected by performance of flood mitigation measures. Identify any assumptions.
4. Describe how personal residential structure and contents damage and their associated uncertainties are affected by flood mitigation measures. Identify any assumptions.
5. Describe how the effects of multiple flood mitigation measures are combined in the flood model and the process used to ensure that multiple flood mitigation measures are correctly combined.
6. Describe how flood mitigation measures affect the uncertainty of the vulnerability. Identify any assumptions.

## **Audit**

1. Flood mitigation measures used by the flood model will be reviewed for theoretical soundness and reasonability.
2. Form VF-3, Flood Mitigation Measures, Range of Changes in Flood Damage, Form VF-4, Coastal Flood Mitigation Measures, Mean Coastal Flood Damage Ratios and Coastal Flood Damage/\$1,000 (Trade Secret Item), and Form VF-5, Inland Flood Mitigation Measures, Mean Inland Flood Damage Ratios and Inland Flood Damage/\$1,000 (Trade Secret Item), will be reviewed.
3. Implementation of flood mitigation measures will be reviewed as well as the effect of individual flood mitigation measures on flood damage. Any variation in the change over the range of flood depths above ground for individual flood mitigation measures will be reviewed. Historical data, technical literature, expert opinion, or insurance claims data used to support the assumptions and implementation of flood mitigation measures will be reviewed. How flood mitigation measures affect the uncertainty of the vulnerability will be reviewed.
4. Implementation of multiple flood mitigation measures will be reviewed. The combined effects of these flood mitigation measures on flood damage will be reviewed. Any variation in the change over the range of flood depths above ground for multiple flood mitigation measures will be reviewed.

# Form VF-1: Coastal Flood with Damaging Wave Action

Purpose: This form provides an illustration of the aggregate damage/exposure ratios by flood depth and by construction type for a specific set of reference structures subject to coastal flooding with damaging wave action.

A. Sample personal residential exposure data for 8 reference structures as defined below and 26 flood depths (0-25 feet at 1-foot increments) are provided in the file named “VFEventFormsInput17.xlsx.”

Model the sample personal residential exposure data provided in the file versus the flood depths, and provide the damage ratios summarized by flood depth and construction type. Estimated Damage for each individual flood depth is the sum of ground up loss to all reference structures in the flood depth range, excluding demand surge.

Personal residential contents, appurtenant structures, or time element coverages are not included.

### Reference Structures

Wood Frame	Masonry	Manufactured Home
#1 One story Crawlspace foundation Top of foundation wall 3 feet above grade	#4 One story Slab foundation Top of slab 1 foot above grade Unreinforced masonry exterior walls	#7 Manufactured post 1994 Dry stack concrete foundation Pier height 3 feet above grade Tie downs Single unit
#2 Two story Slab foundation Top of slab 1 foot above grade 5/8” diameter anchors at 48” centers for wall/slab connections	#5 Two story Slab foundation Top of slab 1 foot above grade Reinforced masonry exterior walls	#8 Manufactured post 1994 Reinforced masonry pier foundation Pier height 6 feet above grade Tie downs Single unit
#3 Two story Timber pile foundation Top of pile 8 feet above grade Wood floor system bolted to piles	#6 Two story Concrete pile foundation Concrete slab Top of pile 8 feet above grade Reinforced masonry exterior walls	

B. Confirm that the structures used in completing the form are identical to those in the above table for the reference structures.

C. If additional assumptions are necessary to complete this form, provide the rationale for the assumptions as well as a description of how they are included.

D. Provide a plot of the flood depth versus estimated damage/subject exposure data.

E. Include Form VF-1, Coastal Flood with Damaging Wave Action, in a submission appendix.



**Form VF-1: Coastal Flood with Damaging Wave Action**

<u>Flood Depth (Feet) Above Ground Level</u>	<u>Estimated Damage/ Subject Exposure</u>
0	_____
1	_____
2	_____
3	_____
4	_____
5	_____
6	_____
7	_____
8	_____
9	_____
10	_____
11	_____
12	_____
13	_____
14	_____
15	_____
16	_____
17	_____
18	_____
19	_____
20	_____
21	_____
22	_____
23	_____
24	_____
25	_____

## Form VF-2: Inland Flood by Flood Depth

Purpose: This form provides an illustration of the aggregate damage/exposure ratios by flood depth and by construction type for a specific set of reference structures subject to inland (inundation) flooding.

- A. Sample personal residential exposure data for 8 reference structures as defined below and 26 flood depths (0-25 feet at 1-foot increments) are provided in the file named “*VFEventFormsInput17.xlsx*.”

Model the sample personal residential exposure data provided in the file versus the flood depths, and provide the damage ratios summarized by flood depth and construction type. Estimated Damage for each individual flood depth is the sum of ground up loss to all reference structures in the flood depth range, excluding demand surge.

Personal residential contents, appurtenant structures, or time element coverages are not included.

### Reference Structures

Wood Frame	Masonry	Manufactured Home
#1 One story Crawlspace foundation Top of foundation wall 3 feet above grade	#4 One story Slab foundation Top of slab 1 foot above grade Unreinforced masonry exterior walls	#7 Manufactured post 1994 Dry stack concrete foundation Pier height 3 feet above grade Tie downs Single unit
#2 Two story Slab foundation Top of slab 1 foot above grade 5/8” diameter anchors at 48” centers for wall/slab connections	#5 Two story Slab foundation Top of slab 1 foot above grade Reinforced masonry exterior walls	#8 Manufactured post 1994 Reinforced masonry pier foundation Pier height 6 feet above grade Tie downs Single unit
#3 Two story Timber pile foundation Top of pile 8 feet above grade Wood floor system bolted to piles	#6 Two story Concrete pile foundation Concrete slab Top of pile 8 feet above grade Reinforced masonry exterior walls	

- B. Confirm that the structures used in completing the form are identical to those in the above table for the reference structures.
- C. If additional assumptions are necessary to complete this form, provide the rationale for the assumptions as well as a description of how they are included.
- D. Provide a plot of the flood depth versus estimated damage/subject exposure data.
- E. Include Form VF-2, Inland Flood by Flood Depth, in a submission appendix.

**Form VF-2: Inland Flood by Flood Depth**

<u>Flood Depth (Feet) Above Ground Level</u>	<u>Estimated Damage/ Subject Exposure</u>
0	_____
1	_____
2	_____
3	_____
4	_____
5	_____
6	_____
7	_____
8	_____
9	_____
10	_____
11	_____
12	_____
13	_____
14	_____
15	_____
16	_____
17	_____
18	_____
19	_____
20	_____
21	_____
22	_____
23	_____
24	_____
25	_____

## Form VF-3: Flood Mitigation Measures, Range of Changes in Flood Damage

**Purpose:** This form illustrates the changes in flood damage ratios for three specific reference structures subject to individual flood mitigation measures and to combinations of flood mitigation measures.

- A. Provide the change in the personal residential reference building damage ratio (not loss cost) for each individual flood mitigation measure listed in Form VF-3, Flood Mitigation Measures, Range of Changes in Flood Damage, as well as for the combination of the flood mitigation measures.
- B. If additional assumptions are necessary to complete this form, provide the rationale for the assumptions as well as a detailed description of how they are included.
- C. Provide this form in Excel format without truncation. The file name shall include the abbreviated name of the modeling organization, the flood standards year, and the form name. Also include Form VF-3, Flood Mitigation Measures, Range of Changes in Flood Damage, in a submission appendix.

### Reference Structures

Wood Frame	Masonry
One story Crawlspace foundation Top of foundation wall 3 feet above grade	One story Slab foundation Top of slab 1 foot above grade Unreinforced masonry exterior walls
Two story Timber pile foundation Top of pile 8 feet above grade Wood floor system bolted to piles	

- D. Place the reference structures at the following locations, with latitude and longitude referenced to the World Geodetic System of 1984 (WGS84) datum, and provide the aggregated results.

Gulf of Mexico  
 Latitude: 27.9957517  
 Longitude: -82.8277373

St. Johns River  
 Latitude: 29.3768881  
 Longitude: -81.6190223

- E. Provide the ground elevation used from the flood model elevation database for both reference points.

## Form VF-3: Flood Mitigation Measures, Range of Changes in Flood Damage

INDIVIDUAL FLOOD MITIGATION MEASURES		PERCENTAGE CHANGES IN DAMAGE ((REFERENCE DAMAGE RATIO - MITIGATED DAMAGE RATIO) / REFERENCE DAMAGE RATIO) * 100											
		TWO-STORY WOOD FRAME STRUCTURE					MASONRY STRUCTURE						
		FLOOD DEPTH (FT) ABOVE GROUND					FLOOD DEPTH (FT) ABOVE GROUND						
		7	9	11	13	15	1	3	5	7	9		
	REFERENCE STRUCTURE	—	—	—	—	—	—	—	—	—			
ELEVATE STRUCTURE	Elevate Floor 1 Foot						—	—	—	—			
	Elevate Floor 2 Feet						—	—	—	—			
	Elevate Floor 3 Feet						—	—	—	—			
UTILITY EQUIPMENT	Elevate or Protect 1 Foot												
	Elevate or Protect 2 Feet												
	Elevate or Protect 3 Feet												
FLOODPROOFING	Wet 1 Foot												
	Wet 2 Feet												
	Wet 3 Feet												
	Dry 1 Foot	—	—	—	—	—							
	Dry 2 Feet	—	—	—	—	—							
	Dry 3 Feet	—	—	—	—	—							
FLOOD OPENINGS	ONE-STORY WOOD FRAME STRUCTURE	FLOOD DEPTH (FT) ABOVE GROUND					FLOOD DEPTH (FT) ABOVE GROUND						
		1	3	5	7	9							
							—	—	—	—	—		
	Flood Openings in Foundation Walls						—	—	—	—	—		
FLOOD MITIGATION MEASURES IN COMBINATION		PERCENTAGE CHANGES IN DAMAGE ((REFERENCE DAMAGE RATIO - MITIGATED DAMAGE RATIO) / REFERENCE DAMAGE RATIO) * 100											
		TWO-STORY WOOD FRAME STRUCTURE					MASONRY STRUCTURE						
		FLOOD DEPTH (FT) ABOVE GROUND					FLOOD DEPTH (FT) ABOVE GROUND						
		7	9	11	13	15	1	3	5	7	9		
Elevate Utility Equipment 2 Feet Above Floor and Wet Floodproof Structure to 2 Feet													

**Form VF-4: Coastal Flood Mitigation Measures,  
Mean Coastal Flood Damage Ratios and  
Coastal Flood Damage/\$1,000 (Trade Secret Item)**

Purpose: This form illustrates the coastal flood damage ratios and coastal flood damage/\$1,000 for three specific reference structures subject to individual flood mitigation measures and to combinations of flood mitigation measures.

- A. Provide the mean coastal flood damage ratio (prior to any insurance considerations) to the reference structure for each individual flood mitigation measure listed in Form VF-4, Coastal Flood Mitigation Measures, Mean Coastal Flood Damage Ratios and Coastal Flood Damage/\$1,000 (Trade Secret Item), as well as the percent coastal flood damage for the combination of the flood mitigation measures.
- B. Provide the coastal flood damage/\$1,000, rounded to three decimal places, for the reference structures and for each individual flood mitigation measure listed in Form VF-4, Coastal Flood Mitigation Measures, Mean Coastal Flood Damage Ratios and Coastal Flood Damage/\$1,000 (Trade Secret Item), as well as the coastal flood damage/\$1,000 for the combination of the flood mitigation measures.
- C. If additional assumptions are necessary to complete this form, provide the rationale for the assumptions as well as a detailed description of how they are included.
- D. Provide a graphical representation of the personal residential structure vulnerability functions for the reference and fully mitigated structures.

**Reference Structures**

<b>Wood Frame</b>	<b>Masonry</b>
One story Crawlspace foundation Top of foundation wall 3 feet above grade	One story Slab foundation Top of slab 1 foot above grade Unreinforced masonry exterior walls
Two story Timber pile foundation Top of pile 8 feet above grade Wood floor system bolted to piles	

Reference and mitigated structures are fully insured personal residential building structures with a zero deductible structure only policy.

- E. Place the reference structures at the following location, with latitude and longitude referenced to the World Geodetic System of 1984 (WGS84) datum.

Gulf of Mexico  
 Latitude: 27.9957517  
 Longitude: -82.8277373

F. Provide the ground elevation used from the flood model elevation database for the reference point.

**Form VF-4: Coastal Flood Mitigation Measures,  
Mean Coastal Flood Damage Ratios and  
Coastal Flood Damage/\$1,000 (Trade Secret Item)**

INDIVIDUAL FLOOD MITIGATION MEASURES		MEAN COASTAL FLOOD DAMAGE RATIO										COASTAL FLOOD DAMAGE PER \$1,000									
		TWO-STORY WOOD FRAME STRUCTURE					MASONRY STRUCTURE					TWO-STORY WOOD FRAME STRUCTURE					MASONRY STRUCTURE				
		FLOOD DEPTH (FT) ABOVE GROUND																			
		7	9	11	13	15	1	3	5	7	9	7	9	11	13	15	1	3	5	7	9
	REFERENCE STRUCTURE	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ELEVATE STRUCTURE	Elevate Floor 1 Foot						—	—	—	—	—						—	—	—	—	—
	Elevate Floor 2 Feet						—	—	—	—	—						—	—	—	—	—
	Elevate Floor 3 Feet						—	—	—	—	—						—	—	—	—	—
UTILITY EQUIPMENT	Elevate or Protect 1 Foot																				
	Elevate or Protect 2 Feet																				
	Elevate or Protect 3 Feet																				
FLOODPROOFING	Wet 1 Foot																				
	Wet 2 Feet																				
	Wet 3 Feet																				
	Dry 1 Foot	—	—	—	—	—						—	—	—	—	—					
	Dry 2 Feet	—	—	—	—	—						—	—	—	—	—					
	Dry 3 Feet	—	—	—	—	—						—	—	—	—	—					
FLOOD OPENINGS		ONE-STORY WOOD FRAME STRUCTURE										ONE-STORY WOOD FRAME STRUCTURE									
		FLOOD DEPTH (FT) ABOVE GROUND																			
		1	3	5	7	9						1	3	5	7	9					
	Flood Openings in Foundation Walls						—	—	—	—	—						—	—	—	—	—
FLOOD MITIGATION MEASURES IN COMBINATION		MEAN COASTAL FLOOD DAMAGE RATIO										COASTAL FLOOD DAMAGE PER \$1,000									
		TWO-STORY WOOD FRAME STRUCTURE					MASONRY STRUCTURE					TWO-STORY WOOD FRAME STRUCTURE					MASONRY STRUCTURE				
		FLOOD DEPTH (FT) ABOVE GROUND																			
		7	9	11	13	15	1	3	5	7	9	7	9	11	13	15	1	3	5	7	9
Elevate Utility Equipment 2 Feet Above Floor and Wet Floodproof Structure to 2 Feet																					



**Form VF-5: Inland Flood Mitigation Measures,  
Mean Inland Flood Damage Ratios and  
Inland Flood Damage/\$1,000 (Trade Secret Item)**

Purpose: This form illustrates the inland flood damage ratios and inland flood damage/\$1,000 for three specific reference structures subject to individual flood mitigation measures and to combinations of flood mitigation measures.

- A. Provide the mean inland flood damage ratio (prior to any insurance considerations) to the reference structure for each individual flood mitigation measure listed in Form VF-5, Inland Flood Mitigation Measures, Mean Inland Flood Damage Ratios and Inland Flood Damage/\$1,000 (Trade Secret Item), as well as the percent inland flood damage for the combination of the flood mitigation measures.
- B. Provide the inland flood damage/\$1,000, rounded to three decimal places, for the reference structures and for each individual flood mitigation measure listed in Form VF-5, Inland Flood Mitigation Measures, Mean Inland Flood Damage Ratios and Inland Flood Damage/\$1,000 (Trade Secret Item), as well as the inland flood damage/\$1,000 for the combination of the flood mitigation measures.
- C. If additional assumptions are necessary to complete this form, provide the rationale for the assumptions as well as a detailed description of how they are included.
- D. Provide a graphical representation of the personal residential structure vulnerability functions for the reference and fully mitigated structures.

**Reference Structures**

<b>Wood Frame</b>	<b>Masonry</b>
One story Crawlspace foundation Top of foundation wall 3 feet above grade	One story Slab foundation Top of slab 1 foot above grade Unreinforced masonry exterior walls
Two story Timber pile foundation Top of pile 8 feet above grade Wood floor system bolted to piles	

Reference and mitigated structures are fully insured personal residential building structures with a zero deductible structure only policy.

- E. Place the reference structures at the following location, with latitude and longitude referenced to the World Geodetic System of 1984 (WGS84) datum.

St. Johns River  
 Latitude: 29.3768881  
 Longitude: -81.6190223

F. Provide the ground elevation used from the flood model elevation database for the reference point.

**Form VF-5: Inland Flood Mitigation Measures,  
Mean Inland Flood Damage Ratios and  
Inland Flood Damage/\$1,000 (Trade Secret Item)**

INDIVIDUAL FLOOD MITIGATION MEASURES		MEAN INLAND FLOOD DAMAGE RATIO										INLAND FLOOD DAMAGE PER \$1,000									
		TWO-STORY WOOD FRAME STRUCTURE					MASONRY STRUCTURE					TWO-STORY WOOD FRAME STRUCTURE					MASONRY STRUCTURE				
		FLOOD DEPTH (FT) ABOVE GROUND																			
		7	9	11	13	15	1	3	5	7	9	7	9	11	13	15	1	3	5	7	9
	REFERENCE STRUCTURE	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ELEVATE STRUCTURE	Elevate Floor 1 Foot						—	—	—	—	—						—	—	—	—	—
	Elevate Floor 2 Feet						—	—	—	—	—						—	—	—	—	—
	Elevate Floor 3 Feet						—	—	—	—	—						—	—	—	—	—
UTILITY EQUIPMENT	Elevate or Protect 1 Foot																				
	Elevate or Protect 2 Feet																				
	Elevate or Protect 3 Feet																				
FLOODPROOFING	Wet 1 Foot																				
	Wet 2 Feet																				
	Wet 3 Feet																				
	Dry 1 Foot	—	—	—	—	—						—	—	—	—	—					
	Dry 2 Feet	—	—	—	—	—						—	—	—	—	—					
	Dry 3 Feet	—	—	—	—	—						—	—	—	—	—					
FLOOD OPENINGS		ONE-STORY WOOD FRAME STRUCTURE										ONE-STORY WOOD FRAME STRUCTURE									
		FLOOD DEPTH (FT) ABOVE GROUND																			
		1	3	5	7	9						1	3	5	7	9					
		Flood Openings in Foundation Walls						—	—	—	—	—						—	—	—	—
FLOOD MITIGATION MEASURES IN COMBINATION		MEAN INLAND FLOOD DAMAGE RATIO										INLAND FLOOD DAMAGE PER \$1,000									
		TWO-STORY WOOD FRAME STRUCTURE					MASONRY STRUCTURE					TWO-STORY WOOD FRAME STRUCTURE					MASONRY STRUCTURE				
		FLOOD DEPTH (FT) ABOVE GROUND																			
		7	9	11	13	15	1	3	5	7	9	7	9	11	13	15	1	3	5	7	9
Elevate Utility Equipment 2 Feet Above Floor and Wet Floodproof Structure to 2 Feet																					

## ACTUARIAL FLOOD STANDARDS

### AF-1 Flood Modeling Input Data and Output Reports

- A. Adjustments, edits, inclusions, or deletions to insurance company or other input data used by the modeling organization shall be based upon generally accepted actuarial, underwriting, and statistical procedures.***
- B. All modifications, adjustments, assumptions, inputs and input file identification, and defaults necessary to use the flood model shall be actuarially sound and shall be included with the flood model output report. Treatment of missing values for user inputs required to run the flood model shall be actuarially sound and described with the flood model output report.***

Purpose: Modeled flood loss costs and flood probable maximum loss levels rely on certain input data assumptions. Implicit assumptions may or may not be appropriate for a given entity using the flood model, depending on the circumstances.

Different modeling approaches may require different input data.

Relevant Form: GF-6, Actuarial Flood Standards Expert Certification

### Disclosures

1. Identify insurance-to-value assumptions and describe the methods and assumptions used to determine the property value and associated flood losses. Provide a sample calculation for determining the property value.
2. Identify depreciation assumptions and describe the methods and assumptions used to reduce insured flood losses on account of depreciation. Provide a sample calculation for determining the amount of depreciation and the actual cash value (ACV) flood losses.
3. Describe the different flood policies, contracts, and endorsements as specified in s. 627.715, F.S., that are modeled.
4. Provide a copy of the input form(s) used by the flood model with the flood model options available for selection by the user for the Florida flood model under review. Describe the process followed by the user to generate the flood model output produced from the input form. Include the flood model name and version identification on the input form. All items included in the input form submitted to the Commission should be clearly labeled and defined.

5. Disclose, in a flood model output report, the specific inputs required to use the flood model and the options of the flood model selected for use in a personal residential property flood insurance rate filing. Include the flood model name and version identification on the flood model output report. All items included in the flood model output report submitted to the Commission should be clearly labeled and defined.
6. Explain the differences in data input and flood model output required for coastal and inland flood modeling.
7. Describe actions performed to ensure the validity of insurer or other input data used for flood model inputs or for validation/verification.
8. Disclose if changing the order of the flood model input exposure data produces different flood model output or results.
9. Disclose if removing or adding policies from the flood model input file affects the flood model output for the remaining policies.

### **Audit**

1. Quality assurance procedures, including methods to assure accuracy of flood insurance or other input data, will be reviewed. Compliance with this standard will be readily demonstrated through documented rules and procedures.
2. All flood model inputs and assumptions will be reviewed to determine that the flood model output report appropriately discloses all modifications, adjustments, assumptions, and defaults used to produce the flood loss costs and flood probable maximum loss levels.
3. Explanation of the differences in data input and flood model output for coastal and inland flood modeling will be reviewed.

## **AF-2 Flood Events Resulting in Modeled Flood Losses**

***A. Modeled flood loss costs and flood probable maximum loss levels shall reflect insured flood related damages from both coastal and inland flood events impacting Florida.***

***B. The modeling organization shall have a documented procedure for distinguishing flood-related losses from other peril losses.***

Purpose: Flood loss costs and flood probable maximum loss levels should reflect the flood losses insurers pay as a result of a flood event (coastal and inland flooding). Note: the flood event may originate outside of Florida and may involve multiple circumstances or a confluence of events (e.g., meteorological events and hydrological and hydraulic events) that contribute to flooding in Florida. Coastal flooding includes storm tide, and inland flooding includes riverine, lacustrine, and surface water flooding.

Flood loss costs and flood probable maximum loss levels should only include insured flood-related losses and time element flood losses in Florida resulting from an event modeled as a flood event (as described above) consistent with s. 627.715, F.S., and consistent with the different flood policies, contracts, and endorsements. The event should include all such insured flood-related damage due to a flood event causing flood loss in Florida.

Relevant Forms: GF-6, Actuarial Flood Standards Expert Certification  
AF-2, Total Flood Statewide Loss Costs

### **Disclosures**

1. Describe how damage from flood model generated floods (originating either inside or outside of Florida) is excluded or included in the calculation of flood loss costs and flood probable maximum loss levels for Florida.
2. Describe how wind losses associated with coastal and inland flooding are treated in the calculation of flood loss costs and flood probable maximum loss levels for Florida.
3. Describe how the flood model considers the correlation and potential overlap of flood losses associated with coastal and inland flooding.
4. Other than coastal and inland flooding, state whether any other types of flooding events are modeled. If so, describe how damage resulting from these flood type events is treated in the calculation of flood loss costs and flood probable maximum loss levels for Florida.
5. Describe which non-flood water losses are considered flood losses from water intrusion. Describe how water intrusion losses are considered in the calculation of flood loss costs and flood probable maximum loss levels for Florida.

## **Audit**

1. The flood model will be reviewed to evaluate whether the determination of flood losses in the flood model is consistent with this standard.
2. The flood model will be reviewed to determine that meteorological or hydrological and hydraulic events originating either inside or outside of Florida are modeled for flood losses occurring in Florida and that such effects are considered in a manner which is consistent with this standard.
3. The flood model will be reviewed to determine whether the flood model takes into account any damage resulting directly and solely from wind. Flood losses associated with flooding will be reviewed to determine the treatment of wind losses.
4. The flood model will be reviewed to determine how flood losses from water intrusion are identified and calculated.
5. The documented procedure for distinguishing flood-related losses from other peril losses will be reviewed.
6. The effect on flood loss costs and flood probable maximum loss levels arising from flood events that are neither inland nor coastal flooding will be reviewed.

## **AF-3 Flood Coverages**

- A. The methods used in the calculation of personal residential structure flood loss costs shall be actuarially sound.***
- B. The methods used in the calculation of personal residential appurtenant structure flood loss costs shall be actuarially sound.***
- C. The methods used in the calculation of personal residential contents flood loss costs shall be actuarially sound.***
- D. The methods used in the calculation of personal residential time element flood loss costs shall be actuarially sound.***

Purpose: A reasonable representation of personal residential structure, appurtenant structure, contents, and time element flood losses is necessary in order to address how the different flood policies, contracts, and endorsements handle flood losses.

Relevant Form: GF-6, Actuarial Flood Standards Expert Certification

### **Disclosures**

1. Describe the methods used in the flood model to calculate flood loss costs for residential structure coverage associated with personal residential properties.
2. Describe the methods used in the flood model to calculate flood loss costs for appurtenant structure coverage associated with personal residential properties.
3. Describe the methods used in the flood model to calculate flood loss costs for contents coverage associated with personal residential properties.
4. Describe the methods used in the flood model to calculate flood loss costs for time element coverage associated with personal residential properties.

### **Audit**

1. The methods used to produce personal residential structure, appurtenant structure, contents, and time element flood loss costs will be reviewed.
2. The treatment of law and ordinance coverage will be reviewed. If it is not modeled, justification will be reviewed.



#### **AF-4 Modeled Flood Loss Cost and Flood Probable Maximum Loss Level Considerations**

- A. Flood loss cost projections and flood probable maximum loss levels shall not include expenses, risk load, investment income, premium reserves, taxes, assessments, or profit margin.***
- B. Flood loss cost projections and flood probable maximum loss levels shall not make a prospective provision for economic inflation.***
- C. Flood loss cost projections and flood probable maximum loss levels shall not include any explicit provision for wind losses.***
- D. Damage caused from inland and coastal flooding shall be included in the calculation of flood loss costs and flood probable maximum loss levels.***
- E. Flood loss cost projections and flood probable maximum loss levels shall be capable of being calculated from exposures at a geocode (latitude-longitude) level of resolution including the consideration of flood extent and depth.***
- F. Demand surge shall be included in the flood model's calculation of flood loss costs and flood probable maximum loss levels using relevant data and actuarially sound methods and assumptions.***

Purpose: The flood loss costs and flood probable maximum loss levels from the flood model should reflect flood losses paid by the insurance company as insurance claims resulting from flood damage from an event as defined in Standard AF-2, Flood Events Resulting in Modeled Flood Losses.

Flood probable maximum loss levels can be either on an annual aggregate, an annual occurrence, or an event basis. All bases can be useful for understanding the flood loss distribution produced by the flood model.

Flood loss costs represent the expected annual loss per \$1,000 exposure. Other “expense and profit loads” such as those listed in the standard may be included in rate filings but are outside the scope of the Commission.

Flood loss severity may be influenced by supply and demand factors applicable to material and labor costs. This is generally known as demand surge which occurs at the time of a large catastrophic event and is recognized as an important element for flood modeling.

Flood insurance may also be influenced (although perhaps differently from demand surge) by general price inflation. This is a type of economic inflation that is associated with past insured flood loss experience that has been used to

develop and validate flood loss projection models. The standard does not allow for prospective recognition of future economic inflation or price inflation.

Relevant Forms: GF-6, Actuarial Flood Standards Expert Certification  
AF-6, Flood Probable Maximum Loss for Florida

## **Disclosures**

1. Describe the method(s) used to estimate annual flood loss costs and flood probable maximum loss levels. Identify any source documents used and any relevant research results.
2. Identify the highest level of resolution for which flood loss costs and flood probable maximum loss levels can be provided. Identify all possible resolutions available for the reported flood output ranges.
3. Describe how the flood model incorporates demand surge in the calculation of flood loss costs and flood probable maximum loss levels. Indicate if there are any differences in the manner that demand surge is incorporated for coastal and inland flooding.
4. Provide citations to published papers, if any, or modeling-organization studies that were used to develop how the flood model estimates demand surge.
5. Describe how economic inflation has been applied to past insurance experience to develop and validate flood loss costs and flood probable maximum loss levels.

## **Audit**

1. How the flood model handles expenses, risk load, investment income, premium reserves, taxes, assessments, profit margin, economic inflation, and any criteria other than direct property flood insurance claim payments will be reviewed.
2. The method of determining flood probable maximum loss levels will be reviewed.
3. The uncertainty in the estimated annual flood loss costs and flood probable maximum loss levels will be reviewed.
4. The data and methods used to incorporate individual aspects of demand surge on personal residential coverages for coastal and inland flooding, inclusive of the effects from building material costs, labor costs, contents costs, and repair time will be reviewed.
5. How the flood model accounts for economic inflation associated with past insurance experience will be reviewed.
6. The treatment of wind losses in the determination of flood losses will be reviewed.
7. How the flood model determines flood loss costs and flood probable maximum loss levels associated with coastal flooding will be reviewed.

8. How the flood model determines flood loss costs and flood probable maximum loss levels associated with inland flooding will be reviewed.
9. The methods used to ensure there is no systematic over-estimation or under-estimation of flood loss costs and flood probable maximum loss levels from coastal and inland flooding will be reviewed.
10. All referenced literature will be reviewed, in hard copy or electronic form, to determine applicability.

## AF-5 Flood Policy Conditions

- A. The methods used in the development of mathematical distributions to reflect the effects of deductibles, policy limits, and flood policy exclusions shall be actuarially sound.**
- B. The relationship among the modeled deductible flood loss costs shall be reasonable.**
- C. Deductible flood loss costs shall be calculated in accordance with s. 627.715, F.S.**

Purpose: For a given flood event and personal residential policy type, flood losses may fall below the deductible or above the policy limit; and therefore, the distribution of flood losses is important.

Section 627.715, F.S., presents a number of options regarding deductibles and loss settlement options. Flood policy exclusions are also an important consideration.

Relevant Form: GF-6, Actuarial Flood Standards Expert Certification  
AF-4, Flood Output Ranges  
AF-5, Logical Relationship to Flood Risk (Trade Secret Item)

### Disclosures

1. Describe the methods used in the flood model to treat deductibles, policy limits, policy exclusions, loss settlement provisions, and insurance-to-value criteria when projecting flood loss costs and flood probable maximum loss levels. In particular, specify the loss settlement options available for manufactured homes.
2. Provide an example of how insurer flood loss (flood loss net of deductibles) is calculated. Discuss data or documentation used to validate the method used by the flood model.

Example:

(A)		(B)	(C)	(D)=(A)*(C)	(E)=(D)-(B)
Structure Value	Policy Limit	Deductible	Damage Ratio	Zero Deductible Flood Loss	Flood Loss Net of Deductible
\$100,000	\$90,000	\$1,500	2%	\$2,000	\$500

3. Describe how the flood model treats annual deductibles.

### Audit

1. The process used to determine the accuracy of the insurance-to-value criteria in data used to develop and validate the flood model results will be reviewed.

2. To the extent that historical data are used to develop mathematical depictions of deductibles, policy limits, policy exclusions, and loss settlement provisions for flood coverage, the goodness-of-fit of the data to fitted models will be reviewed.
3. To the extent that historical data are used to validate the flood model results, the treatment of the effects of deductibles, policy limits, policy exclusions, coinsurance, and loss settlement provisions for flood coverage in the data will be reviewed.
4. Treatment of annual deductibles will be reviewed.

## **AF-6 Flood Loss Outputs and Logical Relationships to Risk**

- A. The methods, data, and assumptions used in the estimation of flood probable maximum loss levels shall be actuarially sound.***
- B. Flood loss costs shall not exhibit an illogical relation to risk, nor shall flood loss costs exhibit a significant change when the underlying risk does not change significantly.***
- C. Flood loss costs cannot increase as the structure flood damage resistance increases, all other factors held constant.***
- D. Flood loss costs cannot increase as flood hazard mitigation measures incorporated in the structure increase, all other factors held constant.***
- E. Flood loss costs shall be consistent with the effects of major flood control measures, all other factors held constant.***
- F. Flood loss costs cannot increase as the flood resistant design provisions increase, all other factors held constant.***
- G. Flood loss costs cannot increase as building code enforcement increases, all other factors held constant.***
- H. Flood loss costs shall decrease as deductibles increase, all other factors held constant.***
- I. The relationship of flood loss costs for individual coverages (e.g., personal residential structure, appurtenant structure, contents, and time element) shall be consistent with the coverages provided.***
- J. Flood output ranges shall be logical for the type of risk being modeled and apparent deviations shall be justified.***
- K. All other factors held constant, flood output ranges produced by the flood model shall in general reflect lower flood loss costs for personal residential structures that have a higher elevation versus those that have a lower elevation.***
- L. For flood loss costs and flood probable maximum loss level estimates derived from and validated with historical insured flood losses or other input data and information, the assumptions in the derivations concerning (1) construction characteristics, (2) policy provisions, and (3) contractual provisions shall be appropriate based on the type of risk being modeled.***

**Purpose:** Flood probable maximum loss levels are to be based on an actuarially sound methodology. The actuarial soundness resulting from compliance with the standard is particularly important to capital markets, insurers, reinsurers, and rating agencies that frequently use flood probable maximum loss levels.

Modeled flood loss costs should vary according to risk. If the risk of loss due to floods is higher for one area or personal residential structure type, then the flood loss costs should also be higher. Likewise, if there is no difference in risk, there should be no difference in flood loss costs. Flood loss costs not having these properties do not have a logical relationship to risk.

**Relevant Forms:** GF-6, Actuarial Flood Standards Expert Certification  
AF-1, Zero Deductible Personal Residential Standard Flood Loss Costs  
AF-2, Total Flood Statewide Loss Costs  
AF-3, Personal Residential Standard Flood Loss Costs by ZIP Code  
AF-4, Flood Output Ranges  
AF-5, Logical Relationship to Flood Risk (Trade Secret Item)  
AF-6, Flood Probable Maximum Loss for Florida  
SF-2, Examples of Flood Loss Exceedance Estimates (Coastal and Inland Combined)

## **Disclosures**

1. Provide a completed Form AF-1, Zero Deductible Personal Residential Standard Flood Loss Costs. Provide a link to the location of the form [insert hyperlink here].
2. Provide a completed Form AF-2, Total Flood Statewide Loss Costs. Provide a link to the location of the form [insert hyperlink here].
3. Provide a completed Form AF-3, Personal Residential Standard Flood Loss Costs by ZIP Code. Provide a link to the location of the form [insert hyperlink here].
4. Provide a completed Form AF-4, Flood Output Ranges, using the modeling-organization-specified, predetermined, and comprehensive exposure dataset. Provide a link to the location of the form [insert hyperlink here].
5. Provide a completed Form AF-6, Flood Probable Maximum Loss for Florida. Provide a link to the location of the form [insert hyperlink here].
6. Describe how the flood model produces flood probable maximum loss levels.
7. Provide citations to published papers, if any, or modeling-organization studies that were used to estimate flood probable maximum loss levels.
8. Explain any differences between the values provided on Form AF-6, Flood Probable Maximum Loss for Florida, and those provided on Form SF-2, Examples of Flood Loss Exceedance Estimates (Coastal and Inland Combined).

9. Provide an explanation for all flood loss costs that are not consistent with the requirements of this standard.

## **Audit**

1. The data and methods used for flood probable maximum loss levels for Form AF-6, Flood Probable Maximum Loss for Florida, will be reviewed. The Top Event and Conditional Tail Expectations will be reviewed.
2. The frequency distribution and the individual event severity distribution, or information about the formulation of events, underlying Form AF-6, Flood Probable Maximum Loss for Florida, will be reviewed.
3. The first and second moments of the Annual Aggregate and Annual Occurrence distributions underlying the tables in Form AF-6, Flood Probable Maximum Loss for Florida, will be reviewed.
4. The first and second moments of the frequency and severity distributions, or similar information about the event distributions, underlying the flood probable maximum loss levels shown in Parts A and B in Form AF-6, Flood Probable Maximum Loss for Florida, will be reviewed.
5. All referenced literature will be reviewed, in hard copy or electronic form, to determine applicability.
6. Graphical representations of flood loss costs by rating areas and geographic zones (consistent with the modeling-organization grid resolution) will be reviewed.
7. Color-coded maps depicting the effects of topography and flood control measures on flood loss costs by rating areas and geographic zones (consistent with the modeling-organization grid resolution) will be reviewed.
8. The procedures used by the modeling organization to verify the individual flood loss cost relationships will be reviewed. Methods (including any software) used in verifying Standard AF-6, Flood Loss Outputs and Logical Relationships to Risk, will be reviewed. Forms AF-1, Zero Deductible Personal Residential Standard Flood Loss Costs, AF-2, Total Flood Statewide Loss Costs, AF-3, Personal Residential Standard Flood Loss Costs by ZIP Code, and AF-5, Logical Relationship to Flood Risk (Trade Secret Item), will be reviewed to assess flood coverage relationships.
9. The flood loss cost relationships among deductible, policy form, construction type, coverage, year of construction, foundation type, condo unit floor, number of stories, and lowest floor elevation will be reviewed. For coastal flooding, the flood loss cost relationship with distance to the closest coast will be reviewed.
10. The total personal residential insured flood losses provided in Forms AF-2, Total Flood Statewide Loss Costs, and AF-3, Personal Residential Standard Flood Loss Costs by ZIP Code, will be reviewed.



11. Form AF-4, Flood Output Ranges, will be reviewed, including geographical representations of the data where applicable.
12. Form AF-4, Flood Output Ranges, will be reviewed to ensure appropriate relativities among deductibles, coverages, and construction types.
13. Apparent anomalies in the flood output ranges and their justification will be reviewed.

## Form AF-1: Zero Deductible Personal Residential Standard Flood Loss Costs

**Purpose:** This form and the associated maps illustrate the range and variation of zero deductible standard flood loss costs across Florida for personal residential building property and for personal property separately for frame owners, masonry owners, and manufactured homes. Each modeling organization can define its own rating areas or geographic zones.

- A. Provide three maps, color-coded by rating areas or geographic zones (with a minimum of six value ranges), displaying zero deductible personal residential standard flood loss costs per \$1,000 of exposure for wood frame, masonry, and manufactured homes.

Note: Standard Flood in Florida is equivalent to the National Flood Insurance Program (NFIP). Rating areas or geographic zones shall be defined by the modeling organization.

- B. Create exposure sets for these exhibits by modeling all of the buildings from Notional Set 3 described in the file *“NotionalInput17\_Flood.xlsx”* geocoded to each rating area or geographic zone in the state, as provided in the flood model. Define the flood rating areas or geographic zones. Provide the predominant County name and the Federal Information Processing Standards (FIPS) Code associated with each rating area or geographic zone. Refer to the Notional Standard Flood Policy Specifications below for additional modeling information. Explain any assumptions, deviations, and differences from the prescribed exposure information.
- C. Provide, in the format given in the file named *“2017FormAF1.xlsx”* in both Excel and PDF format, the underlying standard flood loss cost data, rounded to three decimal places, used for A. above. The file name shall include the abbreviated name of the modeling organization, the flood standards year, and the form name.

## Notional Standard Flood Policy Specifications

<u>Policy Type</u>	<u>Assumptions</u>
<b>Owners</b>	<p><b>Coverage A = Building Property</b></p> <ul style="list-style-type: none"><li>• Replacement cost equal to Coverage A limit</li><li>• Excludes all appurtenant structures</li></ul> <p><b>Coverage B = Personal Property</b></p> <ul style="list-style-type: none"><li>• Actual cash value equal to Coverage B limit</li></ul> <p><b>Time Element Coverage</b></p> <ul style="list-style-type: none"><li>• To be defined by the modeling organization</li></ul> <p>✧ Flood loss costs per \$1,000 shall be related to the Coverage A limit for Coverage A, to the Coverage B limit for Coverage B, and to the Time Element limit for Time Element Coverage</p>
<b>Manufactured Homes</b>	<p><b>Coverage A = Building Property</b></p> <ul style="list-style-type: none"><li>• Replacement cost equal to Coverage A limit</li></ul> <p><b>Coverage B = Personal Property</b></p> <ul style="list-style-type: none"><li>• Actual cash value equal to Coverage B limit</li></ul> <p><b>Time Element Coverage</b></p> <ul style="list-style-type: none"><li>• To be defined by the modeling organization</li></ul> <p>✧ Flood loss costs per \$1,000 shall be related to the Coverage A limit for Coverage A, to the Coverage B limit for Coverage B, and to the Time Element limit for Time Element Coverage</p>

## Form AF-2: Total Flood Statewide Loss Costs

Purpose: This form illustrates the modeling organization’s ability to estimate flood loss costs for a modeling-organization-specified, predetermined and comprehensive exposure dataset.

- A. Provide the total personal residential insured flood loss and the percentage contribution of the total personal residential insured flood loss assuming zero deductible policies for individual historical flooding events using a modeling-organization-specified, predetermined and comprehensive exposure dataset. The list of flooding events in this form shall include meteorological and hydrological events and circumstances occurring inside or outside of Florida that resulted in or contributed to flooding in Florida included in the modeling organization flood-event dataset (e.g., Florida and by-passing hurricanes, tropical cyclones below hurricane strength that caused flood losses in Florida, rainfall events that caused flood losses in Florida).

The table below contains the minimum number of tropical cyclones from HURDAT2 and rainfall events to be included in the modeling organization flood-event dataset. As defined, a by-passing hurricane (ByP) is a hurricane which does not make landfall, but produces minimum damaging windspeeds or greater on land in Florida. For the by-passing hurricanes included in the table only, the hurricane intensity entered is the maximum windspeed at closest approach to Florida as a hurricane, not the windspeed over Florida. Each tropical cyclone and rainfall event has been assigned an ID number. Additional tropical cyclones and rainfall events included in the modeling organization flood-event dataset shall be added to the table below in order of year and assigned an intermediate ID number as the tropical cyclone and rainfall event falls within the bounding ID numbers.

- B. If additional assumptions are necessary to complete this form, provide the rationale for the assumptions as well as a detailed description of how they are included.
- C. Provide this form in Excel format. The file name shall include the abbreviated name of the modeling organization, the flood standards year, and the form name. Also include Form AF-2, Total Flood Statewide Loss Costs, in a submission appendix.

ID	Tropical Cyclone/ Hurricane Landfall/Closest Approach Date	Year	Name	Hurricane Landfall Region as defined in <i>Figure 3- Category</i>	Personal Residential Insured Flood Losses (\$)	Percentage Contribution
005	10/25/1921	1921	TampaBay06-1921	B-3		
010	09/18/1926	1926	GreatMiami07-1926	C-4/A-3		
015	09/17/1928	1928	LakeOkeechobee04-1928	C-4		
020	09/03/1935	1935	LaborDay03-1935	C-5/A-2		
025	08/31/1950	1950	Baker-1950	F-1/ByP-1		
030	09/05/1950	1950	Easy-1950	A-3		
035	10/18/1950	1950	King-1950	C-4		
040	09/26/1953	1953	Florence-1953	A-1		

ID	Tropical Cyclone/ Hurricane Landfall/Closest Approach Date	Year	Name	Hurricane Landfall Region as defined in <i>Figure 3- Category</i>	Personal Residential Insured Flood Losses (\$)	Percentage Contribution
045	10/09/1953	1953	Hazel-1953	B-1		
050	09/25/1956	1956	Flossy-1956	A-1		
055	09/10/1960	1960	Donna-1960	B-4		
060	09/15/1960	1960	Ethel-1960	F-1		
065	08/27/1964	1964	Cleo-1964	C-2		
070	09/10/1964	1964	Dora-1964	D-2		
075	10/14/1964	1964	Isbell-1964	B-3		
080	09/08/1965	1965	Betsy-1965	C-3		
085	06/09/1966	1966	Alma-1966	A-2		
090	10/04/1966	1966	Inez-1966	B-1		
095	10/19/1968	1968	Gladys-1968	A-2		
100	08/18/1969	1969	Camille-1969	F-5		
105	06/19/1972	1972	Agnes-1972	A-1		
110	09/23/1975	1975	Eloise-1975	A-3		
115	09/04/1979	1979	David-1979	C-2/E-2		
120	09/13/1979	1979	Frederic-1979	F-3		
125	09/02/1985	1985	Elena-1985	F-3/ByP-3		
130	11/21/1985	1985	Kate-1985	A-2		
135	10/12/1987	1987	Floyd-1987	B-1		
140	08/24/1992	1992	Andrew-1992	C-5		
145	08/03/1995	1995	Erin-1995	C-1/A-2		
150	10/04/1995	1995	Opal-1995	A-3		
155	07/19/1997	1997	Danny-1997	F-1		
160	09/03/1998	1998	Earl-1998	A-1		
165	09/25/1998	1998	Georges-1998	B-2/F-2		
170	10/15/1999	1999	Irene-1999	B-1		
175	08/13/2004	2004	Charley-2004	B-4		
180	09/05/2004	2004	Frances-2004	C-2		
185	09/16/2004	2004	Ivan-2004	F-3/ByP-3		
190	09/26/2004	2004	Jeanne-2004	C-3		
195	0710/2005	2005	Dennis-2005	A-3		
200	08/25/2005	2005	Katrina-2005	C-1		
205	09/20/2005	2005	Rita-2005	ByP-2		
210	10/24/2005	2005	Wilma-2005	B-3		
215	08/18/2008	2008	Tropical Storm Fay-2008			
220		May 2009	Unnamed Storm in East Florida-2009			
225		July 2013	Unnamed Storm in Panhandle-2013			
230	09/02/2016	2016	Hermine-2016	A-1		
235	10/07/2016	2016	Matthew-2016	ByP-3		
TBD			Storm(s) chosen by modeling organization			
			<b>Total</b>			

## Form AF-3: Personal Residential Standard Flood Loss Costs by ZIP Code

**Purpose:** This form illustrates the modeling organization's ability to estimate zero deductible standard flood loss costs for a specified set of historical flood events.

- A. Provide the percentage of personal residential zero deductible standard flood losses, rounded to four decimal places, and the monetary contribution from the events listed below using the modeling-organization-specified, predetermined, and comprehensive exposure dataset. Include all ZIP Codes where losses are material. Disclose the materiality threshold.

Hurricane Andrew (1992)  
Hurricane Ivan (2004)  
Hurricane Jeanne (2004)  
Hurricane Wilma (2005)  
Tropical Storm Fay (2008)  
Unnamed Storm in East Florida (May 2009)  
Unnamed Storm in Panhandle (July 2013)  
Storm chosen by modeling organization

- B. Provide maps color-coded by ZIP Code depicting the percentage total personal residential standard flood losses from each flood event and for the cumulative flood losses using the following interval coding:

Red	Over 5%
Light Red	2% to 5%
Pink	1% to 2%
Light Pink	0.5% to 1%
Light Blue	0.2% to 0.5%
Medium Blue	0.1% to 0.2%
Blue	Below 0.1%

- C. If additional assumptions are necessary to complete this form, provide the rationale for the assumptions as well as a detailed description of how they are included.
- D. Provide, in the format given in the file named "2017FormAF3.xlsx," the total flood loss costs by ZIP Code. The file name shall include the abbreviated name of the modeling organization, the flood standards year, and the form name. Also include Form AF-3, Personal Residential Standard Flood Loss Costs by ZIP Code, in a submission appendix.

## Form AF-4: Flood Output Ranges

**Purpose:** This form provides an illustration of the projected personal residential modeled flood loss costs by county and provides a means to review for appropriate differentials among deductibles, coverage, and construction types.

- A. Provide personal residential flood output ranges in the format shown in the file named “2017FormAF4.xlsx” by using an automated program or script. Provide this form in Excel format. The file name shall include the abbreviated name of the modeling organization, the flood standards year, and the form name. Also include Form AF-4, Flood Output Ranges, in a submission appendix.
- B. Provide flood loss costs by county, rounded to three decimal places. Within each county, flood loss costs shall be shown separately per \$1,000 of exposure for frame owners, masonry owners, frame renters, masonry renters, frame condo unit owners, masonry condo unit owners, and manufactured homes. For each of these categories using rating areas or geographic zones, the flood output range shall show the highest flood loss cost, the lowest flood loss cost, and the weighted average flood loss cost. The aggregate personal residential exposure data for this form shall be developed from the modeling-organization-specified, predetermined, and comprehensive exposure dataset except for insured values and deductibles information. Insured values shall be based on the standard flood output range specifications given below. When calculating the weighted average flood loss costs, weight the flood loss costs by the total insured value calculated above. Include the statewide range of flood loss costs (i.e., low, high, and weighted average).
- C. If a modeling organization has flood loss costs for a rating area or geographic zone for which there is no exposure, give the flood loss costs zero weight (i.e., assume the exposure in that rating area or geographic zone is zero). Provide a list in the flood model submission document of those rating areas or geographic zones where this occurs.
- D. If a modeling organization does not have flood loss costs for a rating area or geographic zone for which there is some exposure, do not assume such flood loss costs are zero, but use only the exposures for which there are flood loss costs in calculating the weighted average flood loss costs. Provide a list in the flood model submission document of the rating areas or geographic zones where this occurs.
- E. NA shall be used in cells to signify no exposure.
- F. All flood loss costs that are not consistent with the requirements of Standard AF-6, Flood Loss Outputs and Logical Relationships to Risk, and have been explained in Disclosure AF-6.9 shall be shaded.

## Standard Flood Output Range Specifications

<u>Policy Type</u>	<u>Assumptions</u>
<b>Owners</b>	<p><b>Coverage A = Building Property</b></p> <ul style="list-style-type: none"><li>• Coverage A limit = \$100,000</li><li>• Replacement cost equal to Coverage A limit</li><li>• Deductible = \$1,500</li></ul> <p><b>Coverage B = Personal Property</b></p> <ul style="list-style-type: none"><li>• Coverage B limit = \$40,000</li><li>• Actual cash value equal to Coverage B limit</li><li>• Deductible = \$1,000</li></ul> <p><b>Time Element Coverage</b></p> <ul style="list-style-type: none"><li>• To be defined by the modeling organization</li></ul> <p>✧ Flood loss costs per \$1,000 shall be specified for each coverage limit</p>
<b>Renters</b>	<p><b>Coverage B = Personal Property</b></p> <ul style="list-style-type: none"><li>• Coverage B limit = \$25,000</li><li>• No coverage for tenant improvements</li><li>• Deductible = \$1,000</li><li>• Actual cash value equal to Coverage B limit</li></ul> <p><b>Time Element Coverage</b></p> <ul style="list-style-type: none"><li>• To be defined by the modeling organization</li></ul> <p>✧ Flood loss costs per \$1,000 shall be related to the Coverage B limit</p>
<b>Condo Unit Owners</b>	<p><b>Coverage A = Building Property</b></p> <ul style="list-style-type: none"><li>• Coverage A limit = 10% of Coverage B limit</li><li>• Replacement cost equal to Coverage A limit</li></ul> <p><b>Coverage B = Personal Property</b></p> <ul style="list-style-type: none"><li>• Coverage B limit = \$50,000</li><li>• Actual cash value equal to Coverage B limit</li><li>• Deductible = \$500</li></ul> <p><b>Time Element Coverage</b></p> <ul style="list-style-type: none"><li>• To be defined by the modeling organization</li></ul> <p>✧ Flood loss costs per \$1,000 shall be related to the Coverage B limit</p>



**Policy Type**

**Assumptions**

**Manufactured Homes**

**Coverage A = Building Property**

- Coverage A limit = \$50,000
- Replacement cost equal to Coverage A limit
- Deductible = \$500

**Coverage B = Personal Property**

- Coverage B limit = \$25,000
- Actual cash value equal to Coverage B limit

**Time Element Coverage**

- To be defined by the modeling organization

✧ Flood loss costs per \$1,000 shall be related to the coverage limit

## Form AF-5: Logical Relationship to Flood Risk (Trade Secret Item)

Purpose: This form provides an illustration of the flood loss cost relationships among deductible, policy form, construction type, coverage, year of construction, foundation type, condo unit floor, number of stories, lowest floor elevation and for coastal flooding, the flood loss cost relationship with distance to the closest coast.

- A. Provide the logical relationship to flood risk exhibits in the format shown in the file named “2017FormAF5.xlsx.”
- B. Create exposure sets for each exhibit by modeling all of the flood coverages from the appropriate Notional Set listed below at each of the locations in “Location Grid A” as described in the file “NotionalInput17\_Flood.xlsx.” Refer to the Notional Standard Flood Policy Specifications below for additional modeling information.
- C. Explain any assumptions, deviations, and differences from the prescribed exposure information. In particular, explain how the treatment of unknown is handled in each sensitivity.

Exhibit	Notional Set
Deductible Sensitivity	Set 1
Policy Form Sensitivity	Set 2
Policy Form/Construction Sensitivity	Set 3
Coverage Sensitivity	Set 4
Year Built Sensitivity	Set 5
Foundation Type Sensitivity	Set 6
Condo Unit Floor Sensitivity	Set 7
Number of Stories Sensitivity	Set 8
Lowest Floor Elevation of Residential Structure Sensitivity	Set 9

- D. Flood models shall treat points in “Location Grid A” as coordinates that would result from a geocoding process. Flood models shall treat points by simulating flood loss at exact location or by using the nearest modeled parcel/street/cell in the flood model. Report results for each of the points in “Location Grid A” individually, unless specified. Flood loss cost per \$1,000 of exposure shall be rounded to three decimal places.

Note: All flood deductibles are \$0 except for the Deductible Sensitivity. The Coverage Sensitivity includes time element.

- E. All flood loss costs that are not consistent with the requirements of Standard AF-6, Flood Loss Outputs and Logical Relationships to Risk, and have been explained in Disclosure AF-6.9 shall be shaded.
- F. Create an exposure set and report flood loss cost results for slab foundation owners frame buildings (Notional Set 6) for each of the points in “Location Grid B” as described in the file

“*NotionalInput17\_Flood.xlsx*.” Provide a color-coded contour or high-resolution map of the flood loss costs for coastal flooding. Provide a scatter plot of the flood loss costs (y-axis) against distance to closest coast (x-axis).

## Notional Standard Flood Policy Specifications

<u>Policy Type</u>	<u>Assumptions</u>
<b>Owners</b>	<p><b>Coverage A = Building Property</b></p> <ul style="list-style-type: none"><li>• Coverage A limit = \$100,000</li><li>• Replacement cost equal to Coverage A limit</li></ul> <p><b>Coverage B = Personal Property</b></p> <ul style="list-style-type: none"><li>• Coverage B limit = \$40,000</li><li>• Actual cash value equal to Coverage B limit</li></ul> <p><b>Time Element Coverage</b></p> <ul style="list-style-type: none"><li>• To be defined by the modeling organization</li></ul> <p>✧ Flood loss costs per \$1,000 shall be specified for each coverage limit</p>
<b>Renters</b>	<p><b>Coverage B = Personal Property</b></p> <ul style="list-style-type: none"><li>• Coverage B limit = \$25,000</li><li>• No coverage for tenant improvements</li><li>• Actual cash value equal to Coverage B limit</li></ul> <p><b>Time Element Coverage</b></p> <ul style="list-style-type: none"><li>• To be defined by the modeling organization</li></ul> <p>✧ Flood loss costs per \$1,000 shall be related to the Coverage B limit</p>
<b>Condo Unit Owners</b>	<p><b>Coverage A = Building Property</b></p> <ul style="list-style-type: none"><li>• Coverage A limit = 10% of Coverage B limit</li><li>• Replacement cost equal to Coverage A limit</li></ul> <p><b>Coverage B = Personal Property</b></p> <ul style="list-style-type: none"><li>• Coverage B limit = \$50,000</li><li>• Actual cash value equal to Coverage B limit</li></ul> <p><b>Time Element Coverage</b></p> <ul style="list-style-type: none"><li>• To be defined by the modeling organization</li></ul> <p>✧ Flood loss costs per \$1,000 shall be related to the Coverage B limit</p>

**Policy Type**

**Assumptions**

**Manufactured Homes**

**Coverage A = Building Property**

- Coverage A limit = \$50,000
- Replacement cost equal to Coverage A limit

**Coverage B = Personal Property**

- Coverage B limit = \$25,000
- Actual cash value equal to Coverage B limit

**Time Element Coverage**

- To be defined by the modeling organization

✧ Flood loss costs per \$1,000 shall be related to the coverage limit

**Form AF-6: Flood Probable Maximum Loss for Florida**

Purpose: This form provides an illustration of the distribution of flood losses and illustrates that appropriate calculations were used to produce both expected annual flood losses and flood probable maximum loss levels.

- A. Provide the estimated flood loss and uncertainty interval for each of the Personal Residential Annual Exceedance Probabilities given in Part A, Annual Aggregate and Part B, Annual Occurrence. Describe how the uncertainty intervals are derived. Also, provide in Parts A and B, the Conditional Tail Expectation, the expected value of flood losses greater than the Estimated Flood Loss Level. If the modeling methodology does not allow the flood model to produce a viable answer for certain exceedance probabilities, state so and why.
- B. Provide this form in Excel format. The file name shall include the abbreviated name of the modeling organization, the flood standards year, and the form name. Also include Form AF-6, Flood Probable Maximum Loss for Florida, in a submission appendix.

**Part A – Personal Residential Flood Probable Maximum Loss for Florida**  
**(Annual Aggregate)**

Annual Exceedance Probability	Estimated Flood Loss Level	Uncertainty Interval	Conditional Tail Expectation
Top Event			---
0.001			
0.002			
0.004			
0.01			
0.02			
0.05			
0.10			
0.20			

**Part B – Personal Residential Flood Probable Maximum Loss for Florida  
(Annual Occurrence)**

<b>Annual Exceedance Probability</b>	<b>Estimated Flood Loss Level</b>	<b>Uncertainty Interval</b>	<b>Conditional Tail Expectation</b>
Top Event			---
0.001			
0.002			
0.004			
0.01			
0.02			
0.05			
0.10			
0.20			

## COMPUTER/INFORMATION FLOOD STANDARDS

### CIF-1 Flood Model Documentation

- A. Flood model functionality and technical descriptions shall be documented formally in an archival format separate from the use of letters, slides, and unformatted text files.***
- B. The modeling organization shall maintain a primary document repository, containing or referencing a complete set of documentation specifying the flood model structure, detailed software description, and functionality. Documentation shall be indicative of current model development and software engineering practices.***
- C. All computer software (i.e., user interface, scientific, engineering, actuarial, data preparation, and validation) relevant to the flood model shall be consistently documented and dated.***
- D. The modeling organization shall maintain a table of all substantive changes in the flood model since this year's initial submission.***
- E. Documentation shall be created separately from the source code.***
- F. The modeling organization shall maintain a list of all externally acquired currently used flood model-specific software and data assets. The list shall include (1) asset name, (2) asset version number, (3) asset acquisition date, (4) asset acquisition source, (5) asset acquisition mode (e.g., lease, purchase, open source), and (6) length of time asset has been in use by the modeling organization.***

Purpose: To capture all aspects of *documenting* the flood model. Documentation enables the modeling organization personnel to create a shared, formal organizational structure of all information specifically related to the flood model. This structure may include many forms of media such as printed documentation, diagrams, and time-based media such as animations.

Relevant Form: GF-7, Computer/Information Flood Standards Expert Certification

### Audit

1. The primary document repository, in either electronic or physical form, and its maintenance process will be reviewed. The repository should contain or reference full documentation of the software.
2. All documentation should be easily accessible from a central location in order to be reviewed.

3. Complete user documentation, including all recent updates, will be reviewed.
4. Modeling organization personnel, or their designated proxies, responsible for each aspect of the software (i.e., user interface, quality assurance, engineering, actuarial, verification) should be present when the Computer/Information Flood Standards are being reviewed. Internal users of the software will be interviewed.
5. Verification that documentation is created separately from, and is maintained consistently with, the source code and data will be reviewed.
6. The list of all externally acquired flood model-specific software and data assets will be reviewed.
7. The tables specified in CIF-1.D that contain the items listed in Standard GF-1, Scope of the Flood Model and Its Implementation, Audit 6 will be reviewed. The tables should contain the item number in the first column. The remaining five columns should contain specific document or file references for affected components or data relating to the following Computer/Information Flood Standards: CIF-2, Flood Model Requirements, CIF-3, Flood Model Architecture and Component Design, CIF-4, Flood Model Implementation, CIF-5, Flood Model Verification, and CIF-6, Flood Model Maintenance and Revision.
8. Tracing of the flood model changes specified in Standard GF-1, Scope of the Flood Model and Its Implementation, Audit 6 through all Computer/Information Flood Standards will be reviewed.



## CIF-2 Flood Model Requirements

***The modeling organization shall maintain a complete set of requirements for each software component as well as for each database or data file accessed by a component. Requirements shall be updated whenever changes are made to the flood model.***

Purpose: To define an initial stage of flood model development. Software development begins with a thorough *specification of requirements* for each component, database, or data file accessed by a component. These requirements are frequently documented informally in natural language, with the addition of illustrations that aid both users and software engineers in specifying components, databases, or data files accessed by a component for the software product and process. Requirements drive the subsequent design (CIF-3, Flood Model Architecture and Component Design), implementation (CIF-4, Flood Model Implementation), and verification (CIF-5, Flood Model Verification) of the flood model.

A typical division of requirements into categories would include:

1. ***Interface:*** For example, use the web browser Internet Explorer, with ActiveX technology, to show county and ZIP Code maps of Florida. Allow text search commands for browsing and locating counties.
2. ***Human Factors:*** For example, ZIP Code boundaries and contents, can be scaled to the extent that the average user can visually identify residential home exposures marked with small circles.
3. ***Functionality:*** For example, make the software design at the topmost level a data flowchart containing the following components: FLOODS, TERRAIN, FLOOD ELEVATION AND DEPTH, WAVE CONDITIONS, FLOOD EXTENT, DAMAGE, and FLOOD LOSS COSTS. Write the low-level code in Java.
4. ***Documentation:*** For example, use Acrobat PDF for the layout language, and add PDF hyperlinks in documents to connect the sub-documents.
5. ***Data:*** For example, store the flood vulnerability data in an Excel spreadsheet using a different sheet for each construction type.
6. ***Human Resources:*** For example, task individuals for the six-month coding of the flood extent and depth simulation. Ask others to design the user-interface by working with the Quality Assurance team.

7. **System Models:** For example, models with representations of software, data, and associated human collaboration, will use Business Process Model and Notation (BPMN), Unified Modeling Language (UML), or Systems Modeling Language (SysML).
8. **Security:** For example, store tapes off-site, with incremental daily backups. Password-protect all source files.
9. **Quality Assurance:** For example, filter insurance claims data against norms and extremes created for the last project.

Relevant Form: GF-7, Computer/Information Flood Standards Expert Certification

### **Disclosure**

1. Provide a description of the documentation for interface, human factors, functionality, documentation, data, human and material resources, security, and quality assurance.

### **Audit**

1. Maintenance and documentation of a complete set of requirements for each software component, database, and data file accessed by a component will be reviewed.

## CIF-3 Flood Model Architecture and Component Design

- A. The modeling organization shall maintain and document (1) detailed control and data flowcharts and interface specifications for each software component, (2) schema definitions for each database and data file, (3) flowcharts illustrating flood model-related flow of information and its processing by modeling organization personnel or consultants, and (4) system model representations associated with (1)-(3). Documentation shall be to the level of components that make significant contributions to the flood model output.**
- B. All flowcharts (e.g., software, data, and system models) shall be based on (1) a referenced industry standard (e.g., Unified Modeling Language (UML), Business Process Model and Notation (BPMN), Systems Modeling Language (SysML)), or (2) a comparable internally-developed standard which is separately documented.**

Purpose: To *design* the flood model once requirements (CIF-2, Flood Model Requirements) have been specified. The software system (comprised of code and data) and the business process (composed of people and information flows) are designed as a collection of interconnected components. These components are frequently specified in hierarchical flowcharts and diagrams. Example components might include: FLOODS, TERRAIN, FLOOD ELEVATION OR DEPTH, WAVE CONDITIONS, FLOOD EXTENT, DAMAGE, and FLOOD LOSS COSTS, and the major sub-components of each. The purpose of each example component is, as follows:

1. FLOODS accepts historical flood event data sources and generates historical and stochastic flood events;
2. TERRAIN accepts topographic, bathymetric, and land use/land cover data and produces ground surface characteristics used by FLOOD ELEVATION OR DEPTH, WAVE CONDITIONS, and FLOOD EXTENT;
3. FLOOD ELEVATION OR DEPTH accepts the output from FLOODS and TERRAIN and produces a stillwater flood surface and site-specific flood depths throughout the area inundated by a flood event;
4. WAVE CONDITIONS accepts the output from FLOODS, FLOOD ELEVATION OR DEPTH, and TERRAIN and produces wave characteristics and wave elevations throughout the area inundated by a coastal flood event;
5. FLOOD EXTENT accepts the output from FLOOD ELEVATION OR DEPTH, TERRAIN, and WAVE CONDITIONS and generates the horizontal limits of flooding for a flood event;

6. DAMAGE accepts the output from FLOOD ELEVATION OR DEPTH and WAVE CONDITIONS and generates flood damage to personal residential property;
7. FLOOD LOSS COSTS accepts the output from DAMAGE and generates flood loss costs.

Relevant Form: GF-7, Computer/Information Flood Standards Expert Certification

## **Audit**

1. The following will be reviewed:
  - a. Detailed control and data flowcharts, completely and sufficiently labeled for each component,
  - b. Interface specifications for all components in the flood model,
  - c. Documentation for schemas for all data files, along with field type definitions,
  - d. Each network flowchart including components, sub-component flowcharts, arcs, and labels, and
  - e. Flowcharts illustrating flood model-related information flow among modeling organization personnel or consultants (e.g., BPMN, UML, SysML, or equivalent technique including a modeling organization internal standard).
2. A flood model component custodian, or designated proxy, should be available for the review of each component.
3. The flowchart reference guide or industry standard reference will be reviewed.

## **CIF-4 Flood Model Implementation**

- A. The modeling organization shall maintain a complete procedure of coding guidelines consistent with current software engineering practices.**
- B. The modeling organization shall maintain a complete procedure used in creating, deriving, or procuring and verifying databases or data files accessed by components.**
- C. All components shall be traceable, through explicit component identification in the flood model representations (e.g., flowcharts) down to the code level.**
- D. The modeling organization shall maintain a table of all software components affecting flood loss costs and flood probable maximum loss levels with the following table columns: (1) component name, (2) number of lines of code, minus blank and comment lines, and (3) number of explanatory comment lines.**
- E. Each component shall be sufficiently and consistently commented so that a software engineer unfamiliar with the code shall be able to comprehend the component logic at a reasonable level of abstraction.**
- F. The modeling organization shall maintain the following documentation for all components or data modified by items identified in Standard GF-1, Scope of the Flood Model and Its Implementation, Audit 6:**
  - 1. A list of all equations and formulas used in documentation of the flood model with definitions of all terms and variables.**
  - 2. A cross-referenced list of implementation source code terms and variable names corresponding to items within F.1 above.**

Purpose: To *implement* the flood model based on requirements (CIF-2, Flood Model Requirements) and design (CIF-3, Flood Model Architecture and Component Design). The flood model implementation is created using computer software (i.e., code) and data. Elements formed in the design stage should be fully traceable to components of the implementation. The design stage serves as an abstract, and often visual, representation of the underlying implementation comprised of code and data.

Relevant Form: GF-7, Computer/Information Flood Standards Expert Certification

## **Disclosure**

1. Specify the hardware, operating system, other software, and all computer languages required to use the flood model.

## **Audit**

1. The interfaces and the coupling assumptions will be reviewed.
2. The documented coding guidelines, including procedures for ensuring readable identifiers for variables, constants, and components, and confirmation that these guidelines are uniformly implemented will be reviewed.
3. The procedure used in creating, deriving, or procuring and verifying databases or data files accessed by components will be reviewed.
4. The traceability among components at all levels of representation will be reviewed.
5. The following information will be reviewed for each component, either in a header comment block, source control database, or the documentation:
  - a. Component name,
  - b. Date created,
  - c. Dates modified, modification rationale, and by whom,
  - d. Purpose or function of the component, and
  - e. Input and output parameter definitions.
6. The table of all software components as specified in CIF-4.D will be reviewed.
7. Flood model components and the method of mapping to elements in the computer program will be reviewed.
8. Comments within components will be reviewed for sufficiency, consistency, and explanatory quality.

## CIF-5 Flood Model Verification

### A. General

***For each component, the modeling organization shall maintain procedures for verification, such as code inspections, reviews, calculation crosschecks, and walkthroughs, sufficient to demonstrate code correctness. Verification procedures shall include tests performed by modeling organization personnel other than the original component developers.***

### B. Component Testing

- 1. The modeling organization shall use testing software to assist in documenting and analyzing all components.***
- 2. Unit tests shall be performed and documented for each component.***
- 3. Regression tests shall be performed and documented on incremental builds.***
- 4. Aggregation tests shall be performed and documented to ensure the correctness of all flood model components. Sufficient testing shall be performed to ensure that all components have been executed at least once.***

### C. Data Testing

- 1. The modeling organization shall use testing software to assist in documenting and analyzing all databases and data files accessed by components.***
- 2. The modeling organization shall perform and document integrity, consistency, and correctness checks on all databases and data files accessed by the components.***

Purpose: To ensure a correct mapping from executing the implementation (CIF-4, Flood Model Implementation) to previously specified requirements (CIF-2, Flood Model Requirements) and design (CIF-3, Flood Model Architecture and Component Design). *Verification* requires tests to be run by varying component inputs to ensure correct output.

Relevant Form: GF-7, Computer/Information Flood Standards Expert Certification

## **Disclosures**

1. State whether any two executions of the flood model with no changes in input data, parameters, code, and seeds of random number generators produce the same flood loss costs and flood probable maximum loss levels.
2. Provide an overview of the component testing procedures.
3. Provide a description of verification approaches used for externally acquired data, software, and models.

## **Audit**

1. The components will be reviewed for containment of sufficient logical assertions, exception-handling mechanisms, and flag-triggered output statements to test the correct values for key variables that might be subject to modification.
2. The testing software used by the modeling organization will be reviewed.
3. The component (unit, regression, aggregation) and data test processes and documentation will be reviewed including compliance with independence of the verification procedures.
4. Fully time-stamped, documented cross-checking procedures and results for verifying equations, including tester identification, will be reviewed. Examples include mathematical calculations versus source code implementation, or the use of multiple implementations using different languages.
5. Flowcharts defining the processes used for manual and automatic verification will be reviewed.
6. Verification approaches used for externally acquired data, software, and models will be reviewed.



## **CIF-6 Flood Model Maintenance and Revision**

- A. *The modeling organization shall maintain a clearly written policy for flood model review, maintenance, and revision, including verification and validation of revised components, databases, and data files.***
- B. *A revision to any portion of the flood model that results in a change in any Florida personal residential flood loss cost or flood probable maximum loss level shall result in a new flood model version identification.***
- C. *The modeling organization shall use tracking software to identify and describe all errors, as well as modifications to code, data, and documentation.***
- D. *The modeling organization shall maintain a list of all flood model versions since the initial submission for this year. Each flood model description shall have a unique version identification and a list of additions, deletions, and changes that define that version.***

Purpose: To create a formal procedure for identifying, organizing, and *maintaining flood model versions*. Flood model software, data, and documentation are stored in an online system that tracks all editing changes by author and change date.

Relevant Form: GF-7, Computer/Information Flood Standards Expert Certification

### **Disclosures**

1. Identify procedures used to review and maintain code, data, and documentation.
2. Describe the rules underlying the flood model and code revision identification systems.

### **Audit**

1. All policies and procedures used to review and maintain the code, data, and documentation will be reviewed. For each component in the system decomposition, the installation date under configuration control, the current version identification, and the date of the most recent change(s) will be reviewed.
2. The policy for flood model revision and management will be reviewed.
3. Portions of the code will be reviewed.
4. The tracking software will be reviewed and checked for the ability to track date and time.
5. The list of all flood model revisions as specified in CIF-6.D will be reviewed.

## CIF-7 Flood Model Security

***The modeling organization shall have implemented and fully documented security procedures for (1) secure access to individual computers where the software components or data can be created or modified, (2) secure operation of the flood model by clients, if relevant, to ensure that the correct software operation cannot be compromised, (3) anti-virus software installation for all machines where all components and data are being accessed, and (4) secure access to documentation, software, and data in the event of a catastrophe.***

Purpose: To ensure that the flood model is *secured* against unauthorized access. Security procedures are necessary to maintain an adequate, secure, and correct base for code, data, and documentation. The modeling organization is expected to have a secure location supporting all code, data, and documentation development and maintenance. Necessary measures include, but are not limited to, (1) virus protection, (2) limited access protocols for software, hardware, and networks, and (3) backup and redundancy procedures.

Relevant Form: GF-7, Computer/Information Flood Standards Expert Certification

### **Disclosure**

1. Describe methods used to ensure the security and integrity of the code, data, and documentation.

### **Audit**

1. The written policy for all security procedures and methods used to ensure the security of code, data, and documentation will be reviewed.
2. Documented security procedures for access, client flood model use, anti-virus software installation, and off-site procedures in the event of a catastrophe will be reviewed.

**WORKING DEFINITIONS  
OF TERMS USED IN THE  
*FLOOD STANDARDS  
REPORT OF ACTIVITIES*  
AND IN THE  
*HURRICANE STANDARDS  
REPORT OF ACTIVITIES***

**Working Definitions of Terms**  
**Used in the *Flood Standards Report of Activities***  
**And in the *Hurricane Standards Report of Activities***

(These terms are applicable to the *Flood Standards Report of Activities*, the *Hurricane Standards Report of Activities*, or both.)

**Actual Cash Value (ACV):**

Cost of replacing damaged or destroyed property with comparable new property minus depreciation.

**Actuary:**

A highly specialized professional with mathematical and statistical sophistication trained in the risk aspects of property insurance, whose functions include the calculations involved in determining proper insurance rates, evaluating reserves, and various aspects of insurance research; a member of the Casualty Actuarial Society or Society of Actuaries with requisite experience.

**Acyclic Graph:**

A graph containing no cycles.

**Additional Living Expense (ALE):**

If a home becomes uninhabitable due to a covered loss, ALE coverage pays for the extra costs of housing, dining expenses, etc. up to the limits for ALE in the policy.

**Aggregate Data:**

Summarized datasets or data summarized by using different variables. For example, data summarizing the exposure amounts by line of business by ZIP Code is one set of aggregated data.

**Aggregation Test:**

A test to ensure the correctness of all components when operating as a whole.

**Annual Aggregate Loss Distribution:**

For Commission purposes, the probability distribution of the sum of all losses that are expected to occur for all modeled hurricane events in each year or for all modeled flood events in each year.

**Annual Exceedance Probability:**

Probability of an annual loss outcome greater than a specified value. Reciprocal of the return period.

**Annual Occurrence Loss Distribution:**

For Commission purposes, the probability distribution of the largest loss that is expected to occur for all modeled hurricane or flood events in each year.

**Appurtenant Structures:**

Detached buildings and other structures located on the same property as the principal insured building (e.g., detached garage, fences, swimming pools, patios). For standard flood policies, contracts, and endorsements, appurtenant structures include detached garage only, and for other flood policies, contracts, and endorsements, appurtenant structures may include detached garage and may include other detached structures.

**Assertion:**

A logical expression specifying a program state that must exist or a set of conditions that program variables must satisfy at a particular point during program execution. Types include input assertion, loop assertion, output assertion. Assertions may be handled specifically by the programming language (i.e., with an “assert” statement) or through a condition (i.e., “if”) statement.

**Astronomical Tide:**

The periodic variation in sea surface that results from gravitational attraction of the sun and moon without any atmospheric influence.

**Atlantic Basin:**

The area including the entire North Atlantic Ocean, the Caribbean Sea, and the Gulf of Mexico.

**Average:**

Arithmetic average or arithmetic mean.

**Average Annual Loss (AAL):**

The AAL is the expected value of the annual aggregate loss distribution.

**Base Hurricane Storm Set:**

The storm set used to calibrate and validate modeled hurricane frequency impacting Florida against historical hurricanes as defined in Standard M-1, Base Hurricane Storm Set.

**Bathymetry:**

Spatial variation of ocean depth relative to mean sea level.

**Business Process Model and Notation (BPMN):**

A graphical representation for specifying business processes in a business process model.

**By-Passing Hurricane:**

A hurricane which does not make landfall, but produces minimum damaging windspeeds or greater on land in Florida.

**Calibration:**

Process of adjusting values of model input parameters in an attempt to fit appropriate target datasets.

**Catastrophe:**

A natural or man-made event that causes more than \$25 million in insured losses as defined by Property Claims Services.

**Center:**

The point inside the eye of a hurricane where the wind is calm and about which the vortex winds rotate.

**Characteristics (Output):**

For Commission purposes, resulting values or datasets which are generated by the model through a process of analyzing, evaluating, interpreting, or performing calculations on parameters (input).

**Code:**

In software engineering, computer instructions and data definitions expressed in a programming language or in a form output by an assembler, compiler, or other translator.  
*Synonym: Program.*

**Code Refactoring:**

Reviewing computer source code to improve nonfunctional attributes of the software through a continuous and sustained code improvement effort. Refactoring involves methods to reduce code complexity, improve readability and extensibility, including unit testing.

**Coding Guidelines:**

Organization, format, and style directives in the development of programs and the associated documentation.

**Coinsurance:**

A specific provision used in a property insurance policy in which an insurer assumes liability only for a proportion of a loss.

**Commercial Residential Property Insurance:**

The type of coverage provided by condominium association, cooperative association, apartment building, and similar policies, including covering the common elements of a homeowners' association; see s. 627.4025, F.S.

**Component:**

One of the parts that make up a system. A component may be subdivided into other components. The terms "module," "component," and "unit" are often used interchangeably or defined to be sub-elements of one another in different ways depending on

the context. For non-object oriented software, a component is defined as the main program, a subprogram, or a subroutine. For object-oriented software, a component is defined as a class characterized by its attributes and component methods.

**Component Tree:**

An acyclic graph depicting the hierarchical decomposition of a software system or model.  
*See also: System Decomposition.*

**Components and Cladding:**

Elements of the building envelope that do not qualify as part of the main wind-force resisting system.

**Conditional Tail Expectation:**

Expected value of the loss above a given loss level.

**Condominium Owners Policy:**

The coverage provided to the condominium unit owner in a building against damage to the interior of the unit.

**Control Flow:**

The sequence in which operations are performed during the execution of a computer program. *Contrast with: Data Flow.*

**Conversion Factor:**

Either the ratio of the one-minute 10-meter wind to a reference wind (e.g., another level, gradient wind, or boundary layer depth-average), or a constant used to convert one unit of measure to another (as in 1 knot = 1.15 mph).

**Correctness:**

(1) The degree to which a system or component is free from faults in its specification, design, and implementation. (2) The degree to which software, documentation, or other items comply with specified requirements.

**Current State-of-the-Science:**

A technique, methodology, process, or data that clearly advances or improves the science and may or may not be of a proprietary nature. Such advancement or improvement should be agreed upon and acceptable to the Commission. Includes current scientific and technical literature.

**Current Scientific and Technical Literature:**

A refereed or peer-reviewed publication specific to the academic discipline involved and recognized by the academic community as an advancement or significant contribution to the literature which has not been superseded or replaced by more recent literature.

**Damage:**

(1) Physical harm caused to something in such a way as to impair its value, usefulness, or normal function. (2) The Commission recognizes that the question, “What is the damage to the house?” may be answered in a number of ways. In constructing their models, the modeling organizations assess “losses” in more than one way, depending on the use to which the information is to be put in the model. A structural engineer might determine that a house is 55% damaged and consider it still structurally sound. A claims adjuster might look at the same house and determine that 55% damage translates into a total loss because the house will be uninhabitable for some time, and further, because of a local ordinance relating to damage exceeding 50%, will have to be completely rebuilt according to updated building requirements. Since the Commission is reviewing hurricane models for purposes of residential rate filings in Florida and flood models for purposes of personal residential rate filings in Florida, loss costs must be a function of insurance damage rather than engineering damage.

**Damage Ratio:**

Percentage of a property damaged by an event relative to the total cost to rebuild or replace the property of like kind and quality.

**Damaging Wave Action:**

Waves with sufficient energy to cause structural damage to a personal residential structure.

**Data Flow:**

The sequence in which data transfer, use, and transformation are performed during the execution of a computer program. *Contrast with:* **Control Flow**.

**Data Validation:**

Techniques to assure the needed accuracy, required consistency, and sufficient completeness of data values used in model development and revision.

**Datum, Horizontal & Vertical:**

The reference specifications of a measurement system, usually a system of coordinate positions on a surface (horizontal datum) or heights above or below a surface (vertical datum). A datum provides a base line reference for numerical values associated with location or height. Common datums used in the U.S. include North American Datum, NAD27 and NAD83 (horizontal) and National Geodetic Vertical Datum, NGVD29 and National American Vertical Datum, NAVD88 (vertical).

**Decay Rate:**

The rate at which surface windspeeds decrease and central pressure increases in a tropical cyclone. Tropical cyclones weaken or decay as central pressure rises. Once tropical cyclones move over land, their rate of decay is affected not only because of the removal of their warm water energy source, but also because of surface roughness. The surface roughness contribution to filling is expected to vary spatially. *See also:* **Weakening**.



**Demand Surge:**

A sudden and generally temporary increase in the cost of claims due to amplified payments following a hurricane or a series of hurricane events.

**Depreciation:**

The decrease in the value of property over time.

**Discharge:**

The volume of water moving through a specifically defined location or two-dimensional area over a quantity of time, usually quantified in cubic feet per second (cfs).

**Dry Floodproofing:**

Measures that result in a building being watertight, with walls and exterior surfaces substantially impermeable to the passage of floodwater, and with structural components having the capacity to resist flood loads.

**Economic Inflation:**

With regards to insurance, the trended long-term increase in the costs of coverages brought about by the increase in costs for the materials and services.

**Elevation:**

Vertical distance above or below a specific vertical datum.

**Erosion (Flood Induced):**

The wearing away, collapse, undermining or subsidence of land during a flood, due to waves or currents exceeding their cyclical levels.

**Event:**

For purposes of modeling hurricane losses, an event is any hurricane that makes landfall in Florida as a hurricane or by-passes Florida as a hurricane but comes close enough to cause damaging winds in Florida.

**Exception:**

A state or condition that either prevents the continuation of program execution or initiates, on its detection, a pre-defined response through the provision of exception-handling capabilities.

**Exposure:**

The unit of measure of the amount of risk assumed. Rates and loss costs are expressed as dollars per exposure. Sometimes the number of houses is used in homeowner's insurance as a loose equivalent.

**Far-Field Pressure:**

Baseline pressure in the cyclone environment that may be used to relate maximum wind to minimum central pressure.

**Filling Rate:**

*Synonym: Decay Rate.*

**Flag-Triggered Output Statements:**

Statements that cause intermediate results (output) to be produced based on a Boolean-valued flag. This is a common technique for program testing.

**Flood:**

A general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties, at least one of which is the policyholder's property, from:

1. Overflow of inland or tidal waters;
2. Unusual and rapid accumulation or runoff of surface waters from any source;
3. Mudflow; or
4. Collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood as defined above.

See s. 627.715(1)(a)5.(b), F.S.

**Flood Barriers:**

A structural component attached to or constructed around a building or building opening, preceding a flood event, to prevent flood waters from entering a building or area by creating a watertight barrier. Flood barriers can include permanent but movable components, such as watertight doors and seals, or temporary (removable) components, such as floodwall panels.

**Flood-borne Debris:**

Objects carried or moved by floodwaters into a personal residential structure and capable of causing damage to that structure.

**Flood, Coastal:**

Flood resulting from astronomical tides or storm surge.

**Flood Conditions:**

Physical characteristics associated with flooding such as extent and elevation or depth, flow, velocity, waves, duration, erosion, salinity, or contamination.

**Flood Depth:**

- (1) For flood hazard purposes, flood depth equals flood elevation minus ground elevation.
- (2) For building vulnerability calculations, flood depth equals flood elevation minus lowest floor elevation. For coastal floods, flood depth is measured from the wave crest elevation or from the water surface including wave runup.

**Flood Duration:**

The length of time in which an area or building is inundated by floodwaters.

**Flood Elevation:**

Elevation of the water surface relative to a vertical datum, including coastal wave effects where present. For coastal floods, the flood elevation includes wave setup (wave radiation stress) and is taken at the wave crest elevation or the water surface including wave runup.

**Flood Extent:**

The horizontal limits of a given flood event, occurring where the ground elevation equals the flood elevation.

**Flood Frequency:**

The probability, in percentage, that a flood of a specific level will occur or be exceeded in any given year. For example, a flood with a 1% flood frequency (i.e., 1% annual chance) is a flood that has a 1% chance of being equaled or exceeded in any year. This same flood frequency can also be written as a decimal (i.e., 0.01 annual exceedance probability) or a return period, which is the inverse of the decimal (i.e., 100-year return period).

**Flood, Inland:**

Flood not of coastal origin. Inland floods typically are due to rainfall, runoff, ponding, and include riverine floods, lacustrine floods, and surface water flooding.

**Flood Inundation:**

The rising of a body or source of water and its overflowing onto normally dry land.

**Flood, Lacustrine:**

A type of inland flooding usually associated with a generally non-moving water source (e.g., lake, pond) caused by water levels rising and inundating adjacent areas with standing water.

**Flood Life Cycle:**

The full progression of flooding conditions, beginning with the initial flood inundation, continuing through the rise, peak, and fall of floodwaters, and ending when floodwaters have receded below the threshold set in the definition of flood.

**Flood Mitigation Measure:**

Any measure which permanently reduces flood damage to a building by (1) preventing flood waters from inundating the building (e.g., elevating a building above the estimated flood elevation), or (2) decreasing the damage which flood inundation would cause to a building (e.g., elevating electrical and other flood-susceptible components of the building above the flood elevation and retrofitting the portions of the building which would be inundated with flood-resistant materials).

**Flood Policies, Contracts and Endorsements:**

Various ways flood coverage can be offered; see s. 627.715, F.S.

**Flood, Riverine:**

A type of inland flooding usually associated with a watercourse (e.g., river, stream) which results in water overflowing the banks of the watercourse and inundating adjacent areas with moving water. The velocity of the floodwater can be a major factor in the resulting damage and injuries associated with the flood.

**Flood, Surface Water:**

Flooding caused by the accumulation of above-ground water which is not associated with a specific watercourse or water body. Surface water flooding excludes water from increased ground water levels.

**Floodplain:**

Any land area susceptible to being inundated by floodwaters from any source.

**Floodwater:**

The water that inundates an area during a flood, usually containing debris and possible contaminants.

**Flowchart:**

A diagram that visually depicts information moving through a system identified by iconic representations of components. Components are interconnected by pathways frequently represented by arrows. Examples of flowcharts are flow of data and control, and flow of information in a system comprised of people and machines.

**Flow Velocity:**

The velocity of water as it moves within a channel or over land, usually quantified in feet per second (ft/s).

**Forward Speed:**

The forward speed at which a tropical cyclone is moving along the earth's surface. This is not the speed at which winds are circulating around the tropical cyclone. A forward speed of 3 mph is slow; a forward speed of 10-15 mph is average; a forward speed of 20-30 mph is fast.

**Frequency Distribution:**

Division of a sample of observations into a number of classes together with the number of observations in each class.

**Function:**

(1) In programming languages, a subprogram, usually with formal parameters, that produces a data value that it returns to the place of the invocation. A function may also produce other changes through the use of parameters. (2) A specific purpose of an entity or its characteristic action.

**Functionality:**

The degree to which the intended function of an entity is realized. *See also:* **Function**.

**Fundamental Engineering Principles:**

The basic engineering tools, physical laws, rules, or assumptions from which other engineering tools can be derived.

**Geocoding:**

Assignment of a location to geographic coordinates.

**Geographic Grid:**

An array of cells used to define geographic space. Each cell stores a numeric value that represents a geographic attribute (e.g., elevation) for that unit of space. Data from the grid cells can be compiled into a set of contours or used to create a three-dimensional surface. When the grid is drawn as a map, cells are often assigned colors according to their numeric value. Each grid cell is referenced by its x,y coordinate location.

**Geographic Information System (GIS):**

An integrated collection of computer software and data used to review and manage information about geographic places, analyze spatial relationships, and model spatial processes. A GIS provides a framework for gathering and organizing spatial data and related information so that it can be displayed and analyzed.

**Geographic Location Data:**

Information related to the geocoding process within the model software.

**Ground Up Loss:**

Loss to a structure or location prior to the application of a deductible, policy limit, coinsurance penalty, depreciation, exclusion or other policy provision.

**Guaranteed Replacement Cost:**

A policy provision in which the insurer agrees to pay losses on a replacement cost basis even if in excess of the policy limit.

**Gust Factor:**

Ratio of the strongest windspeed within a specified interval of time (such as 3-second or 10-second) to the mean windspeed.

**Homeowner Insurance Policy (HO):**

A package policy for the homeowner that typically combines protection on the structure and contents, additional living expense protection, and personal liability insurance. Homeowner's policies were first developed in the 1950's. Prior to that time, homeowners wishing coverage for fire, theft, and liability had to purchase three separate policies. Homeowner's policies do not cover earthquake or flood. These are sold separately.

**Human Factors:**

Study of the interrelationships between humans, the tools they use, and the environment in which they live and work. *See also: User Interface.*

**Hurricane:**

A tropical cyclone in which the maximum one-minute average windspeed at 10-meters height is 74 miles per hour or greater.

**Hurricane Characteristic:**

An output of the hurricane model. Examples are modeled windspeed at a particular location, track, and intensity variation.

**Hurricane Mitigation Measure:**

A factor or function that improves a structure's wind resistance.

**Hurricane Parameter:**

An input (generally stochastic) to the hurricane model. Examples are radius of maximum wind, maximum wind, profile factor, and instantaneous speed and direction of motion.

**Implementation:**

The process of transforming a design specification into a system realization with components in hardware, software and "humanware." *See also: Code.*

**Incremental Build:**

A system development strategy that begins with a subset of required capabilities and progressively adds functionality through a cyclical build and test approach.

**Independent:**

An independent characteristic or event is one which is unaffected by the existence of another characteristic or by whether or not another event occurs.

**Inflow Angle:**

The angle that near-surface hurricane wind vectors make with respect to the azimuthal direction about the storm center. The angle is measured inward toward the storm center. It is a parameter used to transform assumed circular hurricane winds appropriate for the free troposphere to inward directed winds appropriate for the near-surface.

**Insurance Policy:**

A contractual document which defines the amount and scope of insurance provided by the insurer resulting in a transfer of risk.

**Insurance to Value:**

The relationship of the amount of insurance to replacement cost. 100% insurance to value means that the amount of insurance equals the replacement cost.

**Insured Loss:**

The cost to repair/restore property after an insured event, including ALE, payable by the insurance company after the application of policy terms and limits.

**Insured Primary Damage:**

Damage that is not excess of or secondary to another policy, contract, or endorsement.

**Intensity:**

The maximum one-minute sustained surface (i.e., 10-meter) winds measured near the center of a tropical storm.

**Interface Specification:**

An unambiguous and complete description of the meaning, type, and format of data exchanges among system components (software, hardware, and “humanware”). *See also: User Interface.*

**Initial Soil Conditions:**

Conditions (generally related to moisture content) of a soil preceding a precipitation or flood event, which affect the soil infiltration rate and maximum infiltration volume. The initial conditions of soil can have a large impact on rainfall runoff, due to the ability (or inability) of the soil to absorb water. Initial moisture conditions of a soil can be affected by groundwater levels or recent rainfall events.

**Invariant:**

A logical expression that remains true within the context of a code segment.

**Isotach:**

A line of constant windspeed.

**Landfall:**

A landfall has occurred when the center of tropical cyclone circulation crosses the coastline from sea to land.

**Landfall Frequency Distribution:**

Frequency distribution of hurricanes whose centers have crossed the coastline from water (Atlantic Ocean or Gulf of Mexico) to land. For hurricane paths that, for example,

roughly parallel the coastline with multiple crossings, a single count of the initial crossing should be used in the frequency distribution.

**Loss Adjustment Expenses (LAE):**

The expenses incurred by an insurer to adjust a claim by a policyholder. These expenses are divided into allocated loss adjustment expenses (ALAE) and unallocated loss adjustment expenses (ULAE). Allocated loss adjustment expenses are specific amounts attributable to individual claims such as attorney's fees and court costs. Unallocated loss adjustment expenses are all other types of LAE.

**Loss Costs:**

The portion of the insurance premium applicable to the payment of insured losses only, exclusive of insurance company expenses and profits, per unit of insured exposure. Loss costs are generally stated per thousand dollars of exposure.

**Loss Exceedance Estimate:**

The loss amount which would be exceeded at a given level of probability based on a specific exposure dataset.

**Lowest Floor:**

The lowest floor of the lowest enclosed area, including basement, but excluding any unfinished or flood-resistant enclosure, usable solely for vehicle parking, building access, or limited storage, provided that such enclosure is not built so as to render the structure in violation of building code and floodplain management requirements.

**Major Flood Control Measure:**

Measure undertaken on a large scale, to reduce the presence, depth, or energy of flow or waves in areas that receive flood protection from the measure. Major flood control measures include dams, levees, and floodwalls whose failure could affect hundreds of personal residential properties or more.

**Manning *n*:**

An empirically-determined coefficient, also known as the Manning's Roughness Coefficient, describing the roughness of a ground and ground-cover combination.

**Manufactured Home:**

Type of *Mobile Home*, fabricated in a plant on or after June 15, 1976, in compliance with the federal Manufactured Home Construction and Safety Standard Act, and according to standards promulgated by the U.S. Department of Housing and Urban Development (HUD). Manufactured homes are transportable in one or more sections, eight feet or more in width and built on an integral chassis. They are designed to be used as a dwelling when set in place and connected to the required utilities and includes the plumbing, heating, air-conditioning, and electrical systems contained therein. Persons licensed by the Florida Department of Highway Safety and Motor Vehicles must perform installation. The structures are typically covered by mobile/manufactured home insurance policies (MH).



**Mapping of ZIP Codes:**

Either a point estimate or a physical geographic area.

**Maximum Windspeed:**

The peak one-minute, 10-meter winds in a hurricane. Depending on context, maximum windspeed may also refer to the strongest gradient wind.

**Mean Windspeed:**

The time average surface (10-meter) windspeed at a location. The averaging period should not be less than one-minute.

**Miles Per Hour (mph):**

Standard unit of windspeed measurement.

**Millibar (mb):**

Unit of air pressure. *See also:* **Minimum Central Pressure.**

**Minimum Central Pressure:**

The minimum surface pressure at the center of a tropical cyclone. The atmosphere exerts a pressure force measured in millibars. Average sea level pressure is 1013.25 millibars. Tropical cyclones have low pressure at the center of the cyclone. For a tropical cyclone of a given radius, lower central pressure corresponds to stronger surface windspeeds and storm surge height. The lowest pressure ever measured in a hurricane in the Atlantic basin was 882 mb in Hurricane Wilma (2005).

**Mobile Home:**

Common term used to describe **Manufactured Home** (see above). Technically, mobile homes were fabricated prior to June 15, 1976. These structures are covered by mobile/manufactured home insurance policies (MH).

**Model:**

A comprehensive set of formal structures, data, and components used to capture processes associated with the effects of hurricanes or floods and their impacts on personal residential and commercial properties leading to insured losses. These processes include the following:

1. Scientific and engineering representations such as equations, pseudo-codes, flowcharts, and source code,
2. All data necessary for producing such losses, and
3. System representations, involving human collaboration and communication, relating to 1. and 2.

**Model Architecture:**

The structure of components in a program/system, their interrelationships, and the principles and guidelines governing their design and evolution over time.

**Model Component Custodian:**

The individual who can explain the functional behavior of the component and is responsible for changes (revisions in code, documentation, or data) to that component.

**Model Management:**

The processes associated with the model lifecycle, including design, creation, implementation, verification, validation, maintenance, and documentation of the model.

**Modeling Organization:**

The entity(s) encompassing the requisite qualifications and experience (as found in Standard G-2, Qualifications of Modeling Organization Personnel and Consultants Engaged in Development of the Hurricane Model and Standard GF-2, Qualifications of Modeling Organization Personnel and Consultants Engaged in Development of the Flood Model) that organize resources to develop and maintain any models that have the potential for improving the accuracy or reliability of the hurricane loss projections used in residential rate filings or flood loss projections used in personal residential rate filings.

**Model Revision:**

The process of changing a model to correct discovered faults, add functional capability, respond to technology advances, or prevent invalid results or unwarranted uses. *See also: Regression Test.*

**Model Validation:**

A comparison between model behavior and empirical (i.e., physical) behavior.

**Model Verification:**

Assuring that the series of transformations, initiating with requirements and concluding with an implementation, follow the prescribed software development process.

**Modification Factor:**

A scalar adjustment to a vulnerability function that may increase or decrease the amount of change.

**Modification Function:**

Adjusts a vulnerability function and may vary over its range.

**Modular Home:**

Dwelling, manufactured off-site and erected/assembled on-site in accordance with Florida Building Code requirements. All site related work (erection, assembly, and other construction at the site, including all foundation work, utility connection, etc.) is subject to local permitting and inspections. Modular homes are typically covered by homeowner insurance policies (i.e., HO-3).

**National Flood Insurance Program (NFIP):**

The program of flood insurance coverage and floodplain management administered under the National Flood Insurance Act of 1968 (and any amendments to it), and applicable Federal regulations promulgated in Title 44 of the Code of Federal Regulations, Subchapter B.

**National Geodetic Vertical Datum of 1929 (NGVD29):**

A vertical datum, established in 1929 and renamed in 1973, derived from observed mean sea level at 26 tide gauges in the United States and Canada, and a series of benchmarks established across the United States from those tide gauges.

**Non-Tropical Storm:**

A storm that has none or only some of the meteorological characteristics of a tropical cyclone. It is driven in part or full by energy sources other than the heat content of seawater. Such storms include but are not limited to extra-tropical cyclones, sub-tropical cyclones, post-tropical cyclones, and remnant lows that may have had tropical origin, as well as mid-latitude cyclones and frontal systems that did not have tropical origins.

**North American Vertical Datum of 1988 (NAVD88):**

A vertical datum, established in 1991, derived from measurements taken in the United States, Canada, and Mexico to address changes in land surface and the resulting elevation distortions due to the motion of the earth's crust, postglacial rebound, and ground subsidence.

**NWS:**

The National Weather Service, a division of NOAA.

**Parameters (Input):**

For Commission purposes, values entered into the model which are used, singularly or in combination, to calculate a characteristic (output).

**Parcel:**

Official land boundary defining the legal extent of a property.

**Peak Gust:**

Highest surface (i.e., 10-meter) wind recorded, generally in a 2- to 3-second interval.

**Peak Hurricane Intensity:**

The peak intensity over the lifetime of a hurricane estimated as the maximum one-minute sustained surface (i.e., 10-meter) winds near the center of the hurricane. *See also: Intensity.*

**Percolation:**

The slow movement of water through the pores in soil or permeable rock, usually occurring under mostly saturated conditions.

**Personal Residential Property Insurance:**

The type of coverage provided by homeowner's, manufactured home owner's, dwelling, tenant's, condominium unit owner's, cooperative unit owner's, and similar policies; see s. 627.4025, F.S.

**Planetary Boundary Layer (PBL) Models:**

Mathematical and statistical representations of the planetary boundary layer (PBL). The PBL is the bottom layer of the atmosphere that is in contact with the surface of the earth. Its properties are highly influenced by frictional contact with the surface. The PBL is often turbulent and ranges in depth from tens of meters to several kilometers depending on time of day and surface geography.

**Position:**

The position of a hurricane is the latitude and longitude of its center.

**Premium:**

The consideration paid or to be paid to an insurer for the issuance and delivery of any binder or policy of insurance; see s. 626.014(2), F.S. Premium is the amount charged to the policyholder and includes all taxes and commissions.

**Pressure Field:**

The spatial distribution of sea level pressure associated with a storm. Typically, the sea level pressure increases radially from a minimum at the storm center until it is indistinguishable from the environmental background pressure.

**Probable Maximum Loss (PML):**

Given an annual probability, the loss that is likely to be exceeded on a particular portfolio of residential exposures in Florida. Modeling organizations can determine the PML on various bases depending on the needs of the user.

**Profile Factor:**

A hurricane parameter input to the hurricane model that controls the radial structure of the cyclone winds independently of  $R_{max}$  and  $V_{max}$ .

**Program:**

*See: Code.*

**Projection, Horizontal & Vertical:**

A method by which the curved surface of the earth is portrayed on a flat surface. This generally requires a mathematical transformation of the earth's latitude and longitude, and projections vary by the portion of the earth being depicted. All projections distort distance, area, shape, direction, or some combination thereof. A common horizontal projection system used in Florida is State Plane Coordinates, divided into three zones: north, east, and west. Vertical components are added to a horizontal projection ( $x,y$  coordinates) to create a projected coordinate system ( $x,y,z$  coordinates).

**Property Insurance:**

Insurance on real or personal property of every kind, whether the property is located on land, on water, or in the air, against loss or damage from any and all perils (hazards or causes); see s. 624.604, F.S.

**Quality Assurance:**

The responsibility and consequent procedures for achieving the targeted levels of quality in the model and the continual improvement of the model development process.

**Radius of Maximum Winds (Rmax):**

Distance from the center of a hurricane to the strongest winds.

**Rate:**

The amount by which the exposure is multiplied to determine the premium; see s. 627.041(1), F.S. Rate times exposure equals premium.

**Recurvature:**

A change in the track of a storm that causes the storm to move continuously from west to east (rather than from east to west as in the tropics), usually also increasing in forward speed. Recurvature happens when the storm moves into the subtropical westerlies.

**Regression Test:**

A procedure that attempts to identify new faults that might be introduced in the changes to remove existing deficiencies (correct faults, add functionality, or prevent user errors). A regression test is a test applied to a new version or release to verify that it performs the intended functions without introducing new faults or deficiencies. This procedure is not to be confused with ordinary least squares as used in statistics. *See also:* **Model Revision.**

**Reinsurance:**

An arrangement by which one insurer (the ceding insurer) transfers all or a portion of its risk under a policy or group of policies to another insurer (the reinsurer). Thus reinsurance is insurance purchased by an insurance company from another insurer, to reduce risk for the ceding insurer.

**Replacement Cost:**

The cost to replace damaged property with a new item of like kind and quality.

**Residential Property Insurance:**

See s. 627.4025, F.S. *See also:* **Commercial Residential Property Insurance** and **Personal Residential Property Insurance.**

**Requirements Specification:**

A document that specifies the requirements for a system or component. Typically included are functional requirements, performance requirements, interface requirements, design requirements, quality requirements, and development standards.

**Return Period:**

The reciprocal of an annual exceedance probability of a given loss or set of events.

**Roughness:**

Surface characteristics capable of disrupting airflow. Roughness elements may be natural (e.g., mountains, trees, grasslands) or man-made (e.g., buildings, bridges).

**Saffir-Simpson Hurricane Wind Scale:**

A scale ranging from one-to-five based on a hurricane's sustained windspeed. This scale estimates potential property damage from hurricane winds. *Reference:* Saffir-Simpson Hurricane Wind Scale provided in Standard M-3, Hurricane Probability Distributions.

**Salinity:**

The dissolved salt content of water, often expressed as a mass fraction. Typical salinity of seawater is 35 parts per thousand, but values vary due to river input, precipitation, evaporation, and other factors.

**Schema:**

(1) A complete description of the structure of a database pertaining to a specific level of consideration. (2) The set of statements, expressed in a data definition language, that completely describes the structure of a database.

**Sea-Surface Drag Coefficient:**

The ratio of the wind stress on the sea surface to the 10-meter wind kinetic energy. It is used to relate the near-surface windspeed to the sea surface wind stress required for storm surge modeling. The coefficient is estimated semi-empirically and is observed to be a function of windspeed.

**Sensitivity:**

The effect that a change in the value of an input variable will have on the output of the model.

**Sensitivity Analysis:**

Determination of the magnitude of the change in response of a model to changes in model inputs and specifications.

**Significant Revision:**

Those revisions to the standards or any revisions to the model that result in changes to loss costs or probable maximum loss levels, or have potential for changes to the loss costs or probable maximum loss levels. The Commission determines whether a revision to a standard is significant.

**Site-Built Home:**

Dwelling that is constructed on the building site in accordance with the Florida Building Code. All site related work (foundation, building, and other construction at the site, utility connection, etc.) is subject to local permitting and inspections. Site-built homes are typically covered by homeowner insurance policies (i.e., HO-3).

**SLOSH:**

Sea, Lake and Overland Surges from Hurricanes (SLOSH) is a NWS computer model developed to estimate storm surge heights resulting from historical, hypothetical, or predicted hurricanes by taking into account the atmospheric pressure (difference between central pressure and ambient pressure far from the storm), radius of maximum winds, and track data (forward speed and direction).

**Software Engineering:**

The application of a systematic, disciplined, and quantifiable approach to the design, development, operation, and maintenance of software; that is, the application of engineering to software.

**Soil Infiltration:**

The downward entry of water into the soil or rock surface.

**Soil Infiltration Rate:**

The rate at which a soil under specified conditions absorbs falling rain, melting snow, or surface water, expressed in depth of water per unit of time (e.g., inches/hour). Infiltration rate usually has a rapid decline with time from the beginning of infiltration and reaches a steady state as the soil eventually becomes saturated. At this stage, the infiltration rate would be approximately equal to the percolation rate.

**Special Loss Settlement:**

Loss provision used by the National Flood Insurance Program (NFIP) for manufactured homes equal to the minimum of the following three quantities: replacement cost, 1.5 times actual cash value, and policy limit.

**Standard Flood Insurance:**

Insurance that must cover only losses from the peril of flood equivalent to that provided under a standard flood insurance policy under the National Flood Insurance Program (NFIP). Standard flood insurance issued in Florida must provide the same coverage, including deductible and adjustment of losses, as that provided under a standard flood insurance policy under the NFIP; see s. 627.715, F.S.

**Statistical Terms:**

Definitions of statistical terms are available in: A Dictionary of Statistical Terms, Fifth Edition, F.H.C. Marriott, John Wiley & Sons, 1990.

**Stillwater Elevation:**

The elevation of the water surface (relative to a vertical datum) resulting from freshwater inputs, and where present, astronomical tides and storm surge. For coastal floods, the stillwater elevation may include wave setup (wave radiation stress) but excludes coastal wave forms (wave height, wave runup) that fluctuate above and below the stillwater elevation.

**Storm Heading:**

The direction towards which a storm is moving. Angle is measured clockwise from north ( $0^\circ$ ) so that east is  $90^\circ$ , etc.

**Storm Surge:**

An abnormal rise in sea level accompanying a storm, and whose height is the difference between the observed level of the sea surface and the level that would have occurred in the absence of the storm. Storm surge is usually estimated by subtracting the normal or astronomical tide from the observed storm tide.

**Storm Tide:**

The level of the sea surface including the effects of both the storm and the astronomical tide.

**Storm Track:**

The path along that a tropical cyclone has already moved.

**Stormwater:**

Water from precipitation events which typically runs off impervious (e.g., paved) areas and is then conveyed via roadways and other impervious areas into systems of swales, ditches, pipes, channels, and ponds. Stormwater usually contains contaminants from impervious areas (e.g., oil, chemicals) and can accumulate to cause flooding during larger precipitation events.

**Sub-Component:**

A component that is encapsulated within another component. *See also:* **Component Tree.**

**System Decomposition:**

The hierarchical division of a system into components. *See also:* **Component Tree.**

**Systems Modeling Language (SysML):**

A general-purpose modeling language for systems engineering applications that supports the specification, analysis, design, verification, and validation of a broad range of systems and systems-of-systems.



**Temporary Flood Protection Measures:**

Any measure temporarily installed preceding a flood event to protect a building or area from inundation by floodwaters, which is then removed after the flood event.

**Terrain:**

Terrain or terrain roughness for structures or a site is determined by the surface area surrounding the site including other structures (height and density) and topographic features such as ground elevation, vegetation or trees, and bodies of water.

**Test:**

A phase in the software (model) development process that focuses on the examination and dynamic analysis of execution behavior. Test plans, test specifications, test procedures, and test results are the artifacts typically produced in completing this phase.

**Testing:**

Software testing involves executing an implementation of the software with test data and examining the outputs of the software and its operational behavior to check that it is performing as required. Testing is a dynamic technique of verification and validation because it works with an executable representation of the system. Typical testing approaches include unit, aggregation, regression, and functional testing.

**Time Element Coverage:**

Insurance for a covered incident resulting in loss of use of property for a period of time. The loss is considered to be time lost, not actual property damage. Examples of time element coverage include business interruption, extra expense, rent and rental value, additional living expense, and leasehold interest coverage.

**Topography:**

A detailed graphic description or representation of the natural and artificial surface features of an area of land, in a way to show relative positions and elevations, and usually not including portions of land which are always or normally submerged. *See also: Bathymetry.*

**Tropical Cyclone:**

A generic term for a non-frontal synoptic-scale cyclone originating over tropical or subtropical waters with organized convection and definite cyclonic surface wind circulation.

**Tropical Storm:**

A tropical cyclone in which the maximum one-minute average windspeed at 10-meters height ranges from 39 to 73 miles per hour inclusive.

**Uncertainty Analysis:**

Determination of the variation or imprecision in model output resulting from the collective variation in the model inputs.

**Underwriting:**

The process of identifying and classifying the potential degree of risk represented by a proposed exposure unit. Potential insureds that satisfy an insurer's underwriting standards are offered insurance or are offered a renewal while others are declined or non-renewed.

**Unified Modeling Language (UML):**

A standardized modeling language in software engineering using graphic notation to create visual models of software systems. This language is designed to enable software developers to specify, visualize, construct, and document artifacts in object-oriented software development.

**Unit:**

*Synonym:* **Component.**

**Unit Test:**

Each component is tested on its own, isolated from the other components in the system.

**User:**

A person who uses a computer to execute code, to provide the code with input through a user interface, or to obtain textual or visual output.

**User Documentation:**

Documentation describing a way in which a system or component is to be used to obtain desired results. *See also:* **User Manual.**

**User Interface:**

An interface that enables information to be passed between a human user and hardware or software components of a computer system. *See also:* **Interface Specification.**

**User Manual:**

A document that presents the information necessary to employ a system or component to obtain desired results. Typically described are system or component capabilities, limitations, options, permitted inputs, expected outputs, possible error messages, and special instructions.

**Vmax (or maximum wind):**

The peak one-minute, 10-meter winds in a hurricane. Depending upon the context, Vmax may also refer to the strongest gradient wind.

**Validation:**

The process of determining the degree to which a model or simulation is an accurate representation of the real-world from the perspective of the intended uses of the model or simulation.

**Verification:**

The process of determining that a model representation accurately represents the developer's conceptual description, specification, and requirements. Verification also evaluates the extent to which the model development process is based on sound and established software engineering techniques. Testing, inspections, reviews, calculation crosschecks and walkthroughs, applied to design and code, are examples of verification techniques. *See also:* **Walkthrough.**

**Version:**

(1) An initial release or re-release of a computer software configuration item, associated with a complete compilation or recompilation of the computer software configuration item. (2) An initial release or complete re-release of a document, as opposed to a revision resulting from issuing change pages to a previous release. (3) An initial release or re-release of a database or file.

**Vertical Wind Profile:**

The continuous variation of hurricane windspeed with height.

**Visualization:**

A two- or three-dimensional graphical display, chart, or plot meant to augment or replace a numerical table.

**Vortex:**

The circularly-symmetric rotating wind and pressure fields of the hurricane.

**Vulnerability Assessment:**

A determination as to how likely a particular insured structure is to be damaged by a hurricane or flood and an estimate of the loss potential.

**Vulnerability Function:**

The curve that represents the damage ratios expected at various windspeeds or at various flood elevations or depths.

**Walkthrough:**

A static analysis technique in which a designer or programmer leads members of the development team and other interested parties through a segment of the documentation or code, and the participants ask questions and make comments about possible errors, violation of development standards, and other problems.

**Water Infiltration:**

Rain entering a building during a tropical cyclone, not including water intrusion caused by flood.

**Water Intrusion:**

Penetration of water from outside the structure into the structure, by means not included in the definition of flood. Water intrusion does not include water infiltration during a tropical cyclone, or during other rain events.

**Wave Crest Elevation:**

Elevation (relative to vertical datum) of the top (crest) of a coastal wave. The wave crest elevation must be above the stillwater elevation.

**Wave Height:**

The vertical distance between the crest and the preceding trough of a wave.

**Wave Proxy:**

A characterization that accounts for the presence of waves without modeling waves explicitly.

**Wave Runup:**

The rush of water up a slope or structure face. Wave runup occurs as waves break and run up above the stillwater elevation.

**Wave Runup Elevation:**

Elevation (relative to vertical datum) that a wave runs up a slope or structure face. The wave runup elevation must be above the stillwater elevation.

**Wave Setup (Wave Radiation Stress):**

Super-elevation of the water surface over normal storm surge elevation due to onshore mass transport of water by wave action alone.

**Weakening:**

A reduction in the maximum one-minute sustained 10-meter winds. *See also: Decay Rate.*

**Wet Floodproofing:**

Measures that allow floodwaters to enter a building while preventing or providing resistance to flood damage to the building and its contents.

**Windfield:**

The area of winds associated with a tropical cyclone. Winds are typically asymmetric in a moving tropical cyclone with winds in the right front quadrant, relative to motion, being strongest.

**ZIP Code Centroid:** Two types of centroids:

**Geographic Centroid:**

The geographic center of a ZIP Code.

**Population Weighted Centroid:**

The center determined by weighting the distribution of population over the ZIP Code.

**REFERENCES  
USED IN THE  
*FLOOD STANDARDS  
REPORT OF ACTIVITIES*  
AND IN THE  
*HURRICANE STANDARDS  
REPORT OF ACTIVITIES***

## References

### Used in the *Flood Standards Report of Activities* And in the *Hurricane Standards Report of Activities*

(These references are applicable to the *Flood Standards Report of Activities*, the *Hurricane Standards Report of Activities*, or both.)

For the purposes of the flood and hurricane standards for flood and hurricane model specification adopted in the *Flood Standards Report of Activities* or in the *Hurricane Standards Report of Activities*, the following references or published datasets are listed. Subsequent revisions to these documents and datasets shall supersede the versions listed below.

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## **VIII. APPENDICES**

**Acronyms**  
**Used in the *Flood Standards Report of Activities***  
**And in the *Hurricane Standards Report of Activities***

(These acronyms are applicable to the *Flood Standards Report of Activities*, the *Hurricane Standards Report of Activities*, or both.)

AAL	Average Annual Loss
ACV	Actual Cash Value
AIR	AIR Worldwide Corporation
ALAE	Allocated Loss Adjustment Expense
ALE	Additional Living Expense
ARA	Applied Research Associates, Inc.
ASTM	American Society for Testing and Materials
BPMN	Business Process Model and Notation
ByP	By-Passing
CDF	Cumulative Distribution Function
CF	Conversion Factor
Commission	Florida Commission on Hurricane Loss Projection Methodology
COR	CoreLogic, Inc.
cfs	Cubic Feet per Second
CP	Central Pressure
CS	Committee Substitute
EPR	Expected Percentage Reduction
EQE	EQECAT, Inc. (now CoreLogic, Inc.)
FCHLPM	Florida Commission on Hurricane Loss Projection Methodology
FFP	Far Field Pressure
FHCF	Florida Hurricane Catastrophe Fund
FIPS	Federal Information Processing Standards
FPM	Florida Public Hurricane Loss Model
F.S.	Florida Statutes
ft/s	Feet per Second
FWMD	Florida Water Management District
GIS	Geographic Information System
HB	House Bill
HO	Homeowner Insurance Policy
HUD	U.S. Department of Housing and Urban Development
HURDAT2	Hurricane Data 2 <sup>nd</sup> Generation
LAE	Loss Adjustment Expense
LHS	Latin Hypercube Sampling
LULC	Land Use Land Cover
mb	Millibar
MH	Manufactured Home Insurance Policy
mph	Miles per Hour
MRLC	Multi-Resolution Land Characteristics
<i>n</i>	Gauckler-Manning Roughness Coefficient
NA	Not Applicable
NAD	North American Datum

NAVD	North American Vertical Datum
NFIP	National Flood Insurance Program
NGVD	National Geodetic Vertical Datum
NLCD	National Land Cover Database
NOAA	National Oceanic & Atmospheric Administration
NWS	National Weather Service
OIR	Office of Insurance Regulation
PBL	Planetary Boundary Layer
PML	Probable Maximum Loss
r	Radius
Rmax	Radius of Maximum Winds
RMS	Risk Management Solutions, Inc.
ROA	Report of Activities
s	Section of Florida Statutes
SA	Sensitivity Analysis
SB	Senate Bill
SBA	State Board of Administration
SLOSH	Sea, Lake, and Overland Surges from Hurricanes
SRC	Standardized Regression Coefficient
SysML	Systems Modeling Language
UA	Uncertainty Analysis
ULAE	Unallocated Loss Adjustment Expense
UML	Unified Modeling Language
USGS	United States Geological Survey
Vmax	Velocity Maximum
VT	Translational Velocity
WGS	World Geodetic System
ZIP	Zone Improvement Plan

## Florida Statutes, 2017

### **627.0628 Florida Commission on Hurricane Loss Projection Methodology; public records exemption; public meetings exemption.–**

#### (1) LEGISLATIVE FINDINGS AND INTENT.–

- (a) Reliable projections of hurricane losses are necessary in order to assure that rates for residential property insurance meet the statutory requirement that rates be neither excessive nor inadequate. The ability to accurately project hurricane losses has been enhanced greatly in recent years through the use of computer modeling. It is the public policy of this state to encourage the use of the most sophisticated actuarial methods to assure that consumers are charged lawful rates for residential property insurance coverage.
- (b) The Legislature recognizes the need for expert evaluation of computer models and other recently developed or improved actuarial methodologies for projecting hurricane losses, in order to resolve conflicts among actuarial professionals, and in order to provide both immediate and continuing improvement in the sophistication of actuarial methods used to set rates charged to consumers.
- (c) It is the intent of the Legislature to create the Florida Commission on Hurricane Loss Projection Methodology as a panel of experts to provide the most actuarially sophisticated guidelines and standards for projection of hurricane losses possible, given the current state of actuarial science. It is the further intent of the Legislature that such standards and guidelines must be used by the State Board of Administration in developing reimbursement premium rates for the Florida Hurricane Catastrophe Fund, and, subject to paragraph (3)(d), must be used by insurers in rate filings under s. 627.062 unless the way in which such standards and guidelines were applied by the insurer was erroneous, as shown by a preponderance of the evidence.
- (d) It is the intent of the Legislature that such standards and guidelines be employed as soon as possible, and that they be subject to continuing review thereafter.
- (e) The Legislature finds that the authority to take final agency action with respect to insurance ratemaking is vested in the Office of Insurance Regulation and the Financial Services Commission, and that the processes, standards, and guidelines of the Florida Commission on Hurricane Loss Projection Methodology do not constitute final agency action or statements of general applicability that implement, interpret, or prescribe law or policy; accordingly, chapter 120 does not apply to the processes, standards, and guidelines of the Florida Commission on Hurricane Loss Projection Methodology.

#### (2) COMMISSION CREATED.–

- (a) There is created the Florida Commission on Hurricane Loss Projection Methodology, which is assigned to the State Board of Administration. For the purposes of this section,

the term “commission” means the Florida Commission on Hurricane Loss Projection Methodology. The commission shall be administratively housed within the State Board of Administration, but it shall independently exercise the powers and duties specified in this section.

(b) The commission shall consist of the following 12 members:

1. The insurance consumer advocate.
2. The senior employee of the State Board of Administration responsible for operations of the Florida Hurricane Catastrophe Fund.
3. The Executive Director of the Citizens Property Insurance Corporation.
4. The Director of the Division of Emergency Management.
5. The actuary member of the Florida Hurricane Catastrophe Fund Advisory Council.
6. An employee of the office who is an actuary responsible for property insurance rate filings and who is appointed by the director of the office.
7. Five members appointed by the Chief Financial Officer, as follows:
  - a. An actuary who is employed full time by a property and casualty insurer that was responsible for at least 1 percent of the aggregate statewide direct written premium for homeowner insurance in the calendar year preceding the member’s appointment to the commission.
  - b. An expert in insurance finance who is a full-time member of the faculty of the State University System and who has a background in actuarial science.
  - c. An expert in statistics who is a full-time member of the faculty of the State University System and who has a background in insurance.
  - d. An expert in computer system design who is a full-time member of the faculty of the State University System.
  - e. An expert in meteorology who is a full-time member of the faculty of the State University System and who specializes in hurricanes.
8. A licensed professional structural engineer who is a full-time faculty member in the State University System and who has expertise in wind mitigation techniques. This appointment shall be made by the Governor.

(c) Members designated under subparagraphs (b)1.-5. shall serve on the commission as long as they maintain the respective offices designated in subparagraphs (b)1.-5. The member appointed by the director of the office under subparagraph (b)6. shall serve on the commission until the end of the term of office of the director who appointed him or her, unless removed earlier by the director for cause. Members appointed by the Chief Financial Officer under subparagraph (b)7. shall serve on the commission until the end of the term of office of the Chief Financial Officer who appointed them, unless earlier removed by the Chief Financial Officer for cause. Vacancies on the commission shall be filled in the same manner as the original appointment.

(d) The State Board of Administration shall annually appoint one of the members of the commission to serve as chair.

(e) Members of the commission shall serve without compensation, but shall be reimbursed for per diem and travel expenses pursuant to s. 112.061.

- (f) The State Board of Administration shall, as a cost of administration of the Florida Hurricane Catastrophe Fund, provide for travel, expenses, and staff support for the commission.
- (g) There shall be no liability on the part of, and no cause of action of any nature shall arise against, any member of the commission, any member of the State Board of Administration, or any employee of the State Board of Administration for any action taken in the performance of their duties under this section. In addition, the commission may, in writing, waive any potential cause of action for negligence of a consultant, contractor, or contract employee engaged to assist the commission.

(3) ADOPTION AND EFFECT OF STANDARDS AND GUIDELINES.—

- (a) The commission shall consider any actuarial methods, principles, standards, models, or output ranges that have the potential for improving the accuracy of or reliability of the hurricane loss projections used in residential property insurance rate filings and flood loss projections used in rate filings for personal lines residential flood insurance coverage. The commission shall, from time to time, adopt findings as to the accuracy or reliability of particular methods, principles, standards, models, or output ranges.
- (b) The commission shall consider any actuarial methods, principles, standards, or models that have the potential for improving the accuracy of or reliability of projecting probable maximum loss levels. The commission shall adopt findings as to the accuracy or reliability of particular methods, principles, standards, or models related to probable maximum loss calculations.
- (c) In establishing reimbursement premiums for the Florida Hurricane Catastrophe Fund, the State Board of Administration must, to the extent feasible, employ actuarial methods, principles, standards, models, or output ranges found by the commission to be accurate or reliable.
- (d) With respect to a rate filing under s. 627.062, an insurer shall employ and may not modify or adjust actuarial methods, principles, standards, models, or output ranges found by the commission to be accurate or reliable in determining hurricane loss factors and probable maximum loss levels for use in a rate filing under s. 627.062. An insurer may employ a model in a rate filing until 120 days after the expiration of the commission's acceptance of that model and may not modify or adjust models found by the commission to be accurate or reliable in determining probable maximum loss levels. This paragraph does not prohibit an insurer from using a straight average of model results or output ranges for the purposes of a rate filing for personal lines residential flood insurance coverage under s. 627.062.
- (e) The commission shall adopt actuarial methods, principles, standards, models, or output ranges for personal lines residential flood loss no later than July 1, 2017.

- (f) The commission shall revise previously adopted actuarial methods, principles, standards, models, or output ranges every odd-numbered year for hurricane loss projections. The commission shall revise previously adopted actuarial methods, principles, standards, models, or output ranges no less than every 4 years for flood loss projections.
- (g) 1. A trade secret, as defined in s. 688.002, which is used in designing and constructing a hurricane or flood loss model and which is provided pursuant to this section, by a private company, to the commission, office, or consumer advocate appointed pursuant to s. 627.0613 is confidential and exempt from s. 119.07(1) and s. 24(a), Art. 1 of the State Constitution.
2. a. That portion of a meeting of the commission or of a rate proceeding on an insurer's rate filing at which a trade secret made confidential and exempt by this paragraph is discussed is exempt from s. 286.011 and s. 24(b), Art. 1 of the State Constitution. The closed meeting must be recorded, and no portion of the closed meeting may be off the record.
- b. The recording of a closed portion of a meeting is exempt from s. 119.07(1) and s. 24(a), Art. 1 of the State Constitution.
- c. This paragraph is subject to the Open Government Sunset Review Act in accordance with s. 119.15, and shall stand repealed on October 2, 2019, unless reviewed and saved from repeal through reenactment by the Legislature.

History.--s. 6, ch. 95-276; s. 6, ch. 96-194; s. 3, ch. 97-55; s. 4, ch. 2000-333; s. 1066, ch. 2003-261; s. 79, ch. 2004-390; s. 4, ch. 2005-111; s. 3, ch. 2005-264; s. 12, ch. 2006-12; s. 145, ch. 2008-4; s. 11, ch. 2008-66; s. 83, ch. 2009-21; s. 10, ch. 2009-70; s. 16, ch. 2009-87; s. 1, ch. 2010-89; s. 431, ch. 2011-142; s. 76, ch. 2012-5; s. 5, ch. 2013-60; s. 2, ch. 2014-80; s. 1, ch. 2014-98; s. 2, ch. 2015-135; s. 1, ch. 2017-142.

## **627.715 Flood insurance. –**

An authorized insurer may issue an insurance policy, contract, or endorsement providing personal lines residential coverage for the peril of flood or excess coverage for the peril of flood on any structure or the contents of personal property contained therein, subject to this section. This section does not apply to commercial lines residential or commercial lines nonresidential coverage for the peril of flood. An insurer may issue flood insurance policies, contracts, endorsements, or excess coverage on a standard, preferred, customized, flexible, or supplemental basis.

(1) (a) Except for excess flood insurance policies, policies issued under this section include:

1. Standard flood insurance, which must cover only losses from the peril of flood, as defined in paragraph (b), equivalent to that provided under a standard flood insurance policy under the National Flood Insurance Program. Standard flood insurance issued under this section must provide the same coverage, including deductibles and adjustment of losses, as that provided under a standard flood insurance policy under the National Flood Insurance Program.
2. Preferred flood insurance, which must include the same coverage as standard flood insurance but:
  - a. Include, within the definition of “flood,” losses from water intrusion originating from outside the structure that are not otherwise covered under the definition of “flood” provided in paragraph (b).
  - b. Include coverage for additional living expenses.
  - c. Require that any loss under personal property or contents coverage that is repaired or replaced be adjusted only on the basis of replacement costs up to the policy limits.
3. Customized flood insurance, which must include coverage that is broader than the coverage provided under standard flood insurance.
4. Flexible flood insurance, which must cover losses from the peril of flood, as defined in paragraph (b), and may also include coverage for losses from water intrusion originating from outside the structure which is not otherwise covered by the definition of flood. Flexible flood insurance must include one or more of the following provisions:
  - a. An agreement between the insurer and the insured that the flood coverage is in a specified amount, such as coverage that is limited to the total amount of each outstanding mortgage applicable to the covered property.
  - b. A requirement for a deductible in an amount authorized under s. 627.701, including a deductible in an amount authorized for hurricanes.
  - c. A requirement that flood loss to a dwelling be adjusted in accordance with s. 627.7011(3) or adjusted only on the basis of the actual cash value of the property.
  - d. A restriction limiting flood coverage to the principal building defined in the policy.
  - e. A provision including or excluding coverage for additional living expenses.
  - f. A provision excluding coverage for personal property or contents as to the peril of flood.



5. Supplemental flood insurance, which may provide coverage designed to supplement a flood policy obtained from the National Flood Insurance Program or from an insurer issuing standard or preferred flood insurance pursuant to this section. Supplemental flood insurance may provide, but need not be limited to, coverage for jewelry, art, deductibles, and additional living expenses.
- (b) “Flood” means a general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties, at least one of which is the policyholder’s property, from:
1. Overflow of inland or tidal waters;
  2. Unusual and rapid accumulation or runoff of surface waters from any source;
  3. Mudflow; or
  4. Collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood as defined in this paragraph.
- (2) Flood coverage deductibles and policy limits pursuant to this section must be prominently noted on the policy declarations page or face page.
- (3) (a) An insurer may establish and use flood coverage rates in accordance with the rate standards provided in s. 627.062.
- (b) For flood coverage rates filed with the office before October 1, 2025, the insurer may also establish and use such rates in accordance with the rates, rating schedules, or rating manuals filed by the insurer with the office which allow the insurer a reasonable rate of return on flood coverage written in this state. Flood coverage rates established pursuant to this paragraph are not subject to s. 627.062(2)(a) and (f). An insurer shall notify the office of any change to such rates within 30 days after the effective date of the change. The notice must include the name of the insurer and the average statewide percentage change in rates. Actuarial data with regard to such rates for flood coverage must be maintained by the insurer for 2 years after the effective date of such rate change and is subject to examination by the office. The office may require the insurer to incur the costs associated with an examination. Upon examination, the office, in accordance with generally accepted and reasonable actuarial techniques, shall consider the rate factors in s. 627.062(2)(b), (c), and (d), and the standards in s. 627.062(2)(e), to determine if the rate is excessive, inadequate, or unfairly discriminatory. If the office determines that a rate is excessive or unfairly discriminatory, the office shall require the insurer to provide appropriate credit to affected insureds or an appropriate refund to affected insureds who no longer receive coverage from the insurer.
- (4) A surplus lines agent may export a contract or endorsement providing flood coverage to an eligible surplus lines insurer without making a diligent effort to seek such coverage from three or more authorized insurers under s. 626.916(1)(a). This subsection expires July 1, 2019, or on the date on which the Commissioner of Insurance Regulation determines in writing that there is an adequate admitted market to provide coverage for the peril of flood consistent with this section, whichever date occurs first. If there are fewer than three admitted insurers on the date this subsection expires, the number of declinations necessary to meet the

diligent-effort requirement shall be no fewer than the number of authorized insurers providing flood coverage.

- (5) In addition to any other applicable requirements, an insurer providing flood coverage that is not excess coverage in this state must:
  - (a) Notify the office at least 30 days before writing flood insurance in this state; and
  - (b) File a plan of operation and financial projections or revisions to such plan, as applicable, with the office.
- (6) Citizens Property Insurance Corporation may not provide insurance for the peril of flood.
- (7) The Florida Hurricane Catastrophe Fund may not provide reimbursement for losses proximately caused by the peril of flood, including losses that occur during a covered event as defined in s. 215.555(2)(b).
- (8) An agent must provide a written notice to be signed by the applicant before the agent places flood insurance coverage with an admitted or surplus lines insurer for a property receiving flood insurance under the National Flood Insurance Program. The notice must notify the applicant that, if the applicant discontinues coverage under the National Flood Insurance Program which is provided at a subsidized rate, the full risk rate for flood insurance may apply to the property if the applicant later seeks to reinstate coverage under the program.
- (9) With respect to the regulation of flood coverage written in this state by authorized insurers, this section supersedes any other provision in the Florida Insurance Code in the event of a conflict.
- (10) If federal law or rule requires a certification by a state insurance regulatory official as a condition of qualifying for private flood insurance or disaster assistance, the Commissioner of Insurance Regulation may provide the certification, and such certification is not subject to review under chapter 120.
- (11)
  - (a) An authorized insurer offering flood insurance may request the office to certify that a policy, contract, or endorsement provides coverage for the peril of flood which equals or exceeds the flood coverage offered by the National Flood Insurance Program. To be eligible for certification, such policy, contract, or endorsement must contain a provision stating that it meets the private flood insurance requirements specified in 42 U.S.C. s. 4012a(b) and may not contain any provision that is not in compliance with 42 U.S.C. s. 4012a(b).
  - (b) The authorized insurer or its agent may reference or include a certification under paragraph (a) in advertising or communications with an agent, a lending institution, an insured, or a potential insured only for a policy, contract, or endorsement that is certified under this subsection. The authorized insurer may include a statement that notifies an insured of the certification on the declarations page or other policy documentation related to flood coverage certified under this subsection.

- (c) An insurer or agent who knowingly misrepresents that a flood policy, contract, or endorsement is certified under this subsection commits an unfair or deceptive act under s. 626.9541.

History.-- ss. 3, 4, ch. 2014-80; s. 3, ch. 2015-69; s. 2, ch. 2017-142.

## Meeting Schedule and Topics of Discussion

### 2014

September 30	Acceptability Process Committee Meeting to discuss the process and timeline for developing flood standards
October 30	Flood Standards Development Committee Meeting
November 14	Flood Standards Development Committee Meeting
December 16	Flood Standards Development Committee Meeting

### 2015

January 29	Flood Standards Development Committee Meeting
February 19	Flood Standards Development Committee Meeting
March 31	Flood Standards Development Committee Meeting
April 22	Flood Standards Development Committee Meeting
June 4	Flood Standards Development Committee Meeting
June 30	Flood Standards Development Committee Meeting
July 1	Flood Standards Development Committee Meeting
August 11	Flood Standards Development Committee Meeting
September 24	Flood Standards Development Committee Meeting
October 8	Flood Standards Development Committee Meeting
November 17	Commission Meeting to Consider Publication of Discussion Flood Standards

### 2017

May 22 & 23	Flood Standards Committee Meetings
June 15 & 16	Adoption of 2017 Flood Standards, Principles, and Acceptability Process
September 27 & 28	Flood Standards Committee Meetings
October 25	Adoption of Revised 2017 Flood Standards and <i>Flood Standards Report of Activities</i>

## Transcript Information

All public meetings of the Florida Commission on Hurricane Loss Projection Methodology are transcribed by a Court Reporter. If you would like to purchase copies of any transcript, contact the Court Reporter for the date of the meeting.

September 30, 2014	Tracy Brown, Accurate Stenotype Reporters, Inc., 850-878-2221
October 30, 2014	Mary Kay Kline, Accurate Stenotype Reporters, Inc., 850-878-2221
November 14, 2014	Lori Dezell, Accurate Stenotype Reporters, Inc., 850-878-2221
December 16, 2014	Lori Dezell, Accurate Stenotype Reporters, Inc., 850-878-2221
January 29, 2015	Lori Dezell, Accurate Stenotype Reporters, Inc., 850-878-2221
February 19, 2015	Lori Dezell, Accurate Stenotype Reporters, Inc., 850-878-2221
March 31, 2015	Tracy Brown, Accurate Stenotype Reporters, Inc., 850-878-2221
April 22, 2015	Tracy Brown, Accurate Stenotype Reporters, Inc., 850-878-2221
June 4, 2015	Lori Dezell, Accurate Stenotype Reporters, Inc., 850-878-2221
June 30, 2015	Tracy Brown, Accurate Stenotype Reporters, Inc., 850-878-2221
July 1, 2015	Lori Dezell, Accurate Stenotype Reporters, Inc., 850-878-2221
August 11, 2015	Lori Dezell, 850-251-1482
September 24, 2015	Lori Dezell, 850-251-1482
October 8, 2015	Lori Dezell, 850-251-1482
November 17, 2015	Carolyn Rankine, Premier Reporting, 850-894-0828
May 22 & 23, 2017	Lori Dezell, 850-251-1482
June 15 & 16, 2017	Lori Dezell, 850-251-1482
September 27 & 28, 2017	Lori Dezell, 850-251-1482
October 25, 2017	Lori Dezell, 850-251-1482

## **Commission Documentation**

The State Board of Administration, in its responsibility as administrator for the Commission, maintains documentation for all meetings of the Commission. This information may be obtained by writing to:

Donna Sirmons  
Florida Commission on Hurricane Loss Projection Methodology  
c/o State Board of Administration  
P. O. Box 13300  
Tallahassee, Florida 32317-3300

or by e-mailing to [donna.sirmons@sbafla.com](mailto:donna.sirmons@sbafla.com).

There is a \$0.15 charge per page per s. 119.07(4)(a), F.S.

This publication is available for a charge of \$16.78.

Documentation is also available on the Commission website at [www.sbafla.com/methodology](http://www.sbafla.com/methodology).