# ACKNOWLEDGMENT OF RECEIPT

# FOR ZONE 1 PROPERTIES ONLY (OCEAN FRONT)

Date: _____

Ref: Address of the Property: _____

I acknowledge receipt of the following documents from the Town of Golden Beach, Building and Zoning Department for properties situated in Zone One.

1. One-Hundred- Year Storm Elevation Requirements for Habitable Structures Located Seaward of a Coastal Construction Control Line
2. Flood Resistant Provisions in the 7th Edition Florida Building Code (2020)
3. Flood Damage- Resistant Materials Requirements
4. Non- Conversion Agreement for Enclosures below the base flood elevation or Design Flood Elevation –fully execute and submit to the building department
5. New Construction/ Addition/ Remodel Permit Documentation Log

_____

Name and Title

_____

Signature

# One-Hundred-Year Storm Elevation Requirements for Habitable Structures Located Seaward of a Coastal Construction Control Line

ELEVATION CERTIFICATE
AND
INSTRUCTIONS


PREPARED BY:

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

DIVISION OF WATER RESOURCE MANAGEMENT

2600 BLAIR STONE ROAD

TALLAHASSEE, FLORIDA 32399-3000



November 1999 (published)
February 2002 (revised)
May 2017 (reformatted)

# TABLE OF CONTENTS

# ONE-HUNDRED-YEAR STORM ELEVATION REQUIREMENTS FOR HABITABLE STRUCTURES LOCATED SEAWARD OF A COASTAL CONSTRUCTION CONTROL LINE

## PURPOSE

This document defines and provides the elevation standards for habitable structures located seaward of a coastal construction control line (CCCL), and the instructions for completing the CCCL Elevation Certificate required within section 3109 of the Florida Building Code.

The coastal construction control line delineates that area of the beach-dune system that is expected to be subject to severe fluctuation resulting from a one-hundred-year storm event. The one-hundred-year storm elevation requirements for habitable structures located seaward of the coastal construction control line ensure that the lowest horizontal structural member of the building is placed at an elevation above the predicted breaking wave crest.

Appendix A identifies the date the CCCL was recorded and its record plat location as filed in the Office of the Clerk of the Circuit Court of Public Records of each County.

Appendix B tabulates the one-hundred-year storm elevations and design grades for all coastal counties with established coastal construction control lines. The one-hundred-year storm elevation is the height of the breaking wave crest or wave approach as superimposed on the storm surge with dynamic wave set-up of a one-hundred-year storm. The design grade is the predicted eroded grade caused by the one-hundred-year storm event and should be considered by the design professional in the calculation of pile capacities and embedment depths of driven piles. All piles standing above the design grade should be designed as columns in accordance with the provisions of the Florida Building Code.

The maps contained in the document titled "Coastal County Maps" (not attached) are a compilation of coastal county maps that show the coastal construction control line and the location and identification number of the Florida Department of Environmental Protection (FDEP) range monuments.

## INSTRUCTIONS FOR COMPLETING THE CCCL ELEVATION CERTIFICATE

The certificate will be prepared by or under the direct supervision of a registered land surveyor or professional engineer or architect. As part of the permit process and upon placement of the lowest horizontal structural member, the property owner will submit, to the building official, a completed CCCL Elevation Certificate depicting the elevation of the lowest horizontal structural member of the lowest habitable floor, as constructed in relation to National Geodetic Vertical Datum (N.G.V.D.). This certificate will be approved by the building official prior to commencing any additional work. Any work undertaken prior to approval of the certificate will be at the property owner's risk. The building official will review the submitted elevation data, and any deficiencies found will be corrected by the permit holder immediately and prior to any further work being authorized to proceed.

### SECTION A - Property Information

The CCCL Elevation Certificate identifies the building, its owner and the building location. Provide the building owner's name(s), the building's complete street address, and lot and block number.

### SECTION B - One-Hundred-Year Storm Elevation Information

In order to complete this portion of the Elevation Certificate, it is necessary to refer to the tables provided in Appendix B and the appropriate county map in the document titled "Coastal County Maps" or the official recorded coastal construction control line maps located in the clerk of the court's office.

B. **1.** Referencing the "Coastal County Maps" or the official recorded CCCL maps, locate the property and note the nearest range monument to the property. Using the tables in Appendix B, locate the county name and range monument and record the one-hundred-year storm elevation for the property. ***Please note that the elevations listed in the tables represent the design wave height of a one-hundred-year storm, not the storm surge elevation. Also note that the building elevation may be affected by environmental issues addressed in the FDEP permit for construction seaward of the CCCL.***

B. **2.** The CCCL Elevation Certificate uses the bottom of the building's lowest horizontal structural member as the point for measuring its elevation. Diagrams 1 and 2 located below are to be used to help determine the location of the lowest horizontal structural member. Record the elevation measurement (to the nearest tenth of a foot) of the bottom of the lowest horizontal structural member as determined by the registered land surveyor, professional engineer or architect.

B. **3.** Record the benchmark used to establish the lowest horizontal structural member elevation along with the benchmark elevation in the space provided.

## SECTION C - Certification

Complete as indicated. The elevation certificate may only be signed by a registered land surveyor or professional engineer or architect registered by the State of Florida.

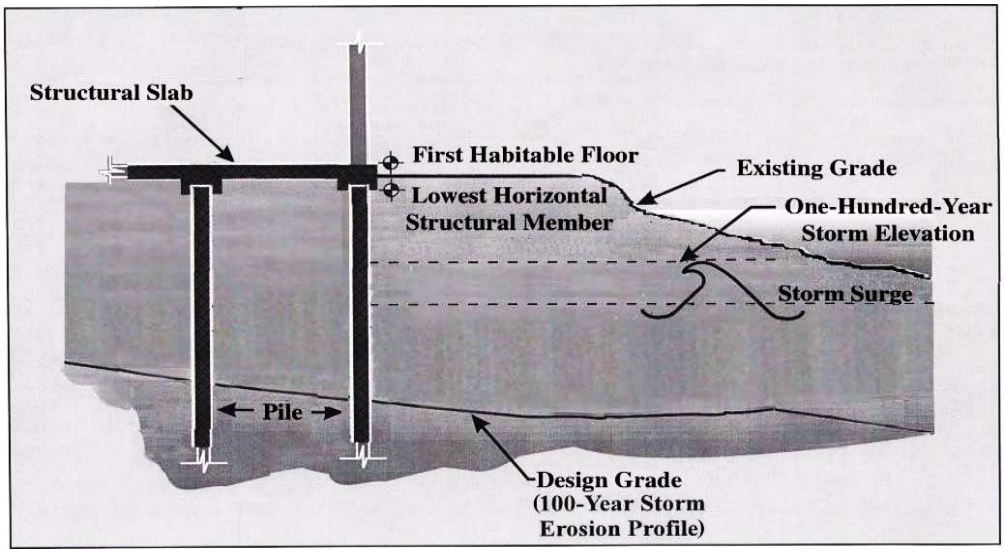



DIAGRAM 1

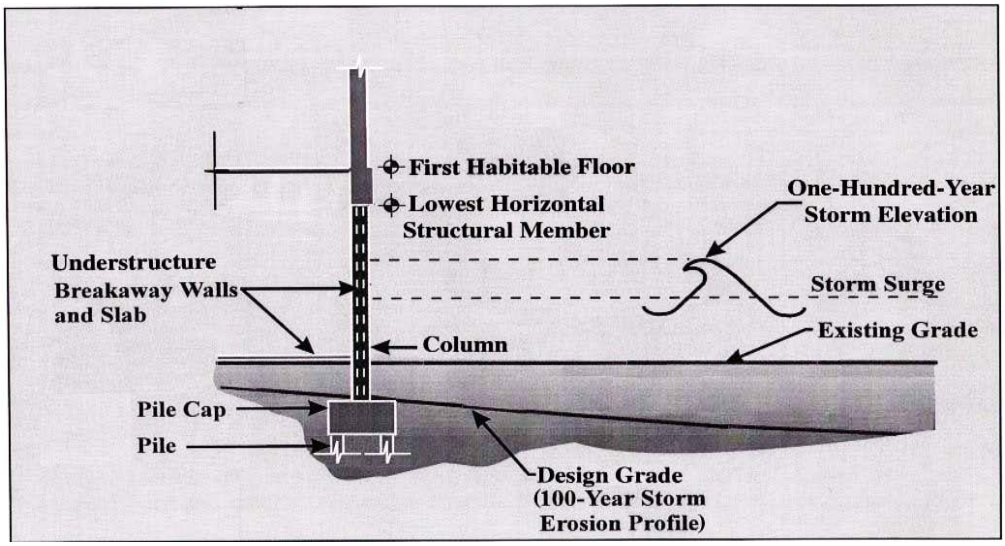



DIAGRAM 2

# CCCL ELEVATION CERTIFICATE
## FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

This certificate is required by section 3109 of the Florida Building Code for habitable structures built seaward of a coastal construction control line to ensure the lowest horizontal structural member of such structures is located above the local one-hundred-year storm elevation as published in the Florida Department of Environmental Protection's document titled, "One-Hundred-Year Storm Elevation Requirements for Habitable Structures Located Seaward of a Coastal Construction Control Line." The elevation of the lowest horizontal structural member is to be shown in relation to National Geodetic Vertical Datum (N.G.V.D., 1929). The Department can assist with conversions to North American Vertical Datum (N.A.V.D., 1988).

NOTICE: This certificate shall be completed as part of the permitting process and submitted to the building official who will note any deficiencies and notify the permit holder of any actions necessary to bring the structure into compliance with the elevation requirement. Any deficiencies found by the building official shall be corrected by the permit holder immediately and prior to proceeding with work. Any work undertaken prior to submission of this certification shall be at the property owner's risk.

### SECTION A Property Information

PROPERTY OWNER'S NAME

STREET ADDRESS (Including Apt., Unit, Suite and/or Bldg. Number) OR P.O. BOX NUMBER

OTHER DESCRIPTION (Lot and Block Numbers, etc.)

CITY | STATE | ZIP CODE

### SECTION B One-Hundred-Year Storm Elevation Information

1. Pursuant to the above document, the bottom of the lowest horizontal structural member must be located at or above _____ feet N.G.V.D.
2. The bottom of the lowest horizontal structural member of the building is _____ feet N.G.V.D.
3. Control elevation reference mark used: Benchmark ID_____ BM elevation: _____ feet N.G.V.D.

Please refer to the diagrams on page 2 of this document for information regarding the location of the bottom of the lowest horizontal structural member.

### SECTION C Certification

This certification is to be signed and sealed by a land surveyor, engineer, or architect authorized by law to certify elevation information and be submitted to and approved by the building official prior to commencing any additional work.

I certify that the information in Sections A, B, and C on this certificate represents my best efforts to interpret the data available.

CERTIFIER'S NAME | LICENSE NUMBER

TITLE | COMPANY NAME

ADDRESS | CITY | STATE | ZIP CODE

SIGNATURE | DATE | TELEPHONE

COMMENTS:

_____

_____

_____

_____

_____ Affix Seal

DEP Form 73-501

# GUIDE TO THE COASTAL COUNTY MAPS

The coastal county maps are contained in the document titled "Coastal County Maps" created by the Department of Environmental Protection, Office of Beaches and Coastal Systems. The maps show the location of each county's coastal construction control line and are provided to give a general overview of the location of each coastal construction control line. The range monuments (R-monuments) shown on the maps are a statewide network of survey monumentation used, by the Department of Environmental Protection, on all of the state's sandy beach shoreline. The coastal county maps were created to provide a quick reference between a coastal property and its proximity to the R-monument.

The maps can be viewed on the Department of Environmental Protection, Division of Water Resource Management, Beaches Program web site: https://floridadep.gov/water/beaches.

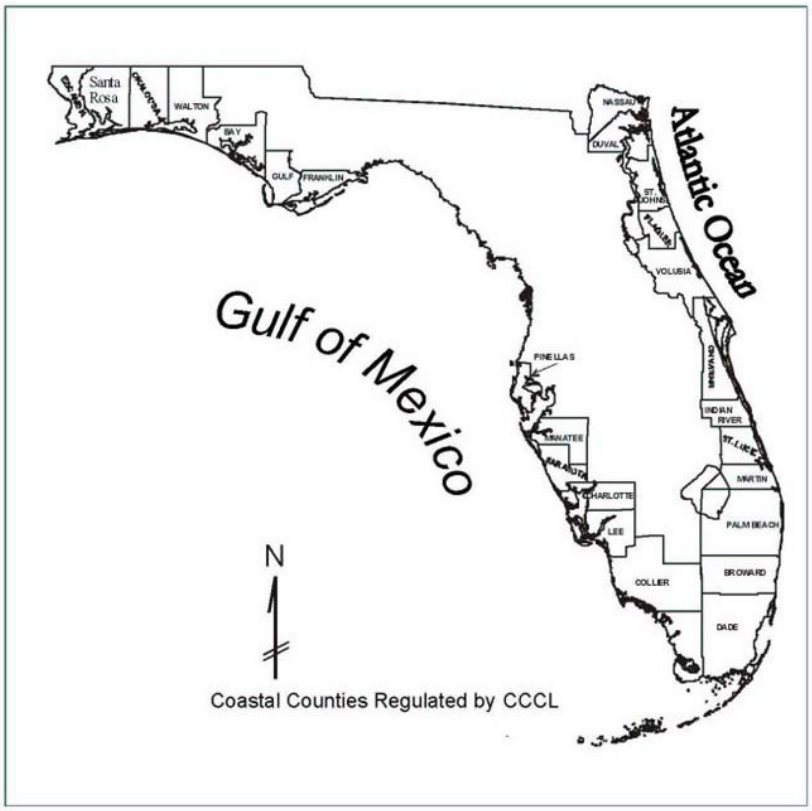
The maps are divided into regions of the state, northwest, southwest, northeast, and southeast. The maps are for information only and are not to scale.

## How to Obtain the Maps

Copies of the coastal county maps may be downloaded from the Beaches Program web site at: http://prodenv.dep.state.fl.us/DwrmCoasts/search. In addition hard copies of coastal county maps are available for a nominal fee. To obtain a hard copy of the current map for a specific area, contact:

**Florida Department of Environmental Protection**
**Division of Water Resource Management**
**2600 Blair Stone Road, Mail Station 3500**
**Tallahassee, Florida 32399-3000**

To facilitate your request, review the current Maps on the web site, and obtain the page number you need or contact the Coastal Data Acquisition section at (850) 245-8336. The Department will also accept orders for maps.



# APPENDIX A CCCL RECORDATION

The tables below identify the date the CCCL was recorded and its record plat location as filed in the Office of the Clerk of the Circuit Court of Public Records of each County.

**PANHANDLE**

| COUNTY | DATE RECORDED | RECORD LOCATION |
|---|---|---|
| Escambia (ES) | 6-19-86 | Plat Bk. 13, Pg. 23, Sheets A-O Inclusive #460193 |
| Santa Rosa (SR) | 6-19-91 | Plat Bk. F, Pg. 4-4-o O.R. 1178 69-84 |
| Okaloosa (OK) | 12-19-91 | CCCL BK 3, Pg. 1-6 + O.R. Bk. 1642, Pg. 1073 - 1082 |
| Walton (WL) | 12-29-82, 8-16-2009 | Book #1, Pp. 1-9; Book #1, Pp. 10-18 |
| Bay (BA) | 2-7-97 | ORB 1687 Pp. 1048 - 1065 MAP CCCL BK2 Pg. 1-12 |
| Gulf (GU) | 2-5-86, 1-21-2010 | Misc. Plat. Bk. #1, Pp. 12, 1-13; Misc. Plat. Bk. #1, Pp. 12, 1-13 |
| Franklin (FR) | 4-30-84, 5-18-2009 | CCCL Bk 1, Pg. 1-19; CCCL Bk 1, Pgs. 20-28 |

**LOWER WEST COAST**

| COUNTY | DATE RECORDED | RECORD LOCATION |
|---|---|---|
| Pinellas (PI) | 1-16-79, 1-2-2002 | Inst. #7900780, CCCL Bk. #1; Bulkhead Line PB 2, Pgs. 79-117 |
| Manatee (ME) | 8-6-87 | Rd. Plat. Bk. #10, Pp. 1-7 |
| Sarasota (ST) | 3-2-89 | O.R. BK. #2102 Pg. 2632-2650 Control Line Book 2 (Plat filed 1-26-89) |
| Charlotte (CH) | 1-29-85 | Setback Bk. #1, Pp. 1A-1G |
| Lee (LE) | 5-30-91 | OR BK. 2224 Pg. 1010-1041, Plat Bk. 48, Pg. 15 thru 34 |
| Collier (CO) | 6-29-89 | CCSBL Bk #1, Pp. 26-36, O.R. Bk. #1452, Pp. 258-275 Doc. 01293533 |

**UPPER EAST COAST**

| COUNTY | DATE RECORDED | RECORD LOCATION |
|---|---|---|
| Nassau (NA) | 4-6-83 | Setback Line Pp. 10-16 |
| Duval (DU) | 7-23-92 | OR. BK 7379 Pg. 1769-1782 Map BK. C, Pg. 72 to 72H |
| St. John's (SJ) | 1-28-88 | CCCL Bk. #13B, Pp. 1-15 |
| Flagler (FL) | 4-14-88 | CCCL Bk. #28, Pp. 5-12 |
| Volusia (VO) | 1-24-91 | OR BK. 3579 Pg. 1550-1576, M.O.R. CCCL BK. 30 Pg. 20 |
| Brevard (BE) | 12-4-86 | Survey Bk. #2A, Pp. 29-42 |

LOWER EAST COAST

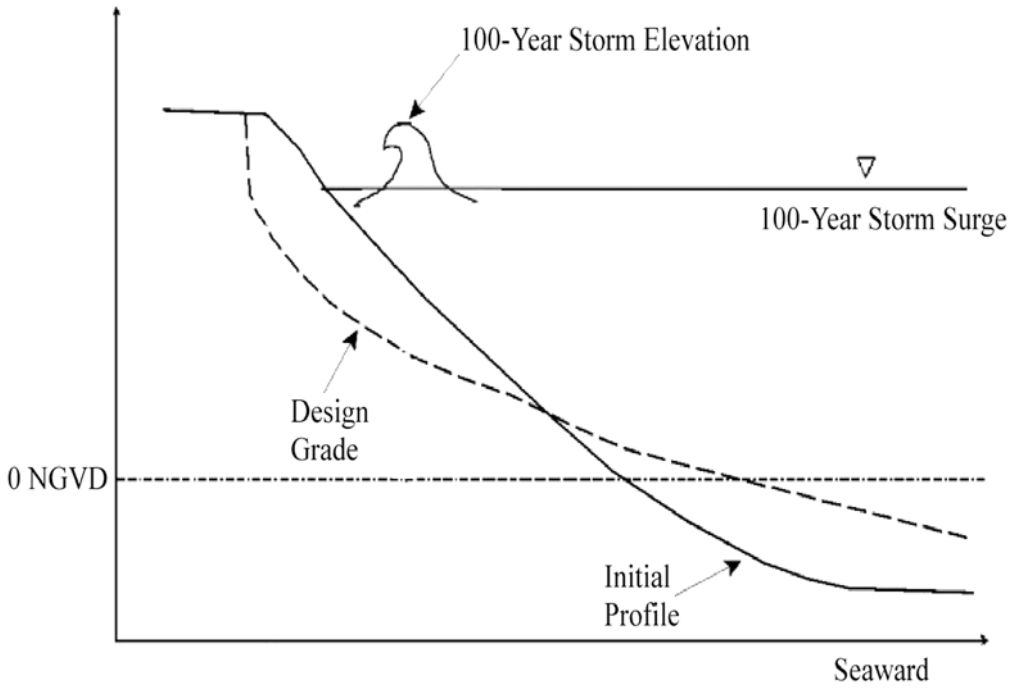
| COUNTY | DATE RECORDED | RECORD LOCATION |
|---|---|---|
| Indian River (IR) | 3-5-87 | Pl. Bk. #12, Pp. 32-32H |
| St. Lucie (SL) | 9-15-88 | CCCL Bk. #26, 26A-26I |
| Martin (MI) | 7-9-85 | Plat Bk. #9, Pg. 99 |
| Palm Beach (PB) | 8-22-97 | Plat Bk. #80, Pp. 137-155, OR Bk. 9951, Pp. 85-108 |
| Broward (BO) | 11-17-81 | 81-315377 Misc. Map Bk. #6, Pg. 10 |
| Dade (DA) | 2-10-82 | Bulkhead Plat. Bk. #82R 31600 Bk. #74, Pg. 25 |

# APPENDIX B

## ONE-HUNDRED-YEAR STORM ELEVATION REQUIREMENTS

The following tables provide the one-hundred-year storm elevations and design grades, in relation to N.G.V.D., for all coastal counties with established coastal construction control lines. The computed one-hundred-year storm and design grade elevations and corresponding location relative to the current monument for each range of all twenty-five counties with an established CCCL, are tabulated below. One county-wide average is applicable to thirteen out of the twenty-five counties, such as Okaloosa County. Table I, IV and VII show results for the Panhandle area, the Southwest Gulf area and the Atlantic area, respectively. Gulf County, the Alligator Point area of Franklin County, the area from Sanibel Island to the southern end of Lee County, and the area from the northern end of Collier County to Gordon Pass show results in Table II, III, V and VI, respectively.

Please note that the one-hundred-year storm elevations and design grades for Navarre Beach, Santa Rosa County are included under R192-209, of Escambia County.




The One-Hundred-Year storm elevation is the height of the breaking wave crest or wave approach as superimposed on the storm surge with dynamic wave set-up of a one-hundred-year storm. The design grade is the predicted eroded grade caused by the one-hundred-year storm event.

| County | From/To | Range Monument ID | Northing | Easting | 100 – Year Storm Elevation (ft.) | 100 – Year Storm Design Grade Elevation (ft.) |
|---|---|---|---|---|---|---|
| Escambia | From | R001 | 478564.000 | 1047494.190 | 15.4 | 4.6 |
| Escambia | To | R032 | 483965.000 | 1078813.130 | 15.4 | 4.6 |
| Escambia | From | R108 | 491954.656 | 1154762.130 | 16.2 | 3.1 |
| Escambia | To | R138 | 496997.406 | 1183497.750 | 16.2 | 3.1 |
| Escambia | From | R192 | 506751.375 | 1236863.000 | 16.5 | 2.4 |
| Escambia | To | R209 | 509553.938 | 1254226.750 | 16.5 | 2.4 |
| Okaloosa | From | R001 | 514426.736 | 1327483.132 | 15.1 | 4.5 |
| Okaloosa | To | R015 | 512770.549 | 1342426.410 | 15.1 | 4.5 |
| Okaloosa | --- | R019 | 508555.961 | 1369494.312 | 15.8 | 4.5 |
| Okaloosa | --- | R020 | 508465.163 | 1370448.945 | 15.8 | 4.5 |
| Okaloosa | --- | R021 | 508687.563 | 1371603.826 | 15.9 | 4.5 |
| Okaloosa | --- | R022 | 508935.591 | 1372633.549 | 15.9 | 4.5 |
| Okaloosa | --- | R023 | 508663.136 | 1373628.780 | 16.0 | 4.5 |
| Okaloosa | --- | R024 | 508640.427 | 1374495.744 | 16.0 | 4.5 |
| Okaloosa | --- | R025 | 508665.049 | 1375776.784 | 16.1 | 4.5 |
| Okaloosa | --- | R026 | 508929.167 | 1376775.206 | 16.2 | 4.5 |
| Okaloosa | --- | R027 | 508925.269 | 1377907.878 | 16.2 | 4.5 |
| Okaloosa | --- | R028 | 508801.942 | 1378861.700 | 16.3 | 4.5 |
| Okaloosa | --- | R030 | 508874.324 | 1381176.832 | 16.4 | 4.5 |
| Okaloosa | --- | R031 | 508652.338 | 1382268.963 | 16.4 | 4.5 |
| Okaloosa | --- | R032 | 508533.120 | 1383128.946 | 16.5 | 4.5 |
| Okaloosa | --- | R033 | 508480.952 | 1384189.678 | 16.5 | 4.5 |
| Okaloosa | --- | R034 | 508458.394 | 1385155.551 | 16.6 | 4.5 |
| Okaloosa | --- | R035 | 508310.187 | 1386141.933 | 16.7 | 4.5 |
| Okaloosa | --- | R039 | 508210.034 | 1390186.581 | 16.2 | 4.5 |
| Okaloosa | --- | R040 | 508001.457 | 1390955.455 | 16.1 | 4.5 |
| Okaloosa | --- | R041 | 507891.070 | 1392271.605 | 16.0 | 4.5 |
| Okaloosa | --- | R042 | 507811.722 | 1393245.277 | 15.9 | 4.5 |
| Okaloosa | --- | R043 | 507605.865 | 1394196.179 | 15.8 | 4.5 |
| Okaloosa | --- | R044 | 507499.738 | 1395132.452 | 15.7 | 4.5 |
| Okaloosa | --- | R045 | 507446.690 | 1396218.893 | 15.5 | 4.5 |
| Okaloosa | --- | R046 | 507202.644 | 1397348.844 | 15.4 | 4.5 |
| Okaloosa | --- | R047 | 507061.576 | 1398286.997 | 15.3 | 4.5 |
| Okaloosa | --- | R048 | 507067.128 | 1399351.979 | 15.2 | 4.5 |
| Okaloosa | --- | R049 | 506877.511 | 1400303.941 | 15.1 | 4.5 |
| Okaloosa | --- | R050 | 506693.094 | 1401289.124 | 15.0 | 4.5 |
| Walton | From | R001 | 506624.750 | 1401734.630 | 16.5 | 3.2 |
| Walton | To | R030 | 500239.875 | 1433045.130 | 16.5 | 3.2 |
| Walton | From | R031 | 499934.594 | 1434069.750 | 16.0 | 3.2 |
| Walton | To | R072 | 486966.500 | 1473660.630 | 16.0 | 3.2 |

| County | From/To | Range Monument ID | Northing | Easting | 100 – Year Storm Elevation (ft.) | 100 – Year Storm Design Grade Elevation (ft.) |
|---|---|---|---|---|---|---|
| Walton | From | R077 | 484740.844 | 1479389.130 | 15.3 | 3.2 |
| Walton | To | R102 | 475652.063 | 1503167.380 | 15.3 | 3.2 |
| Walton | From | R103 | 475592.719 | 1504326.380 | 15.0 | 3.2 |
| Walton | To | R127 | 465086.313 | 1527413.880 | 15.0 | 3.2 |
| Bay | From | R001 | 463811.375 | 1530362.750 | 17.4 | 2.7 |
| Bay | To | R091 | 141799.906 | 1605999.880 | 17.4 | 2.7 |
| Bay | From | R128 | 346907.781 | 1706095.250 | 17.1 | 3.6 |
| Bay | To | R144 | 337404.344 | 1718488.250 | 17.1 | 3.6 |
| Gulf | --- | R001 | 336734.437 | 1719230.800 | 15.6 | 3.3 |
| Gulf | --- | R002 | 335922.665 | 1719861.940 | 15.7 | 4.1 |
| Gulf | --- | R003 | 335171.923 | 1720553.880 | 15.8 | 4.9 |
| Gulf | --- | R004 | 334377.704 | 1721193.693 | 15.9 | 5.3 |
| Gulf | --- | R005 | 333609.732 | 1721842.351 | 16.0 | 5.8 |
| Gulf | --- | R006 | 332855.653 | 1722478.412 | 16.0 | 5.7 |
| Gulf | --- | R007 | 332027.000 | 1723171.500 | 16.1 | 5.6 |
| Gulf | --- | R008 | 331337.999 | 1723839.035 | 16.2 | 5.5 |
| Gulf | --- | R009 | 330510.142 | 1724403.122 | 16.3 | 5.4 |
| Gulf | --- | R010 | 329724.652 | 1725026.649 | 16.4 | 5.1 |
| Gulf | --- | R011 | 328993.160 | 1725675.610 | 16.5 | 4.9 |
| Gulf | --- | R012 | 328134.084 | 1726198.792 | 16.6 | 4.7 |
| Gulf | --- | R013 | 327318.010 | 1726785.384 | 16.7 | 4.2 |
| Gulf | --- | R014 | 326481.618 | 1727321.819 | 16.8 | 4.0 |
| Gulf | --- | R015 | 325619.764 | 1727843.603 | 16.9 | 3.5 |
| Gulf | --- | R016 | 324734.681 | 1728359.002 | 17.0 | 3.3 |
| Gulf | --- | R017 | 323872.125 | 1728842.578 | 17.1 | 3.0 |
| Gulf | --- | R018 | 322977.795 | 1729329.526 | 17.1 | 2.6 |
| Gulf | --- | R019 | 322044.390 | 1729767.821 | 17.2 | 2.3 |
| Gulf | --- | R020 | 321216.300 | 1730196.095 | 17.3 | 2.2 |
| Gulf | --- | R021 | 320241.202 | 1730595.233 | 17.4 | 2.0 |
| Gulf | --- | R022 | 319342.114 | 1730990.035 | 17.5 | 1.9 |
| Gulf | --- | R023 | 318428.682 | 1731384.677 | 17.6 | 1.8 |
| Gulf | --- | R024 | 317499.871 | 1731744.788 | 17.7 | 1.5 |
| Gulf | --- | R025 | 316562.848 | 1732076.509 | 17.8 | 1.4 |
| Gulf | --- | R026 | 315588.585 | 1732232.859 | 17.9 | 1.3 |
| Gulf | --- | R027 | 314660.742 | 1732664.158 | 18.0 | 1.2 |
| Gulf | --- | R028 | 313692.980 | 1732957.850 | 18.1 | 1.1 |
| Gulf | --- | R029 | 312761.590 | 1733338.794 | 18.2 | 1.0 |
| Gulf | --- | R030 | 311848.953 | 1733756.649 | 18.2 | 0.9 |
| Gulf | --- | R031 | 310946.617 | 1734257.318 | 18.3 | 0.9 |
| Gulf | --- | R075 | 276991.344 | 1713720.976 | 12.1 | 3.3 |

| County | From/To | Range Monument ID | Northing | Easting | 100 – Year Storm Elevation (ft.) | 100 – Year Storm Design Grade Elevation (ft.) |
|---|---|---|---|---|---|---|
| Gulf | --- | R076 | 275960.197 | 1713930.740 | 12.3 | 3.3 |
| Gulf | --- | R077 | 274935.000 | 1714164.020 | 12.4 | 3.3 |
| Gulf | --- | R078 | 273899.107 | 1714380.765 | 12.6 | 3.3 |
| Gulf | --- | R079 | 272875.574 | 1714617.633 | 12.8 | 3.3 |
| Gulf | --- | R080 | 271897.646 | 1714952.460 | 12.9 | 3.2 |
| Gulf | --- | R081 | 270943.508 | 1715419.948 | 13.1 | 3.2 |
| Gulf | --- | R082 | 269919.392 | 1715664.947 | 13.3 | 3.1 |
| Gulf | --- | R083 | 269149.733 | 1715854.958 | 13.5 | 3.1 |
| Gulf | --- | R084 | 268039.803 | 1716303.341 | 13.6 | 3.0 |
| Gulf | --- | R085 | 267097.857 | 1716632.415 | 13.8 | 2.9 |
| Gulf | --- | R087 | 265158.109 | 1717310.097 | 14.2 | 2.9 |
| Gulf | --- | R088 | 264175.774 | 1717634.182 | 14.3 | 2.8 |
| Gulf | --- | R089 | 263201.837 | 1717965.952 | 14.5 | 2.8 |
| Gulf | --- | R090 | 262210.391 | 1718263.666 | 14.7 | 2.5 |
| Gulf | --- | R091 | 261262.400 | 1718636.681 | 14.8 | 2.2 |
| Gulf | --- | R092 | 260331.282 | 1719071.035 | 15.0 | 2.0 |
| Gulf | --- | R093 | 259390.459 | 1719392.883 | 15.2 | 1.9 |
| Gulf | --- | R094 | 258450.138 | 1719788.544 | 15.4 | 1.8 |
| Gulf | --- | R095 | 257457.445 | 1720171.707 | 15.5 | 1.7 |
| Gulf | --- | R096 | 256448.079 | 1720450.030 | 15.7 | 1.6 |
| Gulf | --- | R097 | 255596.713 | 1720997.807 | 15.9 | 1.5 |
| Gulf | --- | R098 | 254657.803 | 1721303.154 | 16.1 | 1.5 |
| Gulf | --- | R099 | 253761.000 | 1721779.000 | 16.2 | 1.4 |
| Gulf | --- | R100 | 252952.411 | 1722323.250 | 16.4 | 1.4 |
| Gulf | --- | R101 | 251972.208 | 1722660.470 | 16.6 | 1.3 |
| Gulf | --- | R102 | 251123.057 | 1723106.136 | 16.8 | 1.2 |
| Gulf | --- | R103 | 250233.353 | 1723644.776 | 17.0 | 1.1 |
| Gulf | --- | R104 | 249379.486 | 1724280.158 | 17.1 | 1.0 |
| Gulf | --- | R105 | 248542.388 | 1724863.917 | 17.3 | 1.0 |
| Gulf | --- | R106 | 247607.744 | 1725302.784 | 17.4 | 1.0 |
| Gulf | --- | R127 | 248100.971 | 1736852.134 | 16.3 | 6.8 |
| Gulf | --- | R128 | 248400.119 | 1737740.342 | 16.4 | 6.8 |
| Gulf | --- | R129 | 248637.994 | 1738712.681 | 16.4 | 6.8 |
| Gulf | --- | R130 | 248903.167 | 1739740.528 | 16.5 | 6.8 |
| Gulf | --- | R131 | 249177.243 | 1740776.869 | 16.6 | 6.4 |
| Gulf | --- | R132 | 249322.731 | 1741782.198 | 16.6 | 6.0 |
| Gulf | --- | R133 | 249541.750 | 1742818.532 | 16.7 | 5.3 |
| Gulf | --- | R134 | 249586.411 | 1743840.938 | 16.8 | 5.1 |
| Gulf | --- | R135 | 249660.032 | 1744839.066 | 16.8 | 5.0 |

| County | From/To | Range Monument ID | Northing | Easting | 100 – Year Storm Elevation (ft.) | 100 – Year Storm Design Grade Elevation (ft.) |
|---|---|---|---|---|---|---|
| Gulf | --- | R136 | 249704.963 | 1745831.549 | 19.9 | 4.8 |
| Gulf | --- | R137 | 249768.243 | 1746886.465 | 17.0 | 4.7 |
| Gulf | --- | R138 | 249790.717 | 1747871.192 | 17.0 | 4.6 |
| Gulf | --- | R139 | 249783.323 | 1748890.427 | 17.1 | 4.5 |
| Gulf | --- | R140 | 249793.964 | 1749849.732 | 17.2 | 4.4 |
| Gulf | --- | R141 | 249784.671 | 1750895.647 | 17.2 | 4.4 |
| Gulf | --- | R142 | 249806.246 | 1751959.884 | 17.3 | 4.4 |
| Gulf | --- | R143 | 249567.942 | 1752897.482 | 17.4 | 4.3 |
| Gulf | --- | R144 | 249636.153 | 1754008.462 | 17.4 | 4.3 |
| Gulf | --- | R145 | 249461.635 | 1754962.190 | 17.5 | 4.3 |
| Gulf | --- | R146 | 249254.988 | 1756014.043 | 17.6 | 4.3 |
| Gulf | --- | R147 | 249130.202 | 1756915.135 | 17.6 | 4.3 |
| Gulf | --- | R148 | 248831.822 | 1757954.250 | 17.7 | 4.2 |
| Gulf | --- | R149 | 248781.215 | 1759000.168 | 17.8 | 4.2 |
| Gulf | --- | R150 | 248524.723 | 1759952.938 | 17.8 | 4.2 |
| Gulf | --- | R151 | 248159.316 | 1760964.010 | 17.9 | 4.2 |
| Gulf | --- | R152 | 247848.254 | 1761999.605 | 18.0 | 4.2 |
| Gulf | --- | R153 | 247574.657 | 1762973.696 | 18.0 | 4.2 |
| Gulf | --- | R154 | 247387.900 | 1763991.610 | 18.1 | 4.2 |
| Gulf | --- | R155 | 247245.879 | 1764994.730 | 18.2 | 4.2 |
| Gulf | --- | R157 | 247370.323 | 1766920.518 | 18.3 | 4.2 |
| Gulf | --- | R158 | 247396.886 | 1767789.473 | 18.4 | 4.2 |
| Gulf | --- | R159 | 247833.520 | 1768712.088 | 18.4 | 4.2 |
| Gulf | --- | R160 | 248406.334 | 1769620.761 | 18.5 | 4.2 |
| Gulf | --- | R161 | 248880.946 | 1770246.440 | 18.6 | 4.2 |
| Franklin | From | R052 | 223589.000 | 1854668.380 | 17.0 | 4.5 |
| Franklin | To | R106 | 249049.234 | 1906519.630 | 17.0 | 4.5 |
| Franklin | From | R154 | 283102.031 | 1947412.130 | 18.9 | 3.8 |
| Franklin | To | R192 | 300507.313 | 1976784.750 | 18.9 | 3.8 |
| Franklin | From | R196 | 328391.281 | 2024589.630 | 20.7 | 3.8 |
| Franklin | To | R200 | 328368.719 | 2028711.000 | 20.7 | 3.8 |
| Franklin | --- | R201 | 328173.188 | 2029597.130 | 20.5 | 3.8 |
| Franklin | --- | R202 | 327808.688 | 2030568.000 | 20.3 | 3.8 |
| Franklin | --- | R203 | 327496.375 | 2031467.500 | 20.2 | 3.8 |
| Franklin | --- | R204 | 327178.125 | 2032458.250 | 20.1 | 3.8 |
| Franklin | --- | R205 | 326712.594 | 2033364.130 | 20.0 | 3.8 |
| Franklin | --- | R206 | 326345.875 | 2034347.630 | 19.9 | 3.8 |
| Franklin | --- | R207 | 326080.438 | 2035298.130 | 19.9 | 3.8 |

| County | From/To | Range Monument ID | Northing | Easting | 100 – Year Storm Elevation (ft.) | 100 – Year Storm Design Grade Elevation (ft.) |
|---|---|---|---|---|---|---|
| Franklin | --- | R208 | 325876.500 | 2036199.380 | 19.9 | 3.8 |
| Franklin | --- | R209 | 325380.469 | 2037219.380 | 19.9 | 3.8 |
| Franklin | --- | R210 | 325058.719 | 2037984.130 | 20.0 | 3.8 |
| Franklin | --- | R211 | 325086.719 | 2039249.250 | 20.3 | 3.8 |
| Franklin | --- | R212 | 325011.406 | 2040168.500 | 20.6 | 3.8 |
| Franklin | --- | R213 | 325356.281 | 2041119.130 | 20.9 | 3.8 |
| Franklin | --- | R214 | 325674.625 | 2042004.000 | 21.2 | 3.8 |
| Franklin | From | R215 | 325941.906 | 2042963.750 | 21.6 | 3.8 |
| Franklin | To | R235 | 340851.375 | 2051679.630 | 21.6 | 3.8 |
| Pinellas | --- | County Wide | --- | --- | 16.8 | 1.6 |
| Manatee | --- | R001 | 1165474.339 | 259662.035 | 18.2 | 2.0 |
| Manatee | --- | R002 | 1165352.334 | 259109.760 | 18.3 | 2.0 |
| Manatee | --- | R003 | 1164815.336 | 258889.001 | 18.3 | 2.0 |
| Manatee | --- | R004 | 1163852.906 | 259099.924 | 18.4 | 2.0 |
| Manatee | --- | R005 | 1163117.219 | 259472.126 | 18.4 | 2.0 |
| Manatee | --- | R006 | 1162277.015 | 260030.420 | 18.5 | 2.0 |
| Manatee | --- | R007 | 1161432.304 | 260951.324 | 18.5 | 2.0 |
| Manatee | --- | R008 | 1160584.674 | 261234.161 | 18.6 | 2.0 |
| Manatee | --- | R009 | 1159873.142 | 262038.826 | 18.6 | 2.0 |
| Manatee | --- | R010 | 1159204.754 | 262731.117 | 18.7 | 2.0 |
| Manatee | --- | R011 | 1158413.967 | 263436.883 | 18.7 | 2.0 |
| Manatee | --- | R012 | 1157635.697 | 264230.802 | 18.8 | 2.0 |
| Manatee | --- | R013 | 1156878.845 | 264862.232 | 18.8 | 2.0 |
| Manatee | --- | R014 | 1156166.132 | 265553.320 | 18.9 | 2.0 |
| Manatee | --- | R015 | 1155158.958 | 266211.096 | 18.9 | 2.0 |
| Manatee | --- | R016 | 1150788.320 | 268955.906 | 19.0 | 2.0 |
| Manatee | --- | R017 | 1153563.281 | 267224.487 | 19.0 | 2.0 |
| Manatee | --- | R018 | 1152857.371 | 267890.334 | 19.1 | 2.0 |
| Manatee | --- | R019 | 1151889.699 | 268237.656 | 19.1 | 2.0 |
| Manatee | --- | R020 | 1151120.965 | 268859.128 | 19.2 | 2.0 |
| Manatee | --- | R021 | 1150056.971 | 269241.486 | 19.2 | 2.0 |
| Manatee | --- | R022 | 1149152.018 | 269653.341 | 19.3 | 2.0 |
| Manatee | --- | R023 | 1148302.927 | 270040.024 | 19.3 | 2.0 |
| Manatee | --- | R024 | 1147347.114 | 270365.557 | 19.4 | 2.0 |
| Manatee | --- | R025 | 1146427.521 | 270663.046 | 19.4 | 2.0 |
| Manatee | --- | R026 | 1145353.679 | 271290.065 | 19.5 | 2.0 |
| Manatee | --- | R027 | 1144550.011 | 271365.367 | 19.5 | 2.0 |
| Manatee | --- | R028 | 1143600.238 | 271703.608 | 19.6 | 2.0 |
| Manatee | --- | R029 | 1142270.217 | 272138.079 | 19.6 | 2.0 |

| County | From/To | Range Monument ID | Northing | Easting | 100 – Year Storm Elevation (ft.) | 100 – Year Storm Design Grade Elevation (ft.) |
|---|---|---|---|---|---|---|
| Manatee | --- | R030 | 1141443.943 | 272568.338 | 19.7 | 2.0 |
| Manatee | --- | R031 | 1140383.792 | 272948.659 | 19.7 | 2.0 |
| Manatee | --- | R032 | 1139501.002 | 273163.108 | 19.8 | 2.0 |
| Manatee | --- | R033 | 1138576.980 | 273485.301 | 19.8 | 2.0 |
| Manatee | --- | R034 | 1137658.592 | 273754.752 | 19.9 | 2.0 |
| Manatee | --- | R035 | 1136689.312 | 274071.908 | 19.9 | 2.0 |
| Manatee | --- | R036 | 1135803.634 | 274334.984 | 20.0 | 2.0 |
| Manatee | --- | R037 | 1134841.633 | 274696.539 | 20.0 | 2.0 |
| Manatee | From | R038 | 1134062.810 | 275136.960 | 17.7 | 2.0 |
| Manatee | To | R046 | 1127411.430 | 277385.519 | 17.7 | 2.0 |
| Manatee | From | R047 | 1126599.104 | 278066.978 | 19.0 | 2.0 |
| Manatee | To | R067 | 1111514.426 | 291279.253 | 19.0 | 2.0 |
| Sarasota | --- | County Wide | --- | --- | 19.4 | 1.8 |
| Charlotte | From | R001 | 949540.942 | 378090.378 | 19.8 | 2.4 |
| Charlotte | To | R015 | 937187.675 | 384794.638 | 19.8 | 2.4 |
| Charlotte | From | R022 | 930830.438 | 389342.981 | 19.5 | 2.4 |
| Charlotte | To | R025 | 929035.756 | 390469.496 | 19.5 | 2.4 |
| Charlotte | From | R026 | 928189.604 | 391004.564 | 19.1 | 2.4 |
| Charlotte | To | R050 | 908565.594 | 404048.701 | 19.1 | 2.4 |
| Charlotte | --- | R051 | 907600.891 | 404709.213 | 19.0 | 2.4 |
| Charlotte | --- | R052 | 906782.874 | 405485.780 | 19.0 | 2.4 |
| Charlotte | --- | R053 | 905850.534 | 406090.584 | 18.9 | 2.4 |
| Charlotte | --- | R054 | 904905.419 | 406546.750 | 18.9 | 2.4 |
| Charlotte | --- | R055 | 903971.324 | 406992.502 | 18.8 | 2.4 |
| Charlotte | --- | R056 | 903043.667 | 407426.752 | 18.8 | 2.4 |
| Charlotte | --- | R057 | 902712.140 | 407883.909 | 18.7 | 2.4 |
| Charlotte | --- | R058 | 900363.295 | 408389.110 | 18.7 | 2.4 |
| Charlotte | --- | R059 | 900282.292 | 407899.465 | 18.6 | 2.4 |
| Charlotte | --- | R060 | 899631.739 | 407608.208 | 18.6 | 2.4 |
| Charlotte | --- | R061 | 898621.011 | 407776.136 | 18.5 | 2.4 |
| Charlotte | --- | R062 | 897713.484 | 408361.166 | 18.5 | 2.4 |
| Charlotte | --- | R063 | 896987.135 | 408874.363 | 18.5 | 2.4 |
| Charlotte | --- | R064 | 895989.576 | 409304.395 | 18.4 | 2.4 |
| Charlotte | --- | R065 | 895169.754 | 409898.529 | 18.4 | 2.4 |
| Charlotte | --- | R066 | 894330.279 | 410411.536 | 18.3 | 2.4 |
| Charlotte | --- | R067 | 893449.036 | 410888.113 | 18.3 | 2.4 |
| Charlotte | --- | R068 | 892970.440 | 411146.461 | 18.3 | 2.4 |
| Lee | From | R001 | 892408.690 | 411391.920 | 18.6 | 3.5 |
| Lee | To | R113 | 778195.190 | 441945.380 | 18.6 | 3.5 |

| County | From/To | Range Monument ID | Northing | Easting | 100 – Year Storm Elevation (ft.) | 100 – Year Storm Design Grade Elevation (ft.) |
|---|---|---|---|---|---|---|
| Lee | --- | R124 | 771304.500 | 450943.500 | 17.6 | 3.5 |
| Lee | --- | R125 | 770709.500 | 451984.500 | 17.6 | 3.5 |
| Lee | --- | R126 | 770049.000 | 452736.500 | 17.6 | 3.5 |
| Lee | --- | R127 | 769317.000 | 453565.500 | 17.7 | 3.5 |
| Lee | --- | R128 | 768317.000 | 454500.500 | 17.7 | 3.5 |
| Lee | --- | R129 | 767633.500 | 455146.500 | 17.8 | 3.5 |
| Lee | --- | R130 | 766808.000 | 455944.000 | 17.8 | 3.5 |
| Lee | --- | R131 | 766028.500 | 456557.000 | 17.9 | 3.5 |
| Lee | --- | R132 | 765297.280 | 457239.340 | 17.9 | 3.5 |
| Lee | --- | R133 | 764689.000 | 457965.500 | 18.0 | 3.5 |
| Lee | --- | R134 | 764177.530 | 458822.000 | 18.0 | 3.5 |
| Lee | --- | R135 | 763720.000 | 459698.000 | 18.1 | 3.5 |
| Lee | --- | R136 | 763339.000 | 460505.000 | 18.1 | 3.5 |
| Lee | --- | R137 | 762865.500 | 461580.500 | 18.2 | 3.5 |
| Lee | --- | R138 | 762493.000 | 462346.500 | 18.2 | 3.5 |
| Lee | --- | R139 | 762032.000 | 463343.000 | 18.3 | 3.5 |
| Lee | --- | R140 | 761713.500 | 464231.000 | 18.3 | 3.5 |
| Lee | --- | R141 | 761350.000 | 465141.500 | 18.4 | 3.5 |
| Lee | --- | R142 | 760881.875 | 466082.717 | 18.4 | 3.5 |
| Lee | --- | R143 | 760538.000 | 467022.500 | 18.5 | 3.5 |
| Lee | --- | R144 | 760229.000 | 467860.000 | 18.5 | 3.5 |
| Lee | --- | R145 | 759865.000 | 468784.500 | 18.6 | 3.5 |
| Lee | --- | R146 | 759581.500 | 469768.500 | 18.6 | 3.5 |
| Lee | --- | R147 | 759359.500 | 470809.000 | 18.7 | 3.5 |
| Lee | --- | R148 | 759092.000 | 471787.000 | 18.7 | 3.5 |
| Lee | --- | R149 | 759108.000 | 472786.000 | 18.8 | 3.5 |
| Lee | --- | R150 | 759051.154 | 473729.247 | 18.8 | 3.5 |
| Lee | --- | R151 | 759121.000 | 474835.500 | 18.9 | 3.5 |
| Lee | --- | R152 | 759159.420 | 475647.227 | 18.9 | 3.5 |
| Lee | --- | R153 | 759484.000 | 476753.000 | 19.0 | 3.5 |
| Lee | --- | R154 | 759760.500 | 477640.500 | 19.0 | 3.5 |
| Lee | --- | R155 | 760079.500 | 478553.500 | 19.1 | 3.5 |
| Lee | --- | R156 | 760507.500 | 479461.000 | 19.1 | 3.5 |
| Lee | --- | R157 | 760883.810 | 480367.080 | 19.2 | 3.5 |
| Lee | --- | R158 | 761310.000 | 481238.000 | 19.2 | 3.5 |
| Lee | --- | R159 | 761701.260 | 482201.800 | 19.3 | 3.5 |
| Lee | --- | R160 | 762153.000 | 482951.500 | 19.3 | 3.5 |
| Lee | --- | R161 | 762698.000 | 483828.500 | 19.4 | 3.5 |
| Lee | --- | R162 | 763747.160 | 485280.070 | 19.4 | 3.5 |
| Lee | --- | R163 | 764361.000 | 486310.000 | 19.4 | 3.5 |

| County | From/To | Range Monument ID | Northing | Easting | 100 – Year Storm Elevation (ft.) | 100 – Year Storm Design Grade Elevation (ft.) |
|---|---|---|---|---|---|---|
| Lee | --- | R164 | 764674.500 | 486908.500 | 19.5 | 3.5 |
| Lee | --- | R165 | 765344.000 | 488032.000 | 19.5 | 3.5 |
| Lee | --- | R166 | 765906.500 | 488830.500 | 19.6 | 3.5 |
| Lee | --- | R167 | 766417.000 | 489674.000 | 19.6 | 3.5 |
| Lee | --- | R168 | 766861.500 | 490557.500 | 19.7 | 3.5 |
| Lee | --- | R169 | 767446.000 | 491467.000 | 19.7 | 3.5 |
| Lee | --- | R170 | 767992.569 | 492350.337 | 19.8 | 3.5 |
| Lee | --- | R171 | 768868.500 | 493016.000 | 19.8 | 3.5 |
| Lee | --- | R172 | 768991.500 | 493853.500 | 19.9 | 3.5 |
| Lee | --- | R173 | 769582.500 | 494843.000 | 19.9 | 3.5 |
| Lee | --- | R174 | 770134.870 | 495158.940 | 20.0 | 3.5 |
| Lee | --- | R175 | 774264.500 | 510899.500 | 20.0 | 3.5 |
| Lee | --- | R176 | 773507.520 | 511107.710 | 20.1 | 3.5 |
| Lee | --- | R177 | 772796.691 | 511650.789 | 20.1 | 3.5 |
| Lee | --- | R178 | 771981.500 | 512406.500 | 20.2 | 3.5 |
| Lee | --- | R179 | 771382.530 | 512952.060 | 20.2 | 3.5 |
| Lee | --- | R180 | 770556.850 | 513703.160 | 20.3 | 3.5 |
| Lee | --- | R181 | 770035.000 | 514545.000 | 20.3 | 3.5 |
| Lee | --- | R182 | 769822.000 | 515546.000 | 20.4 | 3.5 |
| Lee | --- | R183 | 769479.000 | 516339.000 | 20.4 | 3.5 |
| Lee | --- | R184 | 769066.000 | 517327.500 | 20.5 | 3.5 |
| Lee | --- | R185 | 768486.500 | 518178.000 | 20.5 | 3.5 |
| Lee | --- | R186 | 768107.500 | 519072.000 | 20.6 | 3.5 |
| Lee | --- | R187 | 767609.290 | 520398.690 | 20.6 | 3.5 |
| Lee | --- | R188 | 766802.000 | 521826.000 | 20.7 | 3.5 |
| Lee | --- | R189 | 766303.500 | 522729.000 | 20.7 | 3.5 |
| Lee | --- | R190 | 765723.500 | 523555.000 | 20.8 | 3.5 |
| Lee | --- | R191 | 765232.000 | 524303.000 | 20.8 | 3.5 |
| Lee | --- | R192 | 764531.000 | 525110.500 | 20.9 | 3.5 |
| Lee | --- | R193 | 763920.500 | 525730.000 | 20.9 | 3.5 |
| Lee | --- | R194 | 763132.000 | 526767.500 | 21.0 | 3.5 |
| Lee | --- | R195 | 762461.500 | 527433.000 | 21.0 | 3.5 |
| Lee | --- | R196 | 761873.466 | 528146.922 | 21.1 | 3.5 |
| Lee | --- | R197 | 761043.448 | 528844.342 | 21.1 | 3.5 |
| Lee | --- | R198 | 760499.000 | 529630.000 | 21.2 | 3.5 |
| Lee | --- | R199 | 759571.500 | 530241.000 | 21.2 | 3.5 |
| Lee | --- | R200 | 758958.500 | 530883.500 | 21.3 | 3.5 |
| Lee | --- | R201 | 757972.000 | 531400.000 | 21.3 | 3.5 |
| Lee | --- | R202 | 757140.500 | 531796.500 | 21.4 | 3.5 |
| Lee | --- | R203 | 755800.661 | 531952.059 | 21.4 | 3.5 |

| County | From/To | Range Monument ID | Northing | Easting | 100 – Year Storm Elevation (ft.) | 100 – Year Storm Design Grade Elevation (ft.) |
|---|---|---|---|---|---|---|
| Lee | --- | R204 | 754821.000 | 532332.000 | 21.5 | 3.5 |
| Lee | --- | R205 | 754347.500 | 533182.000 | 21.5 | 3.5 |
| Lee | --- | R206 | 753419.040 | 533947.300 | 21.6 | 3.5 |
| Lee | --- | R207 | 752534.500 | 534590.500 | 21.6 | 3.5 |
| Lee | --- | R208 | 752409.000 | 535626.000 | 21.7 | 3.5 |
| Lee | --- | R209 | 752360.500 | 536645.500 | 21.7 | 3.5 |
| Lee | --- | R210 | 752595.000 | 537753.000 | 21.7 | 3.5 |
| Lee | --- | R226 | 738034.800 | 544769.950 | 21.7 | 3.5 |
| Lee | --- | R227 | 737131.000 | 545207.500 | 21.7 | 3.5 |
| Lee | --- | R228 | 736140.000 | 545743.500 | 21.7 | 3.5 |
| Lee | --- | R229 | 735566.990 | 546361.330 | 21.7 | 3.5 |
| Lee | --- | R230 | 734617.500 | 546820.500 | 21.7 | 3.5 |
| Lee | --- | R231 | 733770.500 | 547379.000 | 21.7 | 3.5 |
| Lee | --- | R232 | 732637.000 | 547725.000 | 21.7 | 3.5 |
| Lee | --- | R233 | 731878.000 | 548225.500 | 21.7 | 3.5 |
| Lee | --- | R234 | 730770.403 | 548580.268 | 21.7 | 3.5 |
| Lee | --- | R235 | 729941.500 | 548896.500 | 21.7 | 3.5 |
| Lee | --- | R236 | 728912.500 | 549424.500 | 21.7 | 3.5 |
| Lee | --- | R237 | 727980.000 | 549649.500 | 21.7 | 3.5 |
| Lee | --- | R238 | 726958.500 | 550188.000 | 21.7 | 3.5 |
| Lee | --- | R239 | 725896.400 | 550570.910 | 21.7 | 3.5 |
| Collier | --- | R001 | 726436.250 | 223078.062 | 22.4 | 1.9 |
| Collier | --- | R002 | 725495.193 | 223418.505 | 22.4 | 1.9 |
| Collier | --- | R003 | 726436.250 | 223078.063 | 22.4 | 1.9 |
| Collier | --- | R004 | 723568.245 | 223968.293 | 22.3 | 1.9 |
| Collier | --- | R005 | 722601.976 | 224364.440 | 22.3 | 1.9 |
| Collier | --- | R006 | 721661.000 | 224773.188 | 22.3 | 1.9 |
| Collier | --- | R022 | 705668.011 | 228699.451 | 21.9 | 1.9 |
| Collier | --- | R023 | 704714.375 | 229032.625 | 21.9 | 1.9 |
| Collier | --- | R024 | 703700.135 | 229177.605 | 21.8 | 1.9 |
| Collier | --- | R025 | 702657.772 | 229595.787 | 21.8 | 1.9 |
| Collier | --- | R026 | 701679.032 | 229607.882 | 21.8 | 1.9 |
| Collier | --- | R027 | 700695.375 | 229750.313 | 21.7 | 1.9 |
| Collier | --- | R028 | 699512.530 | 229922.136 | 21.7 | 1.9 |
| Collier | --- | R029 | 698675.639 | 230101.954 | 21.7 | 1.9 |
| Collier | --- | R030 | 697665.976 | 230298.027 | 21.7 | 1.9 |
| Collier | --- | R031 | 696642.183 | 230465.698 | 21.6 | 1.9 |
| Collier | --- | R032 | 695653.088 | 230651.516 | 21.6 | 1.9 |
| Collier | --- | R033 | 694660.188 | 230862.125 | 21.6 | 1.9 |
| Collier | --- | R034 | 693648.875 | 231040.750 | 21.6 | 1.9 |

| County | From/To | Range Monument ID | Northing | Easting | 100 – Year Storm Elevation (ft.) | 100 – Year Storm Design Grade Elevation (ft.) |
|---|---|---|---|---|---|---|
| Collier | --- | R035 | 692656.378 | 231168.587 | 21.5 | 1.9 |
| Collier | --- | R045 | 682488.589 | 232239.212 | 21.3 | 1.9 |
| Collier | --- | R046 | 681383.119 | 232299.047 | 21.3 | 1.9 |
| Collier | --- | R047 | 680409.685 | 232314.060 | 21.2 | 1.9 |
| Collier | --- | R048 | 679476.707 | 232328.825 | 21.2 | 1.9 |
| Collier | --- | R049 | 678409.602 | 232343.589 | 21.2 | 1.9 |
| Collier | --- | R050 | 677323.866 | 232373.165 | 21.2 | 1.9 |
| Collier | --- | R051 | 675998.160 | 232474.314 | 21.1 | 1.9 |
| Collier | --- | R052 | 675120.608 | 232594.199 | 21.1 | 1.9 |
| Collier | --- | R053 | 674076.534 | 232689.818 | 21.1 | 1.9 |
| Collier | --- | R054 | 673006.100 | 232711.616 | 21.0 | 1.9 |
| Collier | --- | R055 | 671959.812 | 232734.833 | 21.0 | 1.9 |
| Collier | --- | R056 | 671040.457 | 232825.414 | 21.0 | 1.9 |
| Collier | --- | R057 | 670276.305 | 232902.238 | 21.0 | 1.9 |
| Collier | --- | R058 | 668531.334 | 233456.764 | 20.9 | 1.9 |
| Collier | --- | R059 | 667557.580 | 233607.481 | 20.9 | 1.9 |
| Collier | --- | R060 | 666513.772 | 233905.400 | 20.9 | 1.9 |
| Collier | --- | R061 | 665477.166 | 234198.203 | 20.9 | 1.9 |
| Collier | --- | R062 | 664456.753 | 234191.994 | 20.8 | 1.9 |
| Collier | --- | R063 | 663472.688 | 234413.688 | 20.8 | 1.9 |
| Collier | --- | R064 | 662560.667 | 234574.574 | 20.8 | 1.9 |
| Collier | --- | R065 | 661782.691 | 234659.134 | 20.8 | 1.9 |
| Collier | --- | R066 | 660976.765 | 234838.515 | 20.7 | 1.9 |
| Collier | --- | R067 | 660180.777 | 234914.559 | 20.7 | 1.9 |
| Collier | --- | R068 | 659373.809 | 234980.285 | 20.7 | 1.9 |
| Collier | --- | R069 | 658564.431 | 235034.690 | 20.7 | 1.9 |
| Collier | --- | R070 | 657769.998 | 235111.455 | 20.6 | 1.9 |
| Collier | --- | R071 | 656975.926 | 235229.700 | 20.6 | 1.9 |
| Collier | --- | R072 | 656184.737 | 235369.073 | 20.6 | 1.9 |
| Collier | --- | R073 | 655374.625 | 235362.500 | 20.6 | 1.9 |
| Collier | --- | R074 | 654569.964 | 235496.311 | 20.5 | 1.9 |
| Collier | --- | R075 | 653794.836 | 235648.548 | 20.5 | 1.9 |
| Collier | --- | R076 | 652994.660 | 235668.912 | 20.5 | 1.9 |
| Collier | --- | R077 | 652213.664 | 235834.436 | 20.4 | 1.9 |
| Collier | --- | R078 | 651448.468 | 235866.680 | 20.4 | 1.9 |
| Collier | --- | R079 | 650350.000 | 235929.375 | 20.4 | 1.9 |
| Collier | --- | R080 | 649196.750 | 235993.625 | 20.4 | 1.9 |
| Collier | --- | R081 | 648097.063 | 236613.500 | 20.3 | 1.9 |
| Collier | --- | R082 | 647265.188 | 236277.125 | 20.3 | 1.9 |
| Collier | --- | R083 | 646228.418 | 236411.155 | 20.3 | 1.9 |

| County | From/To | Range Monument ID | Northing | Easting | 100 – Year Storm Elevation (ft.) | 100 – Year Storm Design Grade Elevation (ft.) |
|---|---|---|---|---|---|---|
| Collier | --- | R084 | 645268.532 | 236449.285 | 20.3 | 1.9 |
| Collier | --- | R085 | 644301.054 | 236612.617 | 20.2 | 1.9 |
| Collier | --- | R086 | 643433.216 | 236775.023 | 20.2 | 1.9 |
| Collier | --- | R087 | 642431.938 | 236975.313 | 20.2 | 1.9 |
| Collier | --- | R088 | 641416.392 | 237031.783 | 20.2 | 1.9 |
| Collier | --- | R089 | 640533.625 | 237172.687 | 20.1 | 1.9 |
| Collier | From | R090 | 639635.625 | 237035.000 | 20.1 | 1.0 |
| Collier | To | R127A | 605677.188 | 251380.813 | 20.1 | 1.0 |
| Collier | From | R128 | 605677.187 | 251380.812 | 18.8 | 1.9 |
| Collier | To | R148 | 573822.125 | 260509.625 | 18.8 | 1.9 |
| Nassau | From | R013 | 2311037.000 | 365120.000 | 19.9 | 3.9 |
| Nassau | To | R031 | 2293831.000 | 362959.000 | 19.9 | 3.9 |
| Nassau | From | R032 | 2292955.000 | 362775.000 | 18.0 | 5.7 |
| Nassau | To | R076 | 2289956.000 | 362070.000 | 18.0 | 5.7 |
| Duval | --- | R039 | 2191059.010 | 374283.770 | 17.3 | 5.5 |
| Duval | --- | R040 | 2190092.750 | 374384.120 | 17.3 | 5.5 |
| Duval | --- | R041 | 2189198.560 | 374367.850 | 17.3 | 5.5 |
| Duval | --- | R042 | 2188152.620 | 374458.210 | 17.3 | 5.5 |
| Duval | --- | R043 | 2187337.850 | 374522.250 | 17.4 | 5.5 |
| Duval | --- | R044 | 2186388.170 | 374603.510 | 17.4 | 5.5 |
| Duval | --- | R045 | 2185453.330 | 374675.320 | 17.4 | 5.5 |
| Duval | --- | R046 | 2184488.250 | 374740.670 | 17.4 | 5.5 |
| Duval | --- | R047 | 2183505.490 | 374879.990 | 17.4 | 5.5 |
| Duval | --- | R048 | 2182484.070 | 374997.370 | 17.5 | 5.5 |
| Duval | --- | R049 | 2181560.700 | 375064.470 | 17.5 | 5.5 |
| Duval | --- | R050 | 2180642.490 | 375142.990 | 17.5 | 5.5 |
| Duval | --- | R051 | 2179702.990 | 375236.990 | 17.5 | 5.5 |
| Duval | --- | R052 | 2178647.990 | 375316.000 | 17.5 | 5.5 |
| Duval | --- | R053 | 2177717.490 | 375393.990 | 17.6 | 5.5 |
| Duval | --- | R054 | 2176803.910 | 375445.790 | 17.6 | 5.5 |
| Duval | --- | R055 | 2175866.990 | 375520.490 | 17.6 | 5.5 |
| Duval | --- | R056 | 2174933.990 | 375564.490 | 17.6 | 5.5 |
| Duval | --- | R057 | 2174074.990 | 375778.490 | 17.7 | 5.5 |
| Duval | --- | R058 | 2173090.300 | 375951.530 | 17.7 | 5.5 |
| Duval | --- | R059 | 2172156.690 | 375998.890 | 17.7 | 5.5 |
| Duval | --- | R060 | 2171248.490 | 376093.490 | 17.7 | 5.5 |
| Duval | --- | R061 | 2170198.390 | 376395.260 | 17.7 | 5.5 |
| Duval | --- | R062 | 2169336.490 | 376508.990 | 17.8 | 5.5 |
| Duval | --- | R063 | 2168329.270 | 376662.420 | 17.8 | 5.5 |
| Duval | --- | R064 | 2167455.030 | 376829.500 | 17.8 | 5.5 |

| County | From/To | Range Monument ID | Northing | Easting | 100 – Year Storm Elevation (ft.) | 100 – Year Storm Design Grade Elevation (ft.) |
|---|---|---|---|---|---|---|
| Duval | --- | R065 | 2166477.950 | 376962.230 | 17.8 | 5.5 |
| Duval | --- | R066 | 2165503.710 | 377128.900 | 17.8 | 5.5 |
| Duval | --- | R067 | 2164537.930 | 377282.630 | 17.9 | 5.5 |
| Duval | --- | R068 | 2163568.490 | 377370.490 | 17.9 | 5.5 |
| Duval | --- | R069 | 2162545.010 | 377609.890 | 17.9 | 5.5 |
| Duval | --- | R070 | 2161538.130 | 377806.140 | 17.9 | 5.5 |
| Duval | --- | R071 | 2160628.050 | 377970.770 | 18.0 | 5.5 |
| Duval | --- | R072 | 2159634.440 | 377925.080 | 18.0 | 5.5 |
| Duval | --- | R073 | 2158689.490 | 378368.780 | 18.0 | 5.5 |
| Duval | --- | R074 | 2157807.880 | 378527.330 | 18.0 | 5.5 |
| Duval | --- | R075 | 2156845.480 | 378751.490 | 18.0 | 5.5 |
| Duval | --- | R076 | 2155824.500 | 378949.770 | 18.1 | 5.5 |
| Duval | --- | R077 | 2154887.990 | 379129.990 | 18.1 | 5.5 |
| Duval | --- | R078 | 2154052.170 | 379268.560 | 18.1 | 5.5 |
| Duval | --- | R079 | 2153053.480 | 379439.700 | 18.1 | 5.5 |
| Duval | --- | R080 | 2151939.290 | 379681.720 | 18.1 | 5.5 |
| St. Johns | From | R001 | 2151940.349 | 379681.864 | 17.3 | 5.2 |
| St. Johns | To | R045 | 2107393.562 | 389799.320 | 17.3 | 5.2 |
| St. Johns | From | R067 | 2084801.704 | 394430.910 | 16.5 | 5.2 |
| St. Johns | To | R117 | 2034104.349 | 406102.112 | 16.5 | 5.2 |
| St. Johns | --- | R118 | 2033084.256 | 406485.121 | 17.6 | 5.2 |
| St. Johns | --- | R119 | 2032061.729 | 406921.041 | 18.2 | 5.2 |
| St. Johns | --- | R120 | 2031034.982 | 407363.865 | 17.9 | 5.2 |
| St. Johns | --- | R121 | 2030032.197 | 407769.343 | 18.3 | 5.2 |
| St. Johns | --- | R122 | 2027528.141 | 406881.407 | 17.3 | 5.2 |
| St. Johns | --- | R142 | 2007878.972 | 415752.124 | 18.6 | 5.2 |
| St. Johns | --- | R143 | 2006063.238 | 415707.466 | 18.4 | 5.2 |
| St. Johns | --- | R144 | 2005831.246 | 415575.231 | 18.6 | 5.2 |
| St. Johns | --- | R145 | 2004803.947 | 415597.979 | 18.0 | 5.2 |
| St. Johns | --- | R146 | 2003809.066 | 415674.148 | 17.5 | 5.2 |
| St. Johns | --- | R147 | 2002764.080 | 415575.260 | 17.0 | 5.2 |
| St. Johns | --- | R148 | 2001825.744 | 415872.102 | 17.0 | 5.2 |
| St. Johns | --- | R149 | 2000819.459 | 415927.813 | 16.4 | 5.2 |
| St. Johns | --- | R150 | 1999839.248 | 416062.115 | 15.8 | 5.2 |
| St. Johns | --- | R151 | 1998834.381 | 416040.556 | 15.5 | 5.2 |
| St. Johns | --- | R152 | 1997849.499 | 416108.848 | 16.1 | 5.2 |
| St. Johns | --- | R199 | 1950313.292 | 428953.791 | 16.1 | 5.2 |
| St. Johns | --- | R200 | 1949336.572 | 429186.976 | 18.0 | 5.2 |
| St. Johns | --- | R209 | 1940544.778 | 431959.225 | 18.0 | 5.2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Flagler | --- | R001 | 1940004.826 | 431994.225 | 18.5 | 3.1 |
| Flagler | --- | R002 | 1939146.500 | 432510.050 | 18.5 | 3.1 |
| Flagler | --- | R003 | 1937964.600 | 432924.210 | 18.4 | 3.1 |
| Flagler | --- | R004 | 1937263.450 | 433216.890 | 18.4 | 3.1 |
| Flagler | --- | R005 | 1936385.690 | 433570.290 | 18.4 | 3.1 |
| Flagler | --- | R006 | 1935440.460 | 433912.090 | 18.4 | 3.1 |
| Flagler | --- | R007 | 1934533.460 | 434240.950 | 18.3 | 3.1 |
| Flagler | --- | R008 | 1933644.980 | 434479.820 | 18.3 | 3.1 |
| Flagler | --- | R009 | 1932634.130 | 434882.330 | 18.3 | 3.1 |
| Flagler | --- | R010 | 1931703.250 | 435223.450 | 18.2 | 3.1 |
| Flagler | --- | R016 | 1926343.940 | 437101.560 | 18.0 | 3.1 |
| Flagler | --- | R017 | 1925387.240 | 437368.610 | 18.0 | 3.1 |
| Flagler | --- | R018 | 1924526.460 | 437762.070 | 18.0 | 3.1 |
| Flagler | --- | R019 | 1923606.920 | 438169.310 | 18.0 | 3.1 |
| Flagler | --- | R020 | 1922698.043 | 438445.777 | 17.9 | 3.1 |
| Flagler | --- | R021 | 1921699.360 | 438896.350 | 17.9 | 3.1 |
| Flagler | --- | R022 | 1920625.940 | 439272.400 | 17.9 | 3.1 |
| Flagler | --- | R023 | 1919825.090 | 439433.170 | 17.8 | 3.1 |
| Flagler | --- | R024 | 1918877.800 | 439706.480 | 17.8 | 3.1 |
| Flagler | --- | R025 | 1917691.440 | 440073.300 | 17.8 | 3.1 |
| Flagler | --- | R026 | 1916865.130 | 440358.430 | 17.7 | 3.1 |
| Flagler | --- | R027 | 1916083.828 | 440656.313 | 17.7 | 3.1 |
| Flagler | --- | R028 | 1915260.260 | 440962.130 | 17.7 | 3.1 |
| Flagler | --- | R029 | 1914407.270 | 441273.440 | 17.6 | 3.1 |
| Flagler | --- | R030 | 1913250.390 | 441688.360 | 17.6 | 3.1 |
| Flagler | --- | R031 | 1912489.320 | 441979.770 | 17.6 | 3.1 |
| Flagler | --- | R032 | 1911541.060 | 442293.980 | 17.6 | 3.1 |
| Flagler | --- | R033 | 1910606.780 | 442642.000 | 17.5 | 3.1 |
| Flagler | --- | R034 | 1909856.620 | 442908.630 | 17.5 | 3.1 |
| Flagler | --- | R035 | 1908706.884 | 443396.711 | 17.5 | 3.1 |
| Flagler | --- | R036 | 1907809.680 | 443665.240 | 17.4 | 3.1 |
| Flagler | --- | R037 | 1906895.070 | 443976.470 | 17.4 | 3.1 |
| Flagler | --- | R038 | 1906001.640 | 444288.780 | 17.4 | 3.1 |
| Flagler | --- | R039 | 1905311.220 | 444978.560 | 17.3 | 3.1 |
| Flagler | --- | R040 | 1904346.830 | 445319.760 | 17.3 | 3.1 |
| Flagler | --- | R041 | 1903429.940 | 445469.930 | 17.3 | 3.1 |
| Flagler | --- | R042 | 1902487.940 | 445831.990 | 17.2 | 3.1 |
| Flagler | --- | R043 | 1901642.140 | 446189.160 | 17.2 | 3.1 |
| Flagler | --- | R044 | 1900671.980 | 446590.420 | 17.2 | 3.1 |
| Flagler | --- | R045 | 1899775.660 | 446805.170 | 17.2 | 3.1 |
| Flagler | --- | R046 | 1898760.770 | 447238.290 | 17.1 | 3.1 |
| Flagler | --- | R047 | 1897851.030 | 447635.960 | 17.1 | 3.1 |
| Flagler | --- | R048 | 1896962.520 | 448013.730 | 17.1 | 3.1 |
| Flagler | --- | R049 | 1896093.720 | 448388.670 | 17.0 | 3.1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Flagler | --- | R050 | 1895171.080 | 448783.530 | 17.0 | 3.1 |
| Flagler | --- | R051 | 1894328.270 | 449147.340 | 17.0 | 3.1 |
| Flagler | --- | R052 | 1893511.050 | 449499.340 | 16.9 | 3.1 |
| Flagler | --- | R053 | 1893098.360 | 449682.010 | 16.9 | 3.1 |
| Flagler | --- | R054 | 1892359.770 | 449997.110 | 16.9 | 3.1 |
| Flagler | --- | R055 | 1891416.070 | 450402.340 | 16.8 | 3.1 |
| Flagler | --- | R056 | 1890658.410 | 450828.460 | 16.8 | 3.1 |
| Flagler | --- | R057 | 1889965.070 | 451040.180 | 16.8 | 3.1 |
| Flagler | --- | R058 | 1888992.350 | 451563.110 | 16.8 | 3.1 |
| Flagler | --- | R059 | 1887981.560 | 452002.550 | 16.7 | 3.1 |
| Flagler | --- | R060 | 1887264.384 | 452318.819 | 16.7 | 3.1 |
| Flagler | --- | R061 | 1886413.520 | 452683.950 | 16.7 | 3.1 |
| Flagler | --- | R062 | 1885505.390 | 453090.520 | 16.6 | 3.1 |
| Flagler | --- | R063 | 1884591.470 | 453483.050 | 16.6 | 3.1 |
| Flagler | --- | R064 | 1883786.510 | 453842.420 | 16.6 | 3.1 |
| Flagler | --- | R065 | 1882902.250 | 454338.350 | 16.5 | 3.1 |
| Flagler | --- | R066 | 1882025.740 | 454668.080 | 16.5 | 3.1 |
| Flagler | --- | R067 | 1881187.140 | 455040.050 | 16.5 | 3.1 |
| Flagler | --- | R068 | 1880214.570 | 455442.650 | 16.4 | 3.1 |
| Flagler | --- | R069 | 1879407.950 | 455801.560 | 16.4 | 3.1 |
| Flagler | --- | R070 | 1878426.420 | 456212.910 | 16.4 | 3.1 |
| Flagler | --- | R071 | 1877567.950 | 456661.350 | 16.4 | 3.1 |
| Flagler | --- | R072 | 1876698.940 | 457020.650 | 16.3 | 3.1 |
| Flagler | --- | R073 | 1875818.670 | 457383.830 | 16.3 | 3.1 |
| Flagler | --- | R074 | 1874945.850 | 457754.340 | 16.3 | 3.1 |
| Flagler | --- | R075 | 1874075.480 | 458122.380 | 16.2 | 3.1 |
| Flagler | --- | R076 | 1873169.650 | 458453.490 | 16.2 | 3.1 |
| Flagler | --- | R077 | 1872301.290 | 458900.260 | 16.2 | 3.1 |
| Flagler | --- | R078 | 1871408.520 | 459278.130 | 16.1 | 3.1 |
| Flagler | --- | R079 | 1870536.860 | 459681.690 | 16.1 | 3.1 |
| Flagler | --- | R080 | 1869633.596 | 459959.865 | 16.1 | 3.1 |
| Flagler | --- | R081 | 1868762.989 | 460335.470 | 16.0 | 3.1 |
| Flagler | --- | R082 | 1867835.500 | 460724.350 | 16.0 | 3.1 |
| Flagler | --- | R083 | 1867000.470 | 461067.920 | 16.0 | 3.1 |
| Flagler | --- | R084 | 1866027.250 | 461456.510 | 16.0 | 3.1 |
| Flagler | --- | R085 | 1865353.389 | 461743.397 | 15.9 | 3.1 |
| Flagler | --- | R086 | 1864463.492 | 462108.075 | 15.9 | 3.1 |
| Flagler | --- | R087 | 1863585.980 | 462462.410 | 15.9 | 3.1 |
| Flagler | --- | R088 | 1862788.870 | 462859.020 | 15.8 | 3.1 |
| Flagler | --- | R089 | 1862032.780 | 463148.360 | 15.8 | 3.1 |
| Flagler | --- | R090 | 1861144.670 | 463496.460 | 15.8 | 3.1 |
| Flagler | --- | R091 | 1860278.640 | 463837.300 | 15.7 | 3.1 |
| Flagler | --- | R092 | 1859396.100 | 464185.120 | 15.7 | 3.1 |
| Flagler | --- | R093 | 1858505.730 | 464531.030 | 15.7 | 3.1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Flagler | --- | R094 | 1857619.950 | 464868.350 | 15.6 | 3.1 |
| Flagler | --- | R095 | 1856693.180 | 465078.600 | 15.6 | 3.1 |
| Flagler | --- | R096 | 1855895.600 | 465400.500 | 15.6 | 3.1 |
| Flagler | --- | R097 | 1855005.110 | 465788.120 | 15.6 | 3.1 |
| Flagler | --- | R098 | 1854126.930 | 466229.430 | 15.5 | 3.1 |
| Flagler | --- | R099 | 1853248.250 | 466593.350 | 15.5 | 3.1 |
| Flagler | --- | R100 | 1852367.100 | 466950.390 | 15.5 | 3.1 |
| Volusia | --- | R021 | 1833592.700 | 474422.580 | 16.1 | 3.6 |
| Volusia | --- | R022 | 1832740.340 | 474770.100 | 16.1 | 3.6 |
| Volusia | --- | R023 | 1831865.400 | 475120.180 | 16.1 | 3.6 |
| Volusia | --- | R024 | 1830970.320 | 475478.120 | 16.1 | 3.6 |
| Volusia | --- | R025 | 1830069.600 | 475861.210 | 16.0 | 3.6 |
| Volusia | --- | R026 | 1829212.820 | 476237.480 | 16.0 | 3.6 |
| Volusia | --- | R027 | 1828338.360 | 476597.770 | 16.0 | 3.6 |
| Volusia | --- | R028 | 1827395.240 | 476843.696 | 16.0 | 3.6 |
| Volusia | --- | R029 | 1826591.540 | 477338.480 | 16.0 | 3.6 |
| Volusia | --- | R030 | 1825760.100 | 477689.840 | 16.0 | 3.6 |
| Volusia | --- | R031 | 1824865.150 | 478059.150 | 15.9 | 3.6 |
| Volusia | --- | R032 | 1824000.720 | 478437.940 | 15.9 | 3.6 |
| Volusia | --- | R033 | 1823130.170 | 478805.940 | 15.9 | 3.6 |
| Volusia | --- | R034 | 1822241.400 | 479167.670 | 15.9 | 3.6 |
| Volusia | --- | R035 | 1821380.240 | 479523.160 | 15.9 | 3.6 |
| Volusia | --- | R036 | 1820509.190 | 479894.790 | 15.9 | 3.6 |
| Volusia | --- | R037 | 1819638.720 | 480228.320 | 15.9 | 3.6 |
| Volusia | --- | R038 | 1818762.460 | 480609.700 | 15.8 | 3.6 |
| Volusia | --- | R039 | 1817884.720 | 480948.570 | 15.8 | 3.6 |
| Volusia | --- | R040 | 1817046.160 | 481357.950 | 15.8 | 3.6 |
| Volusia | --- | R041 | 1816146.530 | 481654.100 | 15.8 | 3.6 |
| Volusia | --- | R042 | 1815220.380 | 482037.670 | 15.8 | 3.6 |
| Volusia | --- | R043 | 1814376.500 | 482360.580 | 15.8 | 3.6 |
| Volusia | --- | R044 | 1813498.460 | 482730.780 | 15.8 | 3.6 |
| Volusia | --- | R045 | 1812913.170 | 482990.810 | 15.7 | 3.6 |
| Volusia | --- | R046 | 1811865.730 | 483304.569 | 15.7 | 3.6 |
| Volusia | --- | R047 | 1810923.740 | 483745.010 | 15.7 | 3.6 |
| Volusia | --- | R048 | 1810023.362 | 484164.346 | 15.7 | 3.6 |
| Volusia | --- | R049 | 1809106.490 | 484519.380 | 15.7 | 3.6 |
| Volusia | --- | R050 | 1808245.225 | 484920.013 | 15.7 | 3.6 |
| Volusia | --- | R051 | 1807399.620 | 485271.460 | 15.6 | 3.6 |
| Volusia | --- | R052 | 1806503.140 | 485660.080 | 15.6 | 3.6 |
| Volusia | --- | R053 | 1805651.880 | 486030.300 | 15.6 | 3.6 |
| Volusia | --- | R054 | 1804737.123 | 486445.215 | 15.6 | 3.6 |
| Volusia | --- | R055 | 1803780.530 | 486826.280 | 15.6 | 3.6 |
| Volusia | --- | R056 | 1803023.530 | 487128.790 | 15.6 | 3.6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Volusia | --- | R057 | 1802170.310 | 487537.030 | 15.6 | 3.6 |
| Volusia | --- | R058 | 1801384.270 | 487860.710 | 15.5 | 3.6 |
| Volusia | --- | R059 | 1800352.838 | 488269.918 | 15.5 | 3.6 |
| Volusia | --- | R060 | 1799556.270 | 488644.290 | 15.5 | 3.6 |
| Volusia | --- | R061 | 1798733.106 | 488988.259 | 15.5 | 3.6 |
| Volusia | --- | R062 | 1797763.707 | 489423.581 | 15.5 | 3.6 |
| Volusia | --- | R063 | 1796886.110 | 489776.930 | 15.5 | 3.6 |
| Volusia | --- | R064 | 1796036.084 | 490179.210 | 15.5 | 3.6 |
| Volusia | --- | R065 | 1795152.030 | 490549.710 | 15.4 | 3.6 |
| Volusia | --- | R066 | 1794174.560 | 490978.910 | 15.4 | 3.6 |
| Volusia | --- | R067 | 1793370.595 | 491335.266 | 15.4 | 3.6 |
| Volusia | --- | R068 | 1792488.350 | 491712.650 | 15.4 | 3.6 |
| Volusia | --- | R069 | 1791620.260 | 492105.130 | 15.4 | 3.6 |
| Volusia | --- | R070 | 1790847.023 | 492443.079 | 15.4 | 3.6 |
| Volusia | --- | R071 | 1789971.647 | 492826.175 | 15.3 | 3.6 |
| Volusia | --- | R072 | 1789019.840 | 493207.320 | 15.3 | 3.6 |
| Volusia | --- | R073 | 1788145.171 | 493507.373 | 15.3 | 3.6 |
| Volusia | --- | R074 | 1787303.911 | 493865.055 | 15.3 | 3.6 |
| Volusia | --- | R075 | 1786577.890 | 494259.760 | 15.3 | 3.6 |
| Volusia | --- | R076 | 1785543.480 | 494699.108 | 15.3 | 3.6 |
| Volusia | --- | R077 | 1784689.027 | 495086.374 | 15.3 | 3.6 |
| Volusia | --- | R078 | 1783762.330 | 495467.840 | 15.2 | 3.6 |
| Volusia | --- | R079 | 1782821.130 | 495842.030 | 15.2 | 3.6 |
| Volusia | --- | R080 | 1781929.480 | 496287.990 | 15.2 | 3.6 |
| Volusia | --- | R081 | 1781046.980 | 496670.860 | 15.2 | 3.6 |
| Volusia | --- | R082 | 1780197.090 | 497081.020 | 15.2 | 3.6 |
| Volusia | --- | R083 | 1779343.670 | 497455.140 | 15.2 | 3.6 |
| Volusia | --- | R084 | 1778390.150 | 497874.293 | 15.2 | 3.6 |
| Volusia | --- | R085 | 1777589.170 | 498193.220 | 15.1 | 3.6 |
| Volusia | --- | R086 | 1776814.130 | 498511.170 | 15.1 | 3.6 |
| Volusia | --- | R087 | 1775906.200 | 498748.160 | 15.1 | 3.6 |
| Volusia | --- | R088 | 1774995.030 | 499245.130 | 15.1 | 3.6 |
| Volusia | --- | R089 | 1774093.210 | 499602.800 | 15.1 | 3.6 |
| Volusia | --- | R090 | 1773321.590 | 499931.010 | 15.1 | 3.6 |
| Volusia | --- | R091 | 1772441.313 | 500295.767 | 15.0 | 3.6 |
| Volusia | --- | R092 | 1771718.950 | 500610.980 | 15.0 | 3.6 |
| Volusia | --- | R093 | 1770886.300 | 500964.600 | 15.0 | 3.6 |
| Volusia | --- | R094 | 1769957.540 | 501374.020 | 15.0 | 3.6 |
| Volusia | --- | R095 | 1769064.740 | 501784.860 | 15.0 | 3.6 |
| Volusia | --- | R096 | 1768201.480 | 502183.480 | 15.0 | 3.6 |
| Volusia | --- | R097 | 1767384.010 | 502553.144 | 15.0 | 3.6 |
| Volusia | --- | R098 | 1766465.200 | 502974.730 | 14.9 | 3.6 |
| Volusia | --- | R099 | 1765622.700 | 503356.650 | 14.9 | 3.6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Volusia | --- | R100 | 1764763.683 | 503739.978 | 14.9 | 3.6 |
| Volusia | --- | R101 | 1763979.160 | 504077.240 | 14.9 | 3.6 |
| Volusia | --- | R102 | 1762973.720 | 504504.060 | 14.9 | 3.6 |
| Volusia | --- | R103 | 1762128.580 | 504909.460 | 14.9 | 3.6 |
| Volusia | --- | R105 | 1760263.670 | 505711.770 | 14.8 | 3.6 |
| Volusia | --- | R106 | 1759350.140 | 506095.300 | 14.8 | 3.6 |
| Volusia | --- | R107 | 1758534.292 | 506590.561 | 14.8 | 3.6 |
| Volusia | --- | R108 | 1757648.947 | 507008.784 | 14.8 | 3.6 |
| Volusia | --- | R109 | 1756760.168 | 507426.595 | 14.8 | 3.6 |
| Volusia | --- | R110 | 1755829.001 | 507870.605 | 14.8 | 3.6 |
| Volusia | --- | R111 | 1755063.981 | 508225.926 | 14.7 | 3.6 |
| Volusia | --- | R112 | 1754246.361 | 508606.791 | 14.7 | 3.6 |
| Volusia | --- | R113 | 1753396.230 | 508999.860 | 14.7 | 3.6 |
| Volusia | --- | R114 | 1752525.730 | 509412.460 | 14.7 | 3.6 |
| Volusia | --- | R115 | 1751221.630 | 510002.220 | 14.7 | 3.6 |
| Volusia | --- | R116 | 1750708.187 | 510283.383 | 14.7 | 3.6 |
| Volusia | --- | R117 | 1749905.236 | 510670.245 | 14.7 | 3.6 |
| Volusia | --- | R118 | 1748968.318 | 511101.249 | 14.6 | 3.6 |
| Volusia | --- | R119 | 1748261.694 | 511487.349 | 14.6 | 3.6 |
| Volusia | --- | R120 | 1747272.046 | 511945.929 | 14.6 | 3.6 |
| Volusia | --- | R121 | 1746499.210 | 512297.130 | 14.6 | 3.6 |
| Volusia | --- | R122 | 1745660.030 | 512684.850 | 14.6 | 3.6 |
| Volusia | --- | R123 | 1744888.190 | 513110.770 | 14.6 | 3.6 |
| Volusia | --- | R124 | 1743929.630 | 513533.320 | 14.6 | 3.6 |
| Volusia | --- | R125 | 1743065.590 | 514025.590 | 14.5 | 3.6 |
| Volusia | --- | R126 | 1742192.730 | 514423.240 | 14.5 | 3.6 |
| Volusia | --- | R127 | 1741398.000 | 514887.320 | 14.5 | 3.6 |
| Volusia | --- | R128 | 1740554.296 | 515355.787 | 14.5 | 3.6 |
| Volusia | --- | R129 | 1739732.170 | 515781.710 | 14.5 | 3.6 |
| Volusia | --- | R130 | 1738875.916 | 516248.214 | 14.5 | 3.6 |
| Volusia | --- | R131 | 1737964.550 | 516676.770 | 14.4 | 3.6 |
| Volusia | --- | R132 | 1737150.170 | 517207.330 | 14.4 | 3.6 |
| Volusia | --- | R133 | 1736295.860 | 517587.550 | 14.4 | 3.6 |
| Volusia | --- | R134 | 1735464.820 | 518062.990 | 14.4 | 3.6 |
| Volusia | --- | R135 | 1734660.870 | 518544.580 | 14.4 | 3.6 |
| Volusia | --- | R136 | 1733843.510 | 519029.860 | 14.4 | 3.6 |
| Volusia | --- | R137 | 1733021.640 | 519516.790 | 14.4 | 3.6 |
| Volusia | --- | R138 | 1732193.100 | 519907.166 | 14.3 | 3.6 |
| Volusia | --- | R139 | 1731416.990 | 520401.850 | 14.3 | 3.6 |
| Volusia | --- | R140 | 1730740.560 | 520844.730 | 14.3 | 3.6 |
| Volusia | --- | R141 | 1729947.500 | 521333.440 | 14.3 | 3.6 |
| Volusia | --- | R142 | 1729201.609 | 522098.382 | 14.3 | 3.6 |
| Volusia | --- | R143 | 1728530.548 | 522624.083 | 14.3 | 3.6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Volusia | --- | R144 | 1727681.500 | 523141.899 | 14.3 | 3.6 |
| Volusia | --- | R145 | 1726978.689 | 523668.331 | 14.2 | 3.6 |
| Volusia | --- | R154 | 1718858.830 | 529365.220 | 14.6 | 3.6 |
| Volusia | --- | R155 | 1717893.910 | 529679.900 | 14.6 | 3.6 |
| Volusia | --- | R156 | 1717002.320 | 530041.990 | 14.7 | 3.6 |
| Volusia | --- | R157 | 1716110.190 | 530322.020 | 14.7 | 3.6 |
| Volusia | --- | R158 | 1715248.240 | 530762.910 | 14.7 | 3.6 |
| Volusia | --- | R159 | 1714347.380 | 531136.210 | 14.7 | 3.6 |
| Volusia | --- | R160 | 1713466.420 | 531587.320 | 14.8 | 3.6 |
| Volusia | --- | R161 | 1712602.350 | 532013.820 | 14.8 | 3.6 |
| Volusia | --- | R162 | 1711779.420 | 532498.530 | 14.8 | 3.6 |
| Volusia | --- | R163 | 1710840.040 | 532863.790 | 14.9 | 3.6 |
| Volusia | --- | R164 | 1710033.000 | 533366.560 | 14.9 | 3.6 |
| Volusia | --- | R165 | 1709175.160 | 533806.120 | 14.9 | 3.6 |
| Volusia | --- | R166 | 1708209.050 | 534255.620 | 15.0 | 3.6 |
| Volusia | --- | R167 | 1707349.590 | 534719.750 | 15.0 | 3.6 |
| Volusia | --- | R168 | 1706617.800 | 535105.482 | 15.0 | 3.6 |
| Volusia | --- | R169 | 1705706.260 | 535466.270 | 15.1 | 3.6 |
| Volusia | --- | R170 | 1704817.500 | 535962.770 | 15.1 | 3.6 |
| Volusia | --- | R171 | 1703961.080 | 536355.110 | 15.1 | 3.6 |
| Volusia | --- | R173 | 1702371.650 | 537311.310 | 15.2 | 3.6 |
| Volusia | --- | R174 | 1701513.620 | 537782.260 | 15.2 | 3.6 |
| Volusia | --- | R175 | 1700686.410 | 538235.140 | 15.3 | 3.6 |
| Volusia | --- | R176 | 1699872.660 | 538764.930 | 15.3 | 3.6 |
| Volusia | --- | R177 | 1698980.110 | 539216.060 | 15.3 | 3.6 |
| Volusia | --- | R178 | 1698059.353 | 539772.551 | 15.4 | 3.6 |
| Volusia | --- | R179 | 1697379.004 | 540152.400 | 15.4 | 3.6 |
| Volusia | --- | R180 | 1696511.610 | 540544.850 | 15.4 | 3.6 |
| Volusia | --- | R181 | 1695734.740 | 541054.110 | 15.5 | 3.6 |
| Volusia | --- | R182 | 1694817.740 | 541482.140 | 15.5 | 3.6 |
| Volusia | --- | R183 | 1693996.820 | 541969.450 | 15.5 | 3.6 |
| Volusia | --- | R184 | 1693063.187 | 542556.846 | 15.6 | 3.6 |
| Volusia | --- | R185 | 1692373.420 | 542761.210 | 15.6 | 3.6 |
| Volusia | --- | R186 | 1691584.540 | 543195.070 | 15.6 | 3.6 |
| Volusia | --- | R187 | 1690734.170 | 543682.220 | 15.7 | 3.6 |
| Volusia | --- | R188 | 1689904.620 | 544167.950 | 15.7 | 3.6 |
| Volusia | --- | R189 | 1689238.271 | 544795.320 | 15.7 | 3.6 |
| Volusia | --- | R190 | 1688216.540 | 545007.330 | 15.7 | 3.6 |
| Volusia | --- | R191 | 1687897.193 | 545514.042 | 15.8 | 3.6 |
| Volusia | --- | R192 | 1686829.779 | 546210.122 | 15.8 | 3.6 |
| Volusia | --- | R193 | 1686034.673 | 546716.702 | 15.8 | 3.6 |
| Volusia | --- | R194 | 1685071.780 | 547040.970 | 15.9 | 3.6 |
| Volusia | --- | R195 | 1684422.540 | 547471.930 | 15.9 | 3.6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Volusia | --- | R196 | 1683612.490 | 548052.040 | 15.9 | 3.6 |
| Volusia | --- | R197 | 1682840.290 | 548593.720 | 16.0 | 3.6 |
| Volusia | --- | R198 | 1682010.670 | 549040.510 | 16.0 | 3.6 |
| Volusia | --- | R199 | 1681207.880 | 549534.750 | 16.0 | 3.6 |
| Volusia | --- | R200 | 1680358.820 | 550053.410 | 16.1 | 3.6 |
| Volusia | --- | R201 | 1679531.470 | 550578.250 | 16.1 | 3.6 |
| Volusia | --- | R202 | 1678754.307 | 551130.014 | 16.1 | 3.6 |
| Volusia | --- | R203 | 1678079.647 | 551557.404 | 16.2 | 3.6 |
| Volusia | --- | R204 | 1677122.830 | 552052.330 | 16.2 | 3.6 |
| Volusia | --- | R205 | 1676368.370 | 552496.990 | 16.2 | 3.6 |
| Volusia | --- | R206 | 1675481.600 | 553016.280 | 16.3 | 3.6 |
| Volusia | --- | R207 | 1674654.290 | 553501.680 | 16.3 | 3.6 |
| Volusia | --- | R208 | 1673834.760 | 553974.800 | 16.3 | 3.6 |
| Brevard | --- | R001 | 1480906.500 | 631108.500 | 14.0 | 5.1 |
| Brevard | --- | R002 | 1480068.000 | 631057.500 | 14.0 | 5.1 |
| Brevard | --- | R003 | 1479006.500 | 630673.000 | 14.0 | 5.1 |
| Brevard | --- | R004 | 1478079.352 | 630407.070 | 14.0 | 5.1 |
| Brevard | --- | R005 | 1477176.500 | 630103.000 | 14.0 | 5.1 |
| Brevard | --- | R006 | 1476239.011 | 629838.121 | 14.0 | 5.1 |
| Brevard | --- | R007 | 1475326.000 | 629521.000 | 14.1 | 5.1 |
| Brevard | --- | R008 | 1474446.500 | 629282.500 | 14.1 | 5.1 |
| Brevard | --- | R009 | 1473508.000 | 629167.500 | 14.1 | 5.1 |
| Brevard | --- | R010 | 1472601.000 | 628990.500 | 14.1 | 5.1 |
| Brevard | --- | R011 | 1471632.000 | 628742.000 | 14.1 | 5.1 |
| Brevard | --- | R012 | 1470688.500 | 628529.000 | 14.2 | 5.1 |
| Brevard | --- | R013 | 1469728.500 | 628336.000 | 14.2 | 5.1 |
| Brevard | --- | R014 | 1468813.000 | 628095.500 | 14.2 | 5.1 |
| Brevard | --- | R015 | 1467833.500 | 627926.500 | 14.2 | 5.1 |
| Brevard | --- | R016 | 1466824.620 | 627782.959 | 14.3 | 5.1 |
| Brevard | --- | R017 | 1465901.000 | 627541.500 | 14.3 | 5.1 |
| Brevard | --- | R018 | 1465084.500 | 627129.000 | 14.3 | 5.1 |
| Brevard | --- | R019 | 1464106.630 | 627235.720 | 14.3 | 5.1 |
| Brevard | --- | R020 | 1463144.000 | 626847.000 | 14.3 | 5.1 |
| Brevard | --- | R021 | 1462116.000 | 626727.500 | 14.4 | 5.1 |
| Brevard | --- | R022 | 1461282.750 | 626927.820 | 14.4 | 5.1 |
| Brevard | --- | R023 | 1460379.500 | 626548.730 | 14.4 | 5.1 |
| Brevard | --- | R024 | 1459350.500 | 626651.500 | 14.4 | 5.1 |
| Brevard | --- | R025 | 1458378.500 | 626611.500 | 14.4 | 5.1 |
| Brevard | --- | R026 | 1457357.000 | 626463.000 | 14.5 | 5.1 |
| Brevard | --- | R027 | 1456390.682 | 625915.045 | 14.5 | 5.1 |
| Brevard | --- | R028 | 1455434.500 | 626161.500 | 14.5 | 5.1 |
| Brevard | --- | R029 | 1454468.000 | 626204.500 | 14.5 | 5.1 |
| Brevard | --- | R030 | | | 14.6 | 5.1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Brevard | --- | R031 | 1452481.500 | 626068.500 | 14.6 | 5.1 |
| Brevard | --- | R032 | 1451490.000 | 626126.500 | 14.6 | 5.1 |
| Brevard | --- | R033 | 1450519.500 | 626070.000 | 14.6 | 5.1 |
| Brevard | --- | R034 | 1449714.000 | 625814.500 | 14.6 | 5.1 |
| Brevard | --- | R035 | 1448784.500 | 625792.500 | 14.7 | 5.1 |
| Brevard | --- | R036 | 1447874.000 | 625787.500 | 14.7 | 5.1 |
| Brevard | --- | R037 | 1447012.510 | 625969.070 | 14.7 | 5.1 |
| Brevard | --- | R038 | 1445927.500 | 625797.500 | 14.7 | 5.1 |
| Brevard | --- | R039 | 1444940.000 | 625847.000 | 14.7 | 5.1 |
| Brevard | --- | R040 | 1443979.000 | 625875.000 | 14.8 | 5.1 |
| Brevard | --- | R041 | 1443026.500 | 625906.500 | 14.8 | 5.1 |
| Brevard | --- | R042 | 1442028.500 | 625926.000 | 14.8 | 5.1 |
| Brevard | --- | R043 | 1441038.000 | 625963.500 | 14.8 | 5.1 |
| Brevard | --- | R044 | 1440092.950 | 626117.170 | 14.9 | 5.1 |
| Brevard | --- | R045 | 1439088.710 | 626201.770 | 14.9 | 5.1 |
| Brevard | --- | R046 | 1438129.500 | 626030.500 | 14.9 | 5.1 |
| Brevard | --- | R047 | 1437135.000 | 626144.000 | 14.9 | 5.1 |
| Brevard | --- | R048 | 1436195.000 | 626235.000 | 14.9 | 5.1 |
| Brevard | --- | R049 | 1435181.900 | 626459.530 | 15.0 | 5.1 |
| Brevard | --- | R050 | 1434017.500 | 626567.000 | 15.0 | 5.1 |
| Brevard | --- | R051 | 1433307.000 | 626467.000 | 15.0 | 5.1 |
| Brevard | --- | R052 | 1432348.000 | 626502.000 | 15.0 | 5.1 |
| Brevard | --- | R053 | 1431535.000 | 626564.000 | 15.0 | 5.1 |
| Brevard | From | R075 | 1410444.500 | 629438.500 | 15.3 | 3.7 |
| Brevard | To | R087 | 1399369.600 | 631539.120 | 15.3 | 3.7 |
| Brevard | From | R088 | 1398229.000 | 631603.000 | 15.4 | 3.7 |
| Brevard | To | R099 | 1388615.460 | 633981.750 | 15.4 | 3.7 |
| Brevard | From | R100 | 1387628.140 | 634212.060 | 15.5 | 3.7 |
| Brevard | To | R112 | 1376260.011 | 636673.542 | 15.5 | 3.7 |
| Brevard | From | R113 | 1375414.000 | 636902.000 | 15.6 | 3.7 |
| Brevard | To | R125 | 1364473.000 | 640358.000 | 15.6 | 3.7 |
| Brevard | From | R126 | 1363536.000 | 640734.500 | 15.7 | 3.7 |
| Brevard | To | R138 | 1352810.660 | 644741.601 | 15.7 | 3.7 |
| Brevard | From | R139 | 1351747.500 | 645011.000 | 15.8 | 3.7 |
| Brevard | To | R151 | 1341684.590 | 649473.462 | 15.8 | 3.7 |
| Brevard | From | R152 | 1340408.753 | 649944.348 | 15.9 | 3.7 |
| Brevard | To | R164 | 1330330.000 | 654410.500 | 15.9 | 3.7 |
| Brevard | From | R165 | 1329461.038 | 655000.369 | 16.0 | 3.7 |
| Brevard | To | R176 | 1319528.060 | 659620.760 | 16.0 | 3.7 |
| Brevard | From | R177 | 1318477.500 | 659781.000 | 16.1 | 3.7 |
| Brevard | To | R191 | 1306570.500 | 665926.500 | 16.1 | 3.7 |
| Brevard | From | R192 | 1305689.781 | 666399.491 | 16.2 | 3.7 |
| Brevard | To | R202 | 1296885.500 | 670848.500 | 16.2 | 3.7 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Brevard | From | R203 | 1295893.000 | 671352.000 | 16.3 | 3.7 |
| Brevard | To | R216 | 1285134.000 | 676798.500 | 16.3 | 3.7 |
| Indian River | From | R012 | 1271669.270 | 683379.880 | 15.7 | 3.0 |
| Indian River | To | R019 | 1265346.520 | 686255.900 | 15.7 | 3.0 |
| Indian River | From | R020 | 1264479.840 | 686661.520 | 15.8 | 3.0 |
| Indian River | To | R026 | 1258924.090 | 689204.330 | 15.8 | 3.0 |
| Indian River | From | R027 | 1258265.160 | 689580.770 | 15.9 | 3.0 |
| Indian River | To | R033 | 1253000.130 | 692260.670 | 15.9 | 3.0 |
| Indian River | From | R034 | 1252115.640 | 692632.470 | 16.0 | 3.0 |
| Indian River | To | R041 | 1245828.870 | 695532.800 | 16.0 | 3.0 |
| Indian River | From | R042 | 1244973.010 | 696042.690 | 16.1 | 3.0 |
| Indian River | To | R048 | 1239578.920 | 698513.140 | 16.1 | 3.0 |
| Indian River | From | R049 | 1238727.410 | 699061.630 | 16.2 | 3.0 |
| Indian River | To | R055 | 1232953.810 | 700850.630 | 16.2 | 3.0 |
| Indian River | From | R056 | 1232002.740 | 701138.540 | 16.3 | 3.0 |
| Indian River | To | R063 | 1225294.310 | 703197.770 | 16.3 | 3.0 |
| Indian River | From | R064 | 1223897.250 | 703596.250 | 16.4 | 3.0 |
| Indian River | To | R070 | 1218534.920 | 705444.120 | 16.4 | 3.0 |
| Indian River | From | R071 | 1217441.160 | 705624.440 | 16.5 | 3.0 |
| Indian River | To | R078 | 1210647.530 | 707523.030 | 16.5 | 3.0 |
| Indian River | From | R079 | 1209729.310 | 707706.400 | 16.6 | 3.0 |
| Indian River | To | R085 | 1203945.410 | 709169.860 | 16.6 | 3.0 |
| Indian River | --- | R086 | 1202900.150 | 709630.040 | 16.7 | 3.0 |
| Indian River | --- | R087 | 1202083.990 | 709769.640 | 16.7 | 3.0 |
| Indian River | --- | R088 | 1200980.040 | 709653.540 | 16.7 | 3.0 |
| Indian River | --- | R089 | 1200182.970 | 709704.770 | 15.4 | 3.0 |
| Indian River | --- | R090 | 1199262.090 | 709671.360 | 15.5 | 3.0 |
| Indian River | --- | R091 | 1198410.890 | 710149.930 | 15.5 | 3.0 |
| Indian River | --- | R092 | 1197362.770 | 710410.600 | 15.6 | 3.0 |
| Indian River | --- | R093 | 1196475.370 | 710816.180 | 15.7 | 3.0 |
| Indian River | --- | R094 | 1195468.060 | 711098.160 | 15.8 | 3.0 |
| Indian River | --- | R095 | 1194658.420 | 711598.700 | 15.8 | 3.0 |
| Indian River | --- | R096 | 1193733.890 | 711955.630 | 15.9 | 3.0 |
| Indian River | --- | R097 | 1192902.500 | 712574.380 | 16.0 | 3.0 |
| Indian River | --- | R098 | 1192133.860 | 712939.830 | 16.0 | 3.0 |
| Indian River | --- | R099 | 1191336.800 | 713753.550 | 16.1 | 3.0 |
| Indian River | --- | R100 | 1190340.030 | 714179.970 | 16.2 | 3.0 |
| Indian River | --- | R101 | 1189689.750 | 714952.750 | 16.3 | 3.0 |
| Indian River | --- | R102 | 1188768.150 | 715312.220 | 16.3 | 3.0 |
| Indian River | --- | R103 | 1187986.320 | 715737.200 | 16.4 | 3.0 |
| Indian River | --- | R104 | 1186989.110 | 716246.190 | 16.5 | 3.0 |
| Indian River | --- | R105 | 1186083.970 | 716438.500 | 16.5 | 3.0 |
| Indian River | --- | R106 | 1184888.320 | 716692.420 | 16.6 | 3.0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Indian River | --- | R107 | 1184107.240 | 716717.460 | 16.7 | 3.0 |
| Indian River | --- | R108 | 1183290.960 | 716902.520 | 16.8 | 3.0 |
| Indian River | --- | R109 | 1182396.190 | 717170.430 | 16.8 | 3.0 |
| Indian River | --- | R110 | 1181590.350 | 717510.010 | 16.9 | 3.0 |
| Indian River | --- | R111 | 1180521.110 | 717751.280 | 17.0 | 3.0 |
| Indian River | --- | R112 | 1179527.700 | 717807.320 | 17.0 | 3.0 |
| Indian River | --- | R113 | 1178397.390 | 718072.050 | 17.1 | 3.0 |
| Indian River | --- | R114 | 1177746.990 | 718300.560 | 17.6 | 3.0 |
| Indian River | --- | R115 | 1176423.000 | 718487.930 | 17.2 | 3.0 |
| Indian River | --- | R116 | 1175531.470 | 718656.630 | 17.3 | 3.0 |
| Indian River | --- | R117 | 1174623.750 | 718833.380 | 17.4 | 3.0 |
| Indian River | --- | R118 | 1173552.130 | 719206.880 | 17.5 | 3.0 |
| Indian River | --- | R119 | 1172653.000 | 719459.710 | 17.5 | 3.0 |
| St. Lucie | From | R001 | 1171765.000 | 719727.500 | 17.9 | 2.7 |
| St. Lucie | To | R049 | 1126483.000 | 734468.063 | 17.9 | 2.7 |
| St. Lucie | From | R050 | 1125514.000 | 734791.750 | 17.0 | 2.7 |
| St. Lucie | To | R115 | 1066338.000 | 759397.438 | 17.0 | 2.0 |
| Martin | From | R001 | 1065411.700 | 759813.930 | 16.5 | 5.1 |
| Martin | To | R042 | 1031889.050 | 774855.780 | 16.5 | 5.1 |
| Martin | From | R076 | 1002604.340 | 783825.500 | 16.3 | 5.1 |
| Martin | To | R082 | 997848.810 | 786291.490 | 16.3 | 5.1 |
| Martin | --- | R083 | No Monument | No Monument | 16.2 | 5.1 |
| Martin | --- | R122 | 964024.230 | 797940.010 | 16.1 | 5.1 |
| Martin | --- | R085 | 995324.670 | 787474.540 | 16.0 | 5.1 |
| Martin | --- | R086 | 994273.810 | 787768.430 | 15.9 | 5.1 |
| Martin | --- | R087 | 993678.460 | 787990.400 | 15.8 | 5.1 |
| Martin | --- | R088 | 992972.800 | 788377.640 | 15.7 | 5.1 |
| Martin | --- | R089 | 992058.770 | 788814.490 | 15.6 | 5.1 |
| Martin | --- | R090 | 991200.060 | 789259.760 | 15.5 | 5.1 |
| Martin | --- | R091 | 990426.180 | 789565.210 | 15.4 | 5.1 |
| Martin | --- | R092 | 989620.360 | 789937.320 | 15.3 | 5.1 |
| Martin | --- | R093 | 988795.130 | 790301.480 | 15.2 | 5.1 |
| Martin | --- | R094 | 987955.580 | 790616.370 | 15.1 | 5.1 |
| Martin | From | R095 | 987105.950 | 790919.780 | 15.0 | 5.1 |
| Martin | To | R122 | 964024.230 | 797940.010 | 15.0 | 5.1 |
| Martin | --- | R123 | 963193.120 | 798286.610 | 16.1 | 5.1 |
| Martin | --- | R124 | 962331.470 | 798602.780 | 16.2 | 5.1 |
| Martin | --- | R125 | 961533.650 | 798928.870 | 16.3 | 5.1 |
| Martin | --- | R126 | 960664.710 | 799131.810 | 16.2 | 5.1 |
| Martin | --- | R127 | 959776.430 | 799275.270 | 15.9 | 5.1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Palm Beach | --- | County Wide | --- | --- | 15.4 | 5.0 |
| Broward | --- | R001 | 723264.945 | 802830.123 | 16.0 | 5.6 |
| Broward | --- | R002 | 722313.673 | 802791.537 | 16.1 | 5.6 |
| Broward | --- | R003 | 721290.445 | 802729.729 | 16.1 | 5.6 |
| Broward | --- | R004 | 720281.094 | 802669.975 | 16.1 | 5.6 |
| Broward | --- | R005 | 719380.514 | 802663.106 | 16.2 | 5.6 |
| Broward | --- | R006 | 718346.336 | 802491.555 | 16.2 | 5.6 |
| Broward | --- | R007 | 717283.768 | 802438.629 | 16.3 | 5.6 |
| Broward | --- | R008 | 716404.034 | 802359.250 | 16.3 | 5.6 |
| Broward | --- | R009 | 715372.114 | 802159.429 | 16.4 | 5.6 |
| Broward | --- | R010 | 714363.707 | 802089.854 | 16.4 | 5.6 |
| Broward | --- | R011 | 713365.520 | 802029.080 | 16.4 | 5.6 |
| Broward | --- | R012 | 712371.051 | 802008.137 | 16.5 | 5.6 |
| Broward | --- | R013 | 711370.025 | 801911.483 | 16.5 | 5.6 |
| Broward | --- | R014 | 710355.534 | 801861.752 | 16.6 | 5.6 |
| Broward | --- | R015 | 709388.161 | 801760.516 | 16.6 | 5.6 |
| Broward | --- | R016 | 708381.879 | 801637.878 | 16.6 | 5.6 |
| Broward | --- | R017 | 707400.158 | 801608.908 | 16.7 | 5.6 |
| Broward | --- | R018 | 706394.165 | 801568.683 | 16.7 | 5.6 |
| Broward | --- | R019 | 705379.976 | 801511.209 | 16.8 | 5.6 |
| Broward | --- | R020 | 704369.228 | 801464.353 | 16.8 | 5.6 |
| Broward | --- | R021 | 703386.555 | 801399.806 | 16.9 | 5.6 |
| Broward | --- | R022 | 702011.402 | 801308.099 | 16.9 | 5.6 |
| Broward | --- | R023 | 701353.683 | 801281.344 | 16.9 | 5.6 |
| Broward | --- | R024 | 700760.040 | 801240.191 | 17.0 | 5.6 |
| Broward | --- | R025 | 700399.147 | 800669.539 | 17.0 | 5.6 |
| Broward | --- | R026 | 699645.447 | 800158.872 | 17.1 | 5.6 |
| Broward | --- | R027 | 698650.371 | 799975.154 | 17.1 | 5.6 |
| Broward | --- | R028 | 697614.706 | 799739.872 | 17.2 | 5.6 |
| Broward | --- | R029 | 696784.036 | 799561.652 | 17.2 | 5.6 |
| Broward | --- | R030 | 695793.653 | 799332.432 | 17.2 | 5.6 |
| Broward | --- | R031 | 694853.554 | 799095.545 | 17.3 | 5.6 |
| Broward | --- | R032 | 693679.858 | 798770.173 | 17.3 | 5.6 |
| Broward | --- | R033 | 692905.177 | 798643.645 | 17.4 | 5.6 |
| Broward | --- | R034 | 691869.990 | 798478.640 | 17.4 | 5.6 |
| Broward | --- | R035 | 690860.669 | 798398.665 | 17.4 | 5.6 |
| Broward | --- | R036 | 689716.136 | 798347.113 | 17.5 | 5.6 |
| Broward | --- | R037 | 688828.044 | 798295.955 | 17.5 | 5.6 |
| Broward | --- | R038 | 687886.061 | 798295.701 | 17.6 | 5.6 |
| Broward | --- | R039 | 686931.793 | 798242.430 | 17.6 | 5.6 |
| Broward | --- | R040 | 685901.197 | 798018.672 | 17.7 | 5.6 |
| Broward | --- | R041 | 685018.397 | 797921.772 | 17.7 | 5.6 |
| Broward | --- | R042 | 684032.049 | 797772.153 | 17.7 | 5.6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Broward | --- | R043 | 683019.391 | 797569.843 | 17.8 | 5.6 |
| Broward | --- | R044 | 682206.337 | 797415.227 | 17.8 | 5.6 |
| Broward | --- | R045 | 681056.033 | 797175.779 | 17.9 | 5.6 |
| Broward | --- | R046 | 680151.863 | 797150.191 | 17.9 | 5.6 |
| Broward | --- | R047 | 679496.785 | 796983.774 | 18.0 | 5.6 |
| Broward | --- | R048 | 678227.410 | 796832.627 | 18.0 | 5.6 |
| Broward | From | R049 | 677099.613 | 796734.350 | 19.1 | 5.6 |
| Broward | To | R066 | 660260.928 | 794646.654 | 19.1 | 5.6 |
| Broward | From | R067 | 659282.973 | 794486.288 | 16.9 | 5.6 |
| Broward | To | R084 | 641774.537 | 793364.665 | 16.9 | 5.6 |
| Broward | From | R086 | 639983.080 | 792583.244 | 19.0 | 5.6 |
| Broward | To | R128 | 597482.108 | 789511.966 | 19.0 | 5.6 |
| Dade | From | R001 | 597480.764 | 789512.467 | 18.2 | 6.8 |
| Dade | To | R050 | 545963.700 | 789523.040 | 18.2 | 6.8 |
| Dade | From | R053 | 542755.065 | 789248.715 | 20.4 | 3.2 |
| Dade | To | R113 | 485961.703 | 778137.044 | 20.4 | 3.2 |

*Collier R-090 to R-127A inserted May 2017 from "Addendum to 100-Year Storm Report - Adds Elevations for Keewaydin Island," FDEP (BSRC) March 4, 2003.

# Flood Resistant Provisions
# in the
# 7th Edition Florida Building Code (2020)

## A compilation prepared by the State Floodplain Management Office, Florida Division of Emergency Management.



Available online: https://www.floridadisaster.org/dem/mitigation/floodplain/ (Community Resources).

**CONTENTS:**



**Summary of Most Significant Changes from the 6th Ed. FBC**

1. FBC, Building.
   a. Modified ASCE 24, Section 9.6 Pools, to permit equipment for pools, spas and water features below the required elevation if elevated to the extent practical, anchored, and supplied by branch circuits with ground-fault circuit interrupter protection.
   b. Modified Section 2702.1.7 to clarify where new essential electrical systems generators are installed, and where new essential electrical system generators are installed, the systems and generators shall be located and installed in accordance with ASCE 24, and where connections for hookup of temporary generators are provided, the connections shall be located at or above the elevation required in ASCE 24.
2. FBC, Residential.
   a. Modified R322.1.6 Protection of mechanical, plumbing and electrical systems, Exception, to permit equipment for pools, spas and water features below the required elevation if elevated to the extent practical, anchored, and supplied by branch circuits with ground-fault circuit interrupter protection.
   b. New R322.3.4: Moves and clarifies requirements for concrete slabs in coastal high hazard areas (Zone V) and Coastal A Zones.
   c. New R322.3.7: Adds requirements for stairways and ramps in coastal high hazard areas (Zone V) and Coastal A Zones.
   d. New R322.3.8: Adds requirements for decks and porches in coastal high hazard areas (Zone V) and Coastal A Zones.

# 7th Edition Florida Building Code, Building (2020)

## CHAPTER 1 ADMINISTRATIVE
## SECTION 101 GENERAL

***Note:*** *In these Chapter 1 excerpts the flood provisions are identified by vertical black bars in the right margin.*

***Note:*** *Sections 101.2 and 102.2 are shown so that floodplain administrators who are not familiar with the code see which buildings are subject to the FBC, Building, FBC, Residential, and FBC, Existing Building, and which buildings and facilities are exempt. The NFIP requires all development to be regulated; buildings not subject to the FBC are still subject to floodplain requirements under local regulations.*

**[A] 101.2 Scope.** The provisions of this code shall apply to the construction, alteration, relocation, enlargement, replacement, repair, equipment, use and occupancy, location, maintenance, removal and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures.

**Exceptions:**

1. Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories above grade plane in height with a separate means of egress, and their accessory structures not more than three stories above grade plane in height, shall comply with the *Florida Building Code, Residential*.
2. Code requirements that address snow loads and earthquake protection are pervasive; they are left in place but shall not be utilized or enforced because Florida has no snow load or earthquake threat.

## SECTION 102 APPLICABILITY

**102.2 Building.** The provisions of the *Florida Building Code* shall apply to the construction, erection, alteration, modification, repair, equipment, use and occupancy, location, maintenance, removal and demolition of every public and private building, structure or facility or floating residential structure, or any appurtenances connected or attached to such buildings, structures or facilities. Additions, alterations, repairs and changes of use or occupancy group in all buildings and structures shall comply with the provisions provided in the *Florida Building Code, Existing Building*. The following buildings, structures and facilities are exempt from the *Florida Building Code* as provided by law, and any further exemptions shall be as determined by the legislature and provided by law:

(a) Building and structures specifically regulated and preempted by the federal government.
(b) Railroads and ancillary facilities associated with the railroad.
(c) Nonresidential farm buildings on farms.
(d) Temporary buildings or sheds used exclusively for construction purposes.
(e) Mobile or modular structures used as temporary offices, except that the provisions of Part II (Sections 553.501-553.513, *Florida Statutes*) relating to accessibility by persons with disabilities shall apply to such mobile or modular structures.
(f) Those structures or facilities of electric utilities, as defined in Section 366.02, *Florida Statutes*, which are directly involved in the generation, transmission, or distribution of electricity.
(g) Temporary sets, assemblies, or structures used in commercial motion picture or television production, or any sound-recording equipment used in such production, on or off the premises.
(h) Chickees constructed by the Miccosukee Tribe of Indians of Florida or the Seminole Tribe of Florida. As used in this paragraph, the term “chickee” means an open-sided wooden hut that has a thatched roof of palm or palmetto or other traditional materials, and that does not incorporate any electrical, plumbing, or other nonwood features.
(i) Family mausoleums not exceeding 250 square feet (23 $m^2$) in area which are prefabricated and assembled on site or preassembled and delivered on site and have walls, roofs, and a floor constructed of granite, marble, or reinforced concrete.

(j) Temporary housing provided by the Department of Corrections to any prisoner in the state correctional system.
(k) A building or structure having less than 1,000 square feet (93 $m^2$) which is constructed and owned by a natural person for hunting and which is repaired or reconstructed to the same dimension and condition as existed on January 1, 2011, if the building or structure:
1. Is not rented or leased or used as a principal residence;
2. Is not located within the 100-year floodplain according to the Federal Emergency Management Agency's current Flood Insurance Rate Map; and
3. Is not connected to an off-site electric power or water supply.

**102.2.5** Each enforcement district shall be governed by a board, the composition of which shall be determined by the affected localities. *[partial shown]*
2. However, the exemptions under subparagraph 1 do not apply to single-family residences that are located in mapped flood hazard areas, as defined in the code, unless the enforcement district or local enforcement agency has determined that the work, which is otherwise exempt, does not constitute a substantial improvement, including the repair of substantial damage, of such single-family residences.

**102.7 Relocation of manufactured buildings.**
(1) Relocation of an existing manufactured building does not constitute an alteration.
(2) A relocated building shall comply with wind speed requirements of the new location, using the appropriate wind speed map. If the existing building was manufactured in compliance with the Standard Building Code (prior to March 1, 2002), the wind speed map of the Standard Building Code shall be applicable. If the existing building was manufactured in compliance with the *Florida Building Code* (after March 1, 2002), the wind speed map of the *Florida Building Code* shall be applicable.
(3) A relocated building shall comply with the flood hazard area requirements of the new location, if applicable.

## SECTION 104 DUTIES AND POWERS OF BUILDING OFFICIAL

**[A] 104.2.1 Determination of substantially improved or substantially damaged existing buildings and structures in flood hazard areas.** Reserved.

**[A] 104.10.1 [Modifications] Flood hazard areas.** Reserved.

## SECTION 105 PERMITS

**[A] 105.1 [Permits] Required.** Any owner or owner's authorized agent who intends to construct, enlarge, alter, repair, move, demolish or change the occupancy of a building or structure, or to erect, install, enlarge, alter, repair, remove, convert or replace any impact-resistant coverings, electrical, gas, mechanical or plumbing system, the installation of which is regulated by this code, or to cause any such work to be performed, shall first make application to the building official and obtain the required permit.

**105.14 Permit issued on basis of an affidavit.** Whenever a permit is issued in reliance upon an affidavit or whenever the work to be covered by a permit involves installation under conditions which, in the opinion of the building official, are hazardous or complex, the building official shall require that the architect or engineer who signed the affidavit or prepared the drawings or computations shall supervise such work. In addition, they shall be responsible for conformity to the permit, provide copies of inspection reports as inspections are performed, and upon completion make and file with the building official written affidavit that the work has been done in conformity to the reviewed plans and with the structural provisions of the technical codes. In the event such architect or engineer is not available, the owner shall employ in his stead a competent person or agency whose qualifications are reviewed by the building official. The building official shall ensure that any person conducting plans review is qualified as a plans examiner under Part XII of Chapter 468, *Florida Statutes,* and that any person conducting inspections is qualified as a building inspector under Part XII of Chapter 468, *Florida Statutes.*
**Exception:** Permit issued on basis of an affidavit shall not extend to the flood load and flood resistance requirements of the *Florida Building Code*.

## SECTION 107 SUBMITTAL DOCUMENTS

**[A] 107.2.6 Site plan.** The construction documents submitted with the application for permit shall be accompanied by a site plan showing to scale the size and location of new construction and existing structures on the site, distances from lot lines, the established street grades and the proposed finished grades and, as applicable, flood hazard areas, floodways, and design flood elevations; and it shall be drawn in accordance with an accurate boundary line survey. In the case of demolition, the site plan shall show construction to be demolished and the location and size of existing structures and construction that are to remain on the site or plot. The building official is authorized to waive or modify the requirement for a site plan where the application for permit is for alteration or repair or where otherwise warranted.

**[A] 107.2.6.1 [Site Plan] Design flood elevations.** Where design flood elevations are not specified, they shall be established in accordance with Section 1612.3.1.

**107.3.5 [Examination of Documents] Minimum plan review criteria for buildings.** The examination of the documents by the building official shall include the following minimum criteria and documents: a floor plan; site plan; foundation plan; floor/roof framing plan or truss layout; all fenestration penetrations; flashing; and rough opening dimensions; and all exterior elevations:

**Commercial Buildings:** *[partial shown]*

**Building**

1. Site requirements:
   Flood hazard areas, flood zones, and design flood elevations
8. Structural requirements shall include:
   Flood requirements in accordance with Section 1612, including lowest floor elevations, enclosures, flood damage-resistant materials

**Electrical**

8. Design flood elevation

**Plumbing**

14. Design flood elevation

**Mechanical**

16. Design flood elevation

**Gas**

10. Design flood elevation

**Residential (one- and two-family):** *[partial shown]*

6. Structural requirements shall include:
   Flood hazard areas, flood zones, design flood elevations, lowest floor elevations, enclosures, equipment, and flood damage-resistant materials

**107.6 Affidavits.** The building official may accept a sworn affidavit from a registered architect or engineer stating that the plans submitted conform to the technical codes. For buildings and structures, the affidavit shall state that the plans conform to the laws as to egress, type of construction and general arrangement and, if accompanied by drawings, show the structural design and that the plans and design conform to the requirements of the technical codes as to strength, stresses, strains, loads and stability. The building official may without any examination or inspection accept such affidavit, provided the architect or engineer who made such affidavit agrees to submit to the building official copies of inspection reports as inspections are performed and upon completion of the structure, electrical, gas, mechanical or plumbing systems a certification that the structure, electrical, gas, mechanical or plumbing system has been erected in accordance with the requirements of the technical codes. Where the building official relies upon such affidavit, the architect or engineer shall assume full responsibility for compliance with all provisions of the technical codes and other pertinent laws or ordinances. The building official shall ensure that any person conducting plans review is qualified as a plans examiner under Part XII of Chapter 468, *Florida Statutes*, and that any person conducting inspections is qualified as a building inspector under Part XII of Chapter 468, *Florida Statutes*.

**107.6.1 [Affidavits] Building permits issued on the basis of an affidavit.** Pursuant to the requirements of federal regulation for participation in the National Flood Insurance Program (44 C.F.R. Parts 59 and 60), the authority granted to the building official to issue permits, to rely on inspections, and to accept plans and construction documents on the basis of affidavits and plans submitted pursuant to Sections 105.14 and 107.6, shall not extend to the flood load and flood-resistance construction requirements of the *Florida Building Code.*

## SECTION 110 INSPECTIONS

**[A] 110.3 Required inspections.** The building official upon notification from the permit holder or his or her agent shall make the following inspections, and shall either release that portion of the construction or shall notify the permit holder or his or her agent of any violations which must be corrected in order to comply with the technical codes. The building official shall determine the timing and sequencing of when inspections occur and what elements are inspected at each inspection.

**Building** *[partial shown]*

1. Foundation inspection. To be made after trenches are excavated and forms erected and shall at a minimum include the following building components:
   - ·Stem-wall
   - ·Monolithic slab-on-grade
   - ·Piling/pile caps
   - ·Footers/grade beams

   1.1. In flood hazard areas, upon placement of the lowest floor, including basement, and prior to further vertical construction, the elevation certification shall be submitted to the authority having jurisdiction.
6. Final inspection. To be made after the building is completed and ready for occupancy.
   6.1. In flood hazard areas, as part of the final inspection, a final certification of the lowest floor elevation shall be submitted to the authority having jurisdiction.

**[A] 110.3.3 [Required inspections] Lowest floor elevation.** Reserved.

**[A] 110.3.11.1 [Final inspection] Flood hazard documentation.** Reserved.

## SECTION 111 CERTIFICATE OF OCCUPANCY

**[A] 111.2 [Certificate of Occupancy] Certificate issued.** After the *building official* inspects the building or structure and does not find violations of the provisions of this code or other laws that are enforced by the department of building safety, the *building official* shall issue a certificate of occupancy that contains the following: *[partial shown]*

6. For buildings and structures in flood hazard areas, a statement that documentation of the as-built lowest floor elevation has been provided and is retained in the records of the authority having jurisdiction

## SECTION 117 VARIANCES IN FLOOD HAZARD AREAS

**117.1 Flood hazard areas.** Pursuant to section 553.73(5), *Florida Statutes*, the variance procedures adopted in the local floodplain management ordinance shall apply to requests submitted to the building official for variances to the provisions of Section 1612.4 of the *Florida Building Code, Building* or, as applicable, the provisions of R322 of the *Florida Building Code, Residential*. This section shall not apply to Section 3109 of the *Florida Building Code, Building.*

## CHAPTER 2 DEFINITIONS
## SECTION 202 DEFINITIONS

**[A] ADDITION.** An extension or increase in floor area, number of stories or height of a building or structure.

**[A] ALTERATION.** Any construction or renovation to an existing structure other than repair or addition.

**[BS] BASE FLOOD.** The flood having a 1-percent chance of being equaled or exceeded in any given year.

**[BS] BASE FLOOD ELEVATION.** The elevation of the base flood, including wave height, relative to the National Geodetic Vertical Datum (NGVD), North American Vertical Datum (NAVD) or other datum specified on the Flood Insurance Rate Map (FIRM).

**[BS] BASEMENT (for flood loads).** The portion of a building having its floor subgrade (below ground level) on all sides. This definition of "Basement" is limited in application to the provisions of Section 1612.

**BASEMENT.** A story that is not a story above grade plane (see "Story above grade plane"). This definition of "Basement" does not apply to the provisions of Section 1612 for flood loads.

**[BS] COASTAL A ZONE.** Area within a special flood hazard area, landward of a V zone or landward of an open coast without mapped coastal high hazard areas. In a coastal A zone, the principal source of flooding must be astronomical tides, storm surges, seiches or tsunamis, not riverine flooding. During the base flood conditions, the potential for breaking wave height shall be greater than or equal to 1 ½ feet (457 mm). The inland limit of the coastal A zone is (a) the Limit of Moderate Wave Action if delineated on a FIRM, or (b) designated by the authority having jurisdiction.

**[BS] COASTAL HIGH HAZARD AREA.** Area within the special flood hazard area extending from offshore to the inland limit of a primary dune along an open coast and any other area that is subject to high-velocity wave action from storms or seismic sources, and shown on a Flood Insurance Rate Map (FIRM) or other flood hazard map as velocity Zone V, VO, VE or V1-30.

**[BS] DESIGN FLOOD.** The flood associated with the greater of the following two areas:

1. Area with a flood plain subject to a 1-percent or greater chance of flooding in any year.
2. Area designated as a flood hazard area on a community's flood hazard map, or otherwise legally designated.

**[BS] DESIGN FLOOD ELEVATION.** The elevation of the "design flood," including wave height, relative to the datum specified on the community's legally designated flood hazard map. In areas designated as Zone AO, the design flood elevation shall be the elevation of the highest existing grade of the building's perimeter plus the depth number (in feet) specified on the flood hazard map. In areas designated as Zone AO where a depth number is not specified on the map, the depth number shall be taken as being equal to 2 feet (610 mm).

**[BS] DRY FLOODPROOFING.** A combination of design modifications that results in a building or structure, including the attendant utilities and equipment and sanitary facilities, being water tight with walls substantially impermeable to the passage of water and with structural components having the capacity to resist loads as identified in ASCE 7.

**EXISTING BUILDING.** A building erected prior to the date of adoption of the appropriate code, or one for which a legal building *permit* has been issued.

**[BS] EXISTING STRUCTURE.** A structure erected prior to the date of adoption of the appropriate code, or one for which a legal building permit has been issued.

**[BS] FLOOD or FLOODING.** A general and temporary condition of partial or complete inundation of normally dry land from:

1. The overflow of inland or tidal waters.
2. The unusual and rapid accumulation or runoff of surface waters from any source.

**[BS] FLOOD DAMAGE-RESISTANT MATERIALS.** Any construction material capable of withstanding direct and prolonged contact with floodwaters without sustaining any damage that requires more than cosmetic repair.

**[BS] FLOOD HAZARD AREA.** The greater of the following two areas:

1. The area within a flood plain subject to a 1-percent or greater chance of flooding in any year.
2. The area designated as a flood hazard area on a community's flood hazard map, or otherwise legally designated.

**[BS] FLOOD INSURANCE RATE MAP (FIRM).** An official map of a community on which the Federal Emergency Management Agency (FEMA) has delineated both the special flood hazard areas and the risk premium zones applicable to the community.

**[BS] FLOOD INSURANCE STUDY.** The official report provided by the Federal Emergency Management Agency containing the Flood Insurance Rate Map (FIRM), the Flood Boundary and Floodway Map (FBFM), the water surface elevation of the base flood and supporting technical data.

**[BS] FLOODWAY.** The channel of the river, creek or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

**HISTORIC BUILDINGS.** Buildings that are listed in or eligible for listing in the National Register of Historic Places, or designated as historic under an appropriate state or local law (see Chapter 12 of the *Florida Existing Building Code*).

**[BS] LIMIT OF MODERATE WAVE ACTION.** Line shown on FIRMs to indicate the inland limit of the 1 ½-foot (457 mm) breaking wave height during the base flood.

**LOCAL FLOODPLAIN MANAGEMENT ORDINANCE.** An ordinance or regulation adopted pursuant to the requirements in Title 44 Code of Federal Regulations, Parts 59 and 60 for participation in the National Flood Insurance Program.

**[BS] 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 Section 1612.

**[BS] SPECIAL FLOOD HAZARD AREA.** The land area subject to flood hazards and shown on a Flood Insurance Rate Map or other flood hazard map as Zone A, AE, A1-30, A99, AR, AO, AH, V, VO, VE, or V1-30.

**[BS] START OF CONSTRUCTION.** The date of issuance for new construction and substantial improvements to existing structures, provided the actual start of construction, repair, reconstruction, rehabilitation, addition, placement or other improvement is within 180 days after the date of issuance. The actual start of construction means the first placement of permanent construction of a building (including a manufactured home) on a site, such as the pouring of a slab or footings, installation of pilings or construction of columns.

Permanent construction does not include land preparation (such as clearing, excavation, grading or filling), the installation of streets or walkways, excavation for a basement, footings, piers or foundations, the erection of temporary forms or the installation of accessory buildings such as garages or sheds not occupied as dwelling units or not part of the main building. For a substantial improvement, the actual "start of construction" means the first alteration of any wall, ceiling, floor or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

**[BS] SUBSTANTIAL DAMAGE.** Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

**[BS] SUBSTANTIAL IMPROVEMENT.** Any repair, reconstruction, rehabilitation, alteration, addition or other improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the improvement or repair is started. If the structure has sustained substantial damage, any repairs are considered substantial improvement regardless of the actual repair work performed. The term does not, however, include either:

1. Any project for improvement of a building required to correct existing health, sanitary or safety code violations identified by the building official and that is the minimum necessary to assure safe living conditions.

2. Any alteration of a historic structure provided that the alteration will not preclude the structure's continued designation as a historic structure.

## CHAPTER 4 SPECIAL DETAILED REQUIREMENTS BASED ON USE AND OCCUPANCY

## SECTION 449 HOSPITALS

**449.4.2.2 Site standards.**

**449.4.2.2.1** Except as permitted by Section 1612 of this code, the lowest floor of all new facilities shall be elevated to the base flood elevation as defined in Section 1612 of this code, plus 2 feet, or to the height of hurricane Category 3 (Saffir-Simpson scale) surge inundation elevation, as described by the Sea, Lake, and Overland Surge (SLOSH) from Hurricanes model developed by the Federal Emergency Management Agency (FEMA), United States Army Corps of Engineers (USACE), and the National Weather Service (NWS), whichever is higher.

**449.4.2.2.2** For all existing facilities, the lowest floor elevations of all additions, and all patient support areas including food service, and all patient support utilities, including mechanical, and electrical (except fuel storage as noted in Section 449.4.2.9.3 of this code) for the additions shall be at or above the elevation of the existing building, if the existing building was designed and constructed to comply with either the site standards of Section 449.4 of this code or local flood-resistant requirements, in effect at the time of construction, whichever requires the higher elevation, unless otherwise permitted by Section 1612 of this code. If the existing building was constructed prior to the adoption of either the site standards of Section 449.4 of this code or local flood-resistant requirements, then the addition and all patient support areas and utilities for the addition as described in this section shall either be designed and constructed to meet the requirements of Section 449.4.2.2.1 of this code or be designed and constructed to meet the dry flood proofing requirements of Section 1612 of this code.

**449.4.2.2.3** Substantial improvement, as defined by Section 1612 of this code, to all existing facilities located within flood areas as defined in Section 1612 of this code or within a Category 3 surge inundation zone as described in Section 449.4.2.2.1 of this code, shall be designed and constructed in compliance with Section 1612 of this code.

**449.4.2.2.4** Where an off-site public access route is available to the new facility at or above the base flood elevation, a minimum of one on-site emergency access route shall be provided that is located at the same elevation as the public access route.

## SECTION 450 NURSING HOMES

**450.4 Physical plant requirements for disaster preparedness of new nursing home construction.**

**450.4.2.2 Site standards**

**450.4.2.2.1** Except as permitted by Section 1612 of this code, the lowest floor of all new facilities shall be elevated to the base flood elevation as defined in Section 1612 of this code, plus 2 feet (607 mm), or to the height of hurricane Category 3 (Saffir-Simpson scale) surge inundation elevation, as described by the Sea, Lake, and Overland Surge (SLOSH) from Hurricanes model developed by the Federal Emergency Management Agency (FEMA), United States Army Corps of Engineers (USACE), and the National Weather Service (NWS), whichever is higher.

**450.4.2.2.2** For all existing facilities, the lowest floor elevations of all additions, and all resident support areas including food service, and all resident support utilities, including mechanical, and electrical (except fuel storage as noted in Section 450.4.2.9.3 of this code) for the additions shall be at or above the elevation of the existing building, if the existing building was designed and constructed to comply with either the site standards of Section 450.4 of this code or local flood-resistant requirements in effect at the time of construction, whichever requires the higher elevation, unless otherwise permitted by Section 1612 of this code. If the existing building was constructed prior to the adoption of either the site standards of Section 450.4 of this code or local flood-resistant requirements, then the addition and all resident support areas and utilities for the addition as described in this section shall either be designed and constructed to meet the requirements of Section 450.4.2.2.1 of this code or be designed and constructed to meet the dry flood proofing requirements of Section 1612 of this code.

**450.4.2.2.3** Substantial improvement, as defined by Section 1612 of this code, to all existing facilities located within flood areas as defined in Section 1612 of this code or within a Category 3 surge inundation zone as described in Section 450.4.2.2.1 of this code, shall be designed and constructed in compliance with Section 1612 of this code.

**450.4.2.2.4** Where an off-site public access route is available to the new facility at or above the base flood elevation, a minimum of one on-site emergency access route shall be provided that is located at the same elevation as the public access route.

## SECTION 453 EDUCATIONAL FACILITIES

**453.4.2 Flood-resistant construction.** Educational facilities in flood hazard areas shall comply with ASCE 24.

**453.10.9 School site master plan.** New schools shall include, as applicable: facility design capacity; floodplain locations; covered accessible walks; infrastructure locations for, and extensions of, technology, telephone, electricity, fire alarm; and, where applicable, water and sewer utilities, and relocatables.

**453.25.2.1 Emergency access.** EHPAs shall have at least one route for emergency vehicle access. The emergency route shall be above the 100-year floodplain. This requirement may be waived by the board, with concurrence of the local emergency management agency or the DEM.

**453.27.5 Site standards/site plan.** Relocatables placed on educational plant sites shall comply with federal and state laws and rules relating to the placement of structures on sites, as well as building code, fire code site requirements.

> **453.27.5.1 Floodplain.** Compliance with floodplain standards is required for the initial and subsequent installation of public educational relocatable units. The finished floor shall be 12 inches (305 mm) above base flood elevation, the structure shall be designed to meet the Florida Building Code and anchored to resist buoyant forces.

## SECTION 454 SWIMMING POOLS AND BATHING PLACES (PUBLIC AND PRIVATE)

**454.1 Public swimming pools and bathing places.** Public swimming pools and bathing places shall comply with the design and construction standards of this section.
Exceptions:

1. A portable pool used exclusively for providing swimming lessons or related instruction in support of an established educational program sponsored or provided by a school district may not be regulated as a public pool. Such pool shall be regulated as a private swimming pool under Section 454.2.
2. A temporary pool may not be regulated as a public pool. Such pool shall be regulated as a private swimming pool under Section 454.2.

**454.1.1 Flood hazard areas.** Public swimming pools installed in flood hazard areas established in Section 612.3 shall comply with Section 1612.

**454.2.4.2 Items not covered.** For any items not specifically covered in these requirements, the administrative authority is hereby authorized to require that all equipment, materials, methods of construction and design features shall be proven to function adequately, effectively and without excessive maintenance and operational difficulties.

**454.2.4.2.1 Flood hazard areas.** Private swimming pools installed in flood hazard areas established in Section 1612.3 shall comply with Section 1612.

## CHAPTER 8 INTERIOR FINISHES

**801.5 [General] Applicability.** For buildings in flood hazard areas as established in Section 1612.3, interior finishes, trim and decorative materials below the elevation required by Section 1612 shall be flood-damage-resistant-materials.

## CHAPTER 12 INTERIOR ENVIRONMENT

**1203.4 [Ventilation] Under-floor ventilation.**
**1203.4.2 Exceptions.** The following are exceptions to Sections 1203.4 and 1203.4.1:

5. For buildings in flood hazard areas as established in Section 1612.3, the openings for under-floor ventilation shall be deemed as meeting the flood opening requirements of ASCE 24 provided that the ventilation openings are designed and installed in accordance with ASCE 24.

## CHAPTER 14 EXTERIOR WALLS

**[BS] 1403.6 [Performance Requirements] Flood resistance.** For buildings in flood hazard areas as established in Section 1612.3, exterior walls extending below the elevation required by Section 1612 shall be constructed with flood-damage-resistant materials.

**[BS] 1403.7 [Performance Requirements] Flood resistance for coastal high-hazard areas and coastal A zones.** For buildings in coastal high-hazard areas and coastal A zones as established in Section 1612.3, electrical, mechanical and plumbing system components shall not be mounted on or penetrate through exterior walls that are designed to break away under flood loads.

## CHAPTER 16 STRUCTURAL DESIGN

**1601.1 [General] Scope.** The provisions of this chapter shall govern the structural design of buildings, structures and portions thereof regulated by this code.

**Exception:** Buildings and structures located within the high-velocity hurricane zone shall comply with the provisions of Sections 1605, 1607, 1611, 1616 through 1626, and, as applicable in flood hazard areas, Section 1612.

## SECTION 1602 DEFINITIONS AND NOTATIONS

**NOTATIONS.**
$F_a$ = Flood load in accordance with Chapter 5 of ASCE 7.

## SECTION 1603 CONSTRUCTION DOCUMENTS

**1603.1.7 Flood design data.** For buildings located in whole or in part in flood hazard areas as established in Section 1612.3, the documentation pertaining to design, if required in Section 1612.5, shall be included and the following information, referenced to the datum on the community's Flood Insurance Rate Map (FIRM), shall be shown, regardless of whether flood loads govern the design of the building:

1. Flood design class assigned according to ASCE 24.
2. In flood hazard areas other than coastal high hazard areas or coastal A zones, the elevation of the proposed lowest floor, including the basement.
3. In flood hazard areas other than coastal high hazard areas or coastal A zones, the elevation to which any nonresidential building will be dry floodproofed.
4. In coastal high hazard areas and coastal A zones, the proposed elevation of the bottom of the lowest horizontal structural member of the lowest floor, including the basement.

## SECTION 1605 LOAD COMBINATIONS

**1605.2.1 [Load combinations using strength design or load and resistance factor design] Other loads.** Where flood loads, $F_a$, are to be considered in the design, the load combinations of Section 2.3.2 of ASCE 7 shall be used. Where self-straining loads, T, are considered in design, their structural effects in combination with other loads shall be determined in accordance with Section 2.3.4 of ASCE 7. Where an ice-sensitive structure is subjected to loads due to atmospheric icing, the load combinations of Section 2.3.3 of ASCE 7 shall be considered.

**1605.3.1.2 [Load combinations using allowable stress design] Other loads.** Where flood loads, $F_a$, are to be considered in design, the load combinations of Section 2.4.2 of ASCE 7 shall be used. Where self-straining loads, T, are considered in design, their structural effects in combination with other loads shall be determined in accordance with Section 2.4.4 of ASCE 7. Where an ice-sensitive structure is subjected to loads due to atmospheric icing, the load combinations of Section 2.4.3 of ASCE 7 shall be considered.

**1605.3.2.1 [Alternative basic load combinations] Other loads.** Where *F*, *H* or *T* are to be considered in the design, each applicable load shall be added to the combinations specified in Section 1605.3.2. Where self-straining loads, *T*, are considered in design, their structural effects in combination with other loads shall be determined in accordance with Section 2.4.4 of ASCE 7.

## SECTION 1612 FLOOD LOADS

**1612.1 General.** Within flood hazard areas as established in Section 1612.3, all new construction of buildings, structures and portions of buildings and structures, including substantial improvement and restoration of substantial damage to buildings and structures, shall be designed and constructed to resist the effects of flood hazards and flood loads. For buildings that are located in more than one flood hazard area, the provisions associated with the most restrictive flood hazard area shall apply.

**1612.1.1 Cross references.** See Table 1612.1.

**TABLE 1612.1**
**CROSS REFERENCES DEFINING FLOOD-RESISTANT PROVISIONS OF THE FLORIDA BUILDING CODE**

| Florida Building Code – Building | | | |
|---|---|---|---|
| Section | | Section | |
| Chapter 1 | Administration | Chapter 14 | Exterior Walls |
| 102 | Applicability | 1403 | Performance Requirements |
| 105 | Permits | | |
| 107 | Construction Documents | Chapter 16 | Structural Design |
| 110 | Inspections | 1601 | General |
| 111 | Certificates of Occupancy and Completion | 1603 | Construction Documents |
| 117 | Variances in Flood Hazard Areas | 1605 | Load Combinations |
| | | 1612 | Flood Loads |
| Chapter 2 | Definitions | | |
| 202 | Definitions | Chapter 18 | Soils and Foundations |
| | | 1804 | Excavation, Grading and Fill |
| Chapter 4 | Special Detailed Requirements Based on Use and Occupancy | 1805 | Dampproofing and Waterproofing |
| 449 | Hospitals | | |
| 450 | Nursing Homes | Chapter 27 | Electrical |
| 453 | Educational Facilities | 2702 | Emergency and Standby Power Systems |
| 454 | Swimming Pools and Bathing Places (Public And Private) | | |
| | | Chapter 30 | Elevators and Conveying Systems |
| Chapter 8 | Interior Finishes | 3001 | General |
| 801 | General | | |
| | | Chapter 31 | Special Construction |
| Chapter 12 | Interior Environment | 3102 | Membrane Structures |
| 1203 | Ventilation | 3109 | Coastal Construction Control Line |
| | | | |
| Florida Building Code – Residential | | | |
| Section | | Section | |
| Chapter 2 | Definitions | Chapter 20 | Boilers and Water Heaters |
| 202 | Definitions | M2001 | Boilers |
| | | | |
| Chapter 3 | Building Planning | Chapter 22 | Special Piping and Storage Systems |
| R301 | Design Criteria | M2201 | Oil Tanks |
| R309 | Garages and Carports | | |
| R322 | Flood-Resistant Construction | Chapter 24 | Fuel Gas |
| | | G2404 (301) | General |
| Chapter 4 | Foundations | | |
| R401 | General | Chapter 26 | General Plumbing Requirements |
| R404 | Foundation and Retaining Walls | P2601 | General |
| R408 | Under-Floor Space | | |
| | | Chapter 27 | Plumbing Fixtures |
| Chapter 13 | General Mechanical System Requirements | P2705 | Installation |
| M1301 | General | | |
| | | Chapter 30 | Sanitary Drainage |
| Chapter 14 | Heating and Cooling Equipment | P3001 | General |
| M1401 | General | | |
| | | Chapter 31 | Vents |
| Chapter 16 | Duct Systems | P3101 | Vent Systems |
| M1601 | Duct Construction | | |

*(continued)*

**TABLE 1612.1—continued**
**CROSS REFERENCES DEFINING FLOOD-RESISTANT PROVISIONS OF THE FLORIDA BUILDING CODE**

| Florida Building Code – Residential | | | |
|---|---|---|---|
| Section | | Section | |
| Chapter 17 | Combustion Air | Chapter 45 | Private Swimming Pools |
| M1701 | General | R4501 | General |
| | | | |
| **Florida Building Code – Existing Building** | | | |
| Section | | Section | |
| Chapter 2 | Definitions | Chapter 7 | Alterations – Level I |
| 202 | Definitions | 701 | General |
| | | | |
| Chapter 3 | Compliance Methods | Chapter 11 | Additions |
| 301.1 | General | 1103 | Structural |
| | | | |
| Chapter 4 | Repairs | Chapter 12 | Historic Buildings |
| 401 | General | 1201 | General |
| 406 | Structural | | |
| | | Chapter 13 | Relocated or Moved Buildings |
| Chapter 5 | Prescriptive Compliance Method | 1302 | Requirements |
| 502 | Additions | | |
| 503 | Alterations | Chapter 14 | Performance Compliance Methods |
| | | 1401 | General |
| | | | |
| **Florida Building Code – Mechanical** | | | |
| Section | | Section | |
| Chapter 3 | General Regulations | Chapter 6 | Duct Systems |
| M301 | General | M602 | Plenums |
| | | M603 | Duct Construction and Installation |
| Chapter 4 | Ventilation | | |
| M401 | General | Chapter 12 | Hydronic Piping |
| | | M1206 | Piping Installation |
| Chapter 5 | Exhaust Systems | | |
| M501 | General | Chapter 13 | Fuel Oil Piping and Storage |
| | | M1305 | Fuel Oil System Installation |
| | | | |
| **Florida Building Code – Plumbing** | | | |
| Section | | | |
| Chapter 3 | General Regulations | | |
| P309 | Flood Hazard Resistance | | |
| | | | |
| **Florida Building Code – Fuel Gas** | | | |
| Section | | | |
| Chapter 3 | General Regulations | | |
| FG301 | General | | |

**1612.2 Definitions.** The following terms are defined in Chapter 2:

**BASE FLOOD.**
**BASE FLOOD ELEVATION.**
**BASEMENT.**
**COASTAL A ZONE.**
**COASTAL HIGH HAZARD AREA.**
**DESIGN FLOOD.**
**DESIGN FLOOD ELEVATION.**
**DRY FLOODPROOFING.**
**EXISTING STRUCTURE.**
**FLOOD or FLOODING.**
**FLOOD DAMAGE-RESISTANT MATERIALS.**
**FLOOD HAZARD AREA.**
**FLOOD INSURANCE RATE MAP (FIRM).**
**FLOOD INSURANCE STUDY.**
**FLOODWAY.**
**LOWEST FLOOR.**
**SPECIAL FLOOD HAZARD AREA.**
**START OF CONSTRUCTION.**
**SUBSTANTIAL DAMAGE.**
**SUBSTANTIAL IMPROVEMENT.**

**1612.3 Establishment of flood hazard areas**. To establish *flood hazard areas*, the applicable governing authority shall, by local floodplain management ordinance, adopt a flood hazard map and supporting data. The flood hazard map shall include, at a minimum, areas of special flood hazard as identified by the Federal Emergency Management Agency.

**1612.3.1 Design flood elevations.** Where design flood elevations are not included in the flood hazard areas established in Section 1612.3, or where floodways are not designated, the building official is authorized to require the applicant to:

1. Obtain and reasonably utilize any design flood elevation and floodway data available from a federal, state, or other source; or
2. Determine the design flood elevation and/or floodway in accordance with accepted hydrologic and hydraulic engineering practices used to define special flood hazard areas. Determinations shall be undertaken by a registered design professional who shall document that the technical methods used reflect currently accepted engineering practice.

**1612.3.2 Determination of impacts.** In riverine flood hazard areas where design flood elevations are specified but floodways have not been designated, the applicant shall provide a floodway analysis that demonstrates that the proposed work will not increase the design flood elevation more than 1 foot (305 mm) at any point within the jurisdiction of the applicable governing authority.

**1612.4 Design and construction.** The design and construction of buildings and structures located in flood hazard areas, including coastal high hazard areas and Coastal A Zones, shall be in accordance with Chapter 5 of ASCE 7 and with ASCE 24.

**1612.4.1 Modification of ASCE 24.** Table 6-1 and Section 6.2.1 in ASCE 24 shall be modified as follows:

1. The title of Table 6.1 shall be “Minimum Elevation of Floodproofing, Relative to Base Flood Elevation (BFE) or Design Flood Elevation (DFE), in Coastal A Zones and in Other Flood Hazard Areas that are not High Risk Flood Hazard Areas.”
2. Section 6.2.1 shall be modified to permit dry floodproofing in Coastal A Zones, as follows: “Dry floodproofing of nonresidential structures and nonresidential areas of mixed-use structures shall not be allowed unless such structures are located outside of High Risk Flood Hazard areas and Coastal High Hazard Areas. Dry floodproofing shall be permitted in Coastal A Zones provided wave

loads and the potential for erosion and local scour are accounted for in the design. Dry floodproofing of residential structures or residential areas of mixed-use structures shall not be permitted."

**1612.4.2 Modification of ASCE 24 9.6 Pools.** Modify Section 9.6 of ASCE 24 by adding an exception as follows:

9.6 Pools. In-ground and above ground pools shall be designed to withstand all flood-related loads and load combinations. Mechanical equipment for pools such as pumps, heating systems, and filtering systems, and their associated electrical systems shall comply with Chapter 7.

**Exception:** Equipment for pools, spas and water features shall be permitted below the elevation required in Table 7-1 provided it is elevated to the extent practical, is anchored to prevent flotation and resist flood forces and is supplied by branch circuits that have ground-fault circuit interrupter protection.

**1612.5 Flood hazard documentation.** The following documentation shall be prepared and sealed by a registered design professional and submitted to the building official:

1. For construction in flood hazard areas other than coastal high hazard areas or coastal A zones:
   1.1. The elevation of the lowest floor, including the basement, as required by the lowest floor elevation inspection in Section 110.3, Building, 1.1 and for the final inspection in Section 110.3, Building, 5.1.
   1.2. For fully enclosed areas below the design flood elevation where provisions to allow for the automatic entry and exit of floodwaters do not meet the minimum requirements in Section 2.7.2.1 of ASCE 24, construction documents shall include a statement that the design will provide for equalization of hydrostatic flood forces in accordance with Section 2.7.2.2 of ASCE 24.
   1.3 For dry floodproofed nonresidential buildings, construction documents shall include a statement that the dry floodproofing is designed in accordance with ASCE 24.
2. For construction in coastal high hazard areas and coastal A zones:
   2.1. The elevation of the bottom of the lowest horizontal structural member as required by the lowest floor elevation inspection in Section 110.3, Building, 1.1 and for the final inspection in Section 110.3, Building, 5.1.
   2.2. Construction documents shall include a statement that the building is designed in accordance with ASCE 24, including that the pile or column foundation and building or structure to be attached thereto is designed to be anchored to resist flotation, collapse and lateral movement due to the effects of wind and flood loads acting simultaneously on all building components, and other load requirements of Chapter 16.
   2.3. For breakaway walls designed to have a resistance of more than 20 psf (0.96 $kN/m^2$) determined using allowable stress design, construction documents shall include a statement that the breakaway wall is designed in accordance with ASCE 24.

## CHAPTER 18 SOILS AND FOUNDATIONS

**1801.1 [General] Scope.** The provisions of this chapter shall apply to building and foundation systems.

**1804.4 [Excavation, Grading and Fill] Site grading.** The ground immediately adjacent to the foundation shall be sloped away from the building at a slope of not less than one unit vertical in 20 units horizontal (5-percent slope) for a minimum distance of 10 feet (3048 mm) measured perpendicular to the face of the wall. If physical obstructions or lot lines prohibit 10 feet (3048 mm) of horizontal distance, a 5-percent slope shall be provided to an approved alternative method of diverting water away from the foundation. Swales used for this purpose shall be sloped a minimum of 2 percent where located within 10 feet (3048 mm) of the building foundation. Impervious surfaces within 10 feet (3048 mm) of the building foundation shall be sloped a minimum of 2 percent away from the building, except as otherwise permitted in Section 1010.1.5, 1012.3 or 1012.6.1.

**Exception:** Where climatic or soil conditions warrant, the slope of the ground away from the building foundation shall be permitted to be reduced to not less than one unit vertical in 48 units horizontal (2-percent slope).

The procedure used to establish the final ground level adjacent to the foundation shall account for additional settlement of the backfill.

**1804.5 [Excavation, Grading and Fill] Grading and fill in flood hazard areas.** In flood hazard areas established in Section 1612.3, grading, fill, or both, shall not be approved:

1. Unless such fill is placed, compacted and sloped to minimize shifting, slumping and erosion during the rise and fall of flood water and, as applicable, wave action.
2. In floodways, unless it has been demonstrated through hydrologic and hydraulic analyses performed by a registered design professional in accordance with standard engineering practice that the proposed grading or fill, or both, will not result in any increase in flood levels during the occurrence of the design flood.
3. In coastal high hazard areas, unless such fill is conducted and/or placed to avoid diversion of water and waves toward any building or structure.
4. Where design flood elevations are specified but floodways have not been designated, unless it has been demonstrated that the cumulative effect of the proposed flood hazard area encroachment, when combined with all other existing and anticipated flood hazard area encroachment, will not increase the design flood elevation more than 1 foot (305 mm) at any point.

**1805.1.2.1 [Dampproofing and Waterproofing; Under-floor space] Flood hazard areas.** For buildings and structures in flood hazard areas as established in Section 1612.3, the finished ground level of an under-floor space such as a crawl space shall be equal to or higher than the outside finished ground level on at least one side.

**Exception:** Under-floor spaces of Group R-3 buildings that meet the requirements of FEMA TB 11.

## CHAPTER 27 ELECTRICAL

**[F] 2702.1.8 [Emergency and Standby Power Systems; Installation] Group I-2 Occupancies.** In Group I-2 occupancies located in flood hazard areas established in Section 1612.3, where new essential electrical systems generators are installed, and where new essential electrical system generators are installed, the systems and generators shall be located and installed in accordance with ASCE 24. Where connections for hookup of temporary generators are provided, the connections shall be located at or above the elevation required in ASCE 24.

## CHAPTER 30 ELEVATORS AND CONVEYING SYSTEMS

**3001.2 [General] Referenced standards.** Except as otherwise provided for in this code, the design, construction, installation, alteration, repair and maintenance of elevators and conveying systems and their components shall conform to the applicable standard specified in Table 3001.2 and ASCE 24 for construction in *flood hazard areas* established in Section 1612.3. The Division of Hotels and Restaurants may grant variances and waivers to the *Elevator Safety Code* as authorized by the *Safety Code for Elevators and Escalators* (ASME A17.1, Section 1.2) and *Florida Statutes* (Chapter 120 and Chapter 399.)

## CHAPTER 31 SPECIAL CONSTRUCTION

**3102.7 [Membrane Structures] Engineering design.** The structure shall be designed and constructed to sustain dead loads; loads due to tension or inflation; live loads including wind, snow or flood and seismic loads and in accordance with Chapter 16.

## SECTION 3109 STRUCTURES SEAWARD OF A COASTAL CONSTRUCTION CONTROL LINE

*This section revised and reorganized in the 6th Edition to more closely align with Section 1612.*

**3109.1 General.** The provisions of this section shall apply to the design and construction of *habitable structures,* and *substantial improvement* or repair of *substantial damage* of such structures, that are entirely seaward of, and portions of such structures that extend seaward of, the *coastal construction control line* or seaward of the *50-foot setback line*, whichever is applicable. This section does not apply to structures that are not *habitable structures*, as defined in this section. Section 1612 shall apply to *habitable structures* and structures that are not *habitable structures* if located in whole or in part in *special flood hazard areas* established in Section 1612.3.

**3109.1.1 Modification, maintenance or repair of existing *habitable structures*.** The requirements of Section 3109 do not apply to the modification, maintenance or repair of existing *habitable structures*, provided all of the following apply to the modification, maintenance, or repair:

1. Is within the limits of the existing foundation.
2. Does not require, involve or include any additions to, or repair or modification of, the existing foundation.
3. Does not include any additions or enclosures added, constructed, or installed below the lowest floor or deck.

**Advisory Note.** If the modification or repair is determined to be *substantial improvement* or *substantial damage*, and if the building is located in a *special flood hazard area* (Zone A and Zone V) established in Section 1612.3, the requirements of *Florida Building Code, Existing Building* applicable to *flood hazard areas* shall apply.

**3109.1.2 Approval prior to construction.** An environmental permit from the Florida Department of Environmental Protection is required prior to the start of construction. When issued, a copy of the environmental permit shall be submitted to the building official. The environmental permit may impose special siting considerations to protect the beach-dune system, proposed or existing structures, and public beach access, and may condition the nature, timing and sequence of construction of permitted activities to provide protection to nesting sea turtles and hatchlings and their habitat, including submittal and approval of lighting plans.

**3109.1.3 Elevation certification.** As part of the permit process, upon placement of the *lowest horizontal structural member* of the *lowest floor* and prior to further vertical construction, certification of the elevation of the bottom of the *lowest horizontal structural member* of the *lowest floor* shall be submitted to the building official. Any work undertaken prior to submission of the certification or subsequent to submission and prior to the building official's review shall be at the applicant's risk.

**3109.2 Definitions.** The following words and terms shall, for the purposes of this section, have the indicated meanings shown herein.

**ALLOWED USE.** For the purpose of Section 3109.3.4, use of enclosures above, or with *dry floodproofing* to, the elevation specified in ASCE 24 and below the *100-year storm elevation,* includes, but is not limited to use for parking of vehicles, storage, building access, small mechanical and electrical rooms, retail shops, commercial pool bars and other bars, snack bars, commercial grills with portable cooking equipment, commercial dining areas where the permanent kitchen is located landward of the *coastal construction control line* or above the *100-year storm elevation*, toilet rooms and bathrooms, cabanas, recreational spaces such as gyms and card rooms, commercial service/storage/back-of-house facilities; and uses of a similar nature that are not spaces for living, sleeping or cooking.

**COASTAL A ZONE.** See Section 202.

**COASTAL CONSTRUCTION CONTROL LINE.** The line established by the State of Florida pursuant to Section 161.053, *Florida Statutes*, and recorded in the official records of the respective county and which defines that portion of the beach-dune system subject to severe fluctuations based on a 100-year storm surge, storm waves or other predictable weather conditions.

**COASTAL HIGH HAZARD AREA.** See Section 202.

**COMBINED TOTAL STORM TIDE ELEVATION (VALUE).** The elevation of combined total tides including storm surges, astronomical tide and dynamic wave setup which occurs primarily inside the wave breaking zone. The *combined total storm tide elevations (values)* for various return periods are determined by the Florida Department of Environmental Protection for each coastal county with an established *coastal construction control lines* and published in reports for each county titled "Revised Combined Total Storm Tide Frequency Analysis."

**DESIGN GRADE.** The predicted eroded grade, accounting for erosion and localized scour resulting from the presence of structural components, used in the calculation of flood loads, pile reactions and bearing capacities. The design grade shall be determined by a site-specific analysis prepared by a qualified registered design professional or the design grade may be determined by the Florida Department of Environmental Protection in the report titled "One-Hundred-Year Storm Elevation Requirements for Habitable Structures Located Seaward of a Coastal Construction Control Line" (1999).

**DRY FLOODPROOFING.** See Section 202.

**FIFTY-FOOT SETBACK LINE.** A line of jurisdiction, established pursuant to the provisions of Section 161.052, *Florida Statutes*, in which construction is prohibited within 50 feet (15.13 m) of the line of mean high water at any riparian coastal location fronting the Gulf of Mexico or the Atlantic coast shoreline.

**FLOOD HAZARD AREA.** See Section 202.

**HABITABLE STRUCTURE.** Structures designed primarily for human occupancy. Typically included within this category are residences, hotels and restaurants.

**LOW-RISE BUILDING.** A structure with mean roof height less than or equal to 60 feet.

**LOWEST FLOOR.** For the purpose of Section 3109, the *lowest floor* of the lowest enclosed area, excluding any enclosure that complies with the requirements and limitations of Section 3109.3.4 applicable to enclosures below the flood elevation.

**LOWEST HORIZONTAL STRUCTURAL MEMBER.** A horizontal structural member that supports floor, wall or column loads and transmits the loads to the foundation.

**100-YEAR STORM ELEVATION.** The height of the breaking wave crest or wave approach as superimposed on the storm surge with dynamic wave setup of a 100-year (one-percent-annual chance) storm. The 100-year storm elevation is determined by the Florida Department of Environmental Protection based on studies published as part of the Coastal Construction Control Line establishment process and an analysis of topographic and other site specific data and found in the report "One-Hundred-Year Storm Elevation Requirements for Habitable Structures Located Seaward of a Coastal Construction Control Line" (1999). An applicant may request the Department of Environmental Protection to determine a site-specific *100-year storm elevation* for the location of the applicant's proposed structure as part of the environmental permit application process.

**SPECIAL FLOOD HAZARD AREA.** See Section 202.

**SUBSTANTIAL DAMAGE.** See Section 202.

**SUBSTANTIAL IMPROVEMENT.** See Section 202.

**3109.3 Design and construction.** The design and construction of *habitable structures*, including *substantial improvement* and repair of *substantial damage* to such structures, shall be in accordance with this section and with Section 1612 and ASCE 24, as applicable. *Habitable structures* subject to this section shall be designed to minimize the potential for wind and water-borne debris during storms.

**Exception:** Additions, repairs, and alterations that, when combined with all other work on a structure, do not constitute *substantial improvement* or repair of *substantial damage*, and provided all of the following apply:

a. The work does not violate the terms of previously issued permits.

b. Any addition does not advance the seaward limits of the existing structure.

**3109.3.1 Flood loads.** Flood loads shall be determined according to Chapter 5 of ASCE 7, where the stillwater depth shall be the difference between the *design grade* at the location and the higher of:

1. The stillwater elevation specified in the applicable Flood Insurance Study referenced to the datum on the Flood Insurance Rate Map, if the structure is also in a *coastal high hazard area* (Zone V); or

2. The *combined total storm tide elevation (value*) for the 100-year return period identified by the Florida Department of Environmental Protection in reports titled “Revised Combined Total Storm Tide Frequency Analysis” prepared for each county with an established *coastal construction control lines*.

**3109.3.2 Foundations.** *Habitable structures* shall be elevated and supported on piles or columns that are designed to comply with this section. The space below elevated *habitable structures* shall be free of obstructions and walls, if any, shall comply with Section 3109.3.4. Foundations shall be designed to comply with ASCE 24 Section 4.5, except shallow foundations and stemwalls are not permitted.

**3109.3.2.1 Piles and columns.** In addition to the requirements of ASCE 24 Section 4.5 for pile and columns foundations:

1. The design ratio or pile spacing to pile diameter, or column spacing to column diameter, shall be not less than 8:1 for individual piles or columns extending above the *design grade*, unless justified by a geotechnical analysis and the foundation design.

2. The tops of grade beams and pile caps shall be at or below the natural grade and below the *design grade* unless designed to resist increased flood loads associated with setting the grade beam or pile cap above the *design grade*.

3. Pile penetration shall take into consideration the anticipated loss of soil above the *design grade*.

**3109.3.2.2 Shear walls.** Shear walls shall comply with one of the following:

1. Shear walls are permitted perpendicular to the shoreline where perpendicular shall mean less than or equal to ±20 degrees from a line drawn normal to the shoreline.

2. Shear walls not perpendicular to the shoreline shall be limited to a maximum of 20 percent of the building length in the direction running parallel to the shore, and wall segments, spacing between wall segments, and elevator shafts shall be located and positioned to allow floodwater to flow easily around the walls and elevator shafts.

**Exception:** *Habitable structures* other than *low-rise buildings* are permitted to have shear walls that are not perpendicular to the shoreline and that exceed 20 percent of the total building length provided the design requires a length greater than 20 percent, wall segments, spacing between wall segments, and elevator shafts are located and positioned to allow floodwater to flow easily around the walls and elevator shafts, and the following design documentation is submitted:

a. A hydraulic analysis conducted and certified by a Florida-registered professional engineer qualified to evaluate the potential impact of flow increase on the subject parcel and adjacent properties and demonstrates the increased shear wall length will not result in substantial

increase of flow velocities and drag forces on the structural components of the proposed structure and neighboring structures.
b. The certified design documentation shall include a statement that the increased length of shear walls over 20 percent of total building length is located landward of the predicted 100-year storm erosion limit.

**3109.3.3 Elevation standards**. The bottom of the *lowest horizontal structural member* of the *lowest floor* shall be at or above the higher of the following:

1. The elevation specified in ASCE 24 Chapter 4 if the structure is in a *coastal high hazard area* or *Coastal A Zone*;
2. The elevation specified by the jurisdiction; or
3. The 100-year storm elevation determined by the Florida Department of Environmental Protection in the report titled "One-Hundred-Year Storm Elevation Requirements for Habitable Structures Located Seaward of a Coastal Construction Control Line" (1999). An applicant may request determination of a site-specific *100-year storm elevation* (see definition).

**3109.3.4 Walls and enclosures below the flood elevation.** Walls and enclosures below the elevation required by Section 3109.3.3 and above the *design grade* elevation shall comply with all of the following, as applicable:

1. Walls seaward of the CCCL shall comply with the breakaway wall requirements of ASCE 24 Section 4.6 using the lesser of the flood loads specified by Section 3109.3.1.
2. Elevator shafts and stairways shall comply with ASCE 24.
3. For nonresidential buildings located outside of a *coastal high hazard area* (Zone V): a. Small mechanical and electrical rooms with *dry floodproofing* to the elevation specified in ASCE 24 or by the jurisdiction are not required to be breakaway. b. Stairwells are not required to be breakaway provided the walls have flood openings in accordance with this section.
4. In *special flood hazard areas* (Zone V and Zone A), all breakaway walls below the elevation specified in ASCE 24 or the elevation specified by the jurisdiction shall have flood openings in accordance with ASCE 24 Section 4.6.2. Flood openings are not required in: a. Shear walls designed in accordance with Section 3109.3.2.2. b. Walls of enclosures below buildings not located in *special flood hazard areas* (Zone X). c. Walls that are designed and constructed in conformance with the *dry floodproofing* requirements of ASCE 24 in areas other than *coastal high hazard areas*.
5. In *special flood hazard areas* (Zone V and Zone A): a. Enclosures below the elevation specified in ASCE 24 or the elevation specified by the jurisdiction shall be used solely for parking of vehicles, building access, or storage unless enclosures are designed and constructed in accordance with the *dry floodproofing* requirements of ASCE 24. b. Enclosures above the elevation specified in ASCE 24 or by the jurisdiction and below the *100-year storm elevation*, or enclosures with *dry floodproofing* to the elevation specified in ASCE 24 or by the jurisdiction, shall be limited to *allowed use* as defined in this section.
6. In *habitable structures* not located in *special flood hazard areas* (Zone X), uses of enclosures below the *100-year storm elevation* shall be limited to *allowed use* as defined in this section.

**3109.3.5 Structural slabs below the 100-year storm elevation.** Structural slabs below the *100-year storm elevation* and below the *lowest floor* are not required to be breakaway provided the slabs are designed by a qualified Florida-registered professional engineer to withstand the flood loads specified by Section 3109.3.1.

**3109.4 Documentation.** In addition to documentation specified in Section 1612.5, where applicable the following documentation shall be prepared, signed, and sealed by a qualified Florida-registered professional engineer and submitted to the building official:

1. For site-specific determination of *design grade*, a report of the assumptions and methods used.
2. For shear walls, the certifications required in Section 3109.3.2.

## CHAPTER 35 REFERENCED STANDARDS

| Standard Reference Number | Title | Referenced in Code Section Number |
|---|---|---|
| ASCE/SEI 24-14 | Flood Resistant Design and Construction | 453.4.2, 1203.4.2, 1612.4, 1612.4.1, 1612.5, 2702.1.7, 3001.2, 3109.3, 3109.3.2.1, 3109.3.4 |
| FEMA-TB-11-01 | Crawlspace Construction for Buildings Located in Special Flood Hazard Areas | 1805.1.2.1 |

# 7th Edition Florida Building Code, Residential (2020)

## CHAPTER 1 SCOPE AND ADMINISTRATION
## SECTION R101 GENERAL

**R101.2 Scope.** The provisions of the *Florida Building Code, Residential,* shall apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, removal and demolition of detached one– and two–family dwellings and townhouses not more than three stories above grade plane in height with a separate means of egress and their accessory structures not more than three stories above *grade plane* in height.

**Exceptions:**

3. Existing buildings undergoing repair, alteration, additions, or change of occupancy shall comply with the *Florida Building Code, Existing Building.*

**R101.2.1** The provisions of Chapter 1, *Florida Building Code, Building,* shall govern the administration and enforcement of the *Florida Building Code, Residential.*

## CHAPTER 2 DEFINITIONS

**[RB] HABITABLE SPACE.** A space in a building for living, sleeping, eating or cooking. Bathrooms, toilet rooms, closets, halls, screen enclosures, sunroom categories as defined at Section R301.2.1.1.1, storage or utility spaces and similar areas are not considered *habitable spaces*. [*Note: this definition shown to clarify that some spaces that are not habitable spaces are not permitted below elevated buildings in SFHAs*.]

**[RB] LIVE LOADS.** Those loads produced by the use and occupancy of the building or other structure and do not include construction or environmental loads such as wind load, snow load, rain load, earthquake load, flood load or dead load.

**LOCAL FLOODPLAIN MANAGEMENT ORDINANCE.** An ordinance or regulation adopted pursuant to the authority granted to local governments by Title 44 Code of Federal Regulations, Sections 59 and 60 for participation in the National Flood Insurance Program.

## CHAPTER 3 BUILDING PLANNING

## SECTION R301 DESIGN CRITERIA

**R301.1 Application.** Buildings and structures, and parts thereof, shall be constructed to safely support all loads, including dead loads, live loads, roof loads, flood loads, snow loads, wind loads and seismic loads as prescribed by this code. The construction of buildings and structures in accordance with the provisions of this code shall result in a system that provides a complete load path that meets the requirements for the transfer of loads from their point of origin through the load-resisting elements to the foundation. Buildings and structures constructed as prescribed by this code are deemed to comply with the requirements of this section.

**Exception**: Buildings and structures located within the High Velocity Hurricane Zone shall comply with Sections R302 to R327, inclusive and the provisions of Chapter 44, Sections R301.2.5 and R406. In addition, buildings and structures located in flood hazard areas established in Table R301.2(1) shall comply with Sections R301.2.4, R301.2.5 and R322.

**R301.2 Climatic and geographic design criteria.** Buildings shall be constructed in accordance with the provisions of this code as limited by the provisions of this section. Additional criteria shall be set forth in Table R301.2(1).

## TABLE R301.2(1) CLIMATIC AND GEOGRAPHIC DESIGN CRITERIA

| GROUND SNOW LOAD | WIND DESIGN | | | | SEISMIC DESIGN CATEGORY[f] | SUBJECT TO DAMAGE FROM | | | WINTER DESIGN TEMP[e] | ICE BARRIER UNDERLAYMENT REQUIRED[h] | FLOOD HAZARDS[g] | AIR FREEZING INDEX[i] | MEAN ANNUAL TEMP[j] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Speed[d] (mph) | Topographic effects[k] | Special wind region[l] | Wind-borne debris zone[m] | | Weathering[a] | Frost line depth[b] | Termite[c] | | | | | |
| NA | See Fig. R301.2(4) | | | | NA | Negligible | NA | Very Heavy | | NA | | NA | NA |

g. The applicable governing body shall, by local floodplain management ordinance, specify (a) the date of the jurisdiction's entry into the National Flood Insurance Program (date of adoption of the first code or ordinance for management of flood hazard areas), (b) the date(s) of the Flood Insurance Study and (c) the panel numbers and dates of the currently effective FIRMs and FBFMs, or other flood hazard map adopted by the authority having jurisdiction, as amended.

**R301.2.4 Floodplain construction.** Buildings and structures constructed in whole or in part in flood hazard areas (including A or V Zones) as established in Table R301.2(1), and substantial improvement and repair of substantial damage of buildings and structures in flood hazard areas, shall be designed and constructed in accordance with Section R322. Buildings and structures that are located in more than one flood hazard area shall comply with the provisions associated with the most restrictive flood hazard area. Buildings and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.

**R301.2.4.1 Alternative provisions.** As an alternative to the requirements in Section R322, ASCE 24 is permitted subject to the limitations of this code and the limitations therein.

**R301.2.5 Structures seaward of a coastal construction control line.** Structures located seaward of the coastal construction control line shall be designed to resist the predicted forces of a 100-year storm event in accordance with Section 3109 of the *Florida Building Code, Building*.

## SECTION R309 GARAGES AND CARPORTS

**R309.3 Flood hazard areas.** For buildings located in flood hazard areas as established by Table R301.2(1), garage floors shall be:

1. Elevated to or above the design flood elevation as determined in Section R322; or
2. Located below the design flood elevation provided that the floors are at or above grade on not less than one side, are used solely for parking, building access or storage, meet the requirements of Section R322 and are otherwise constructed in accordance with this code.

## SECTION R322 FLOOD-RESISTANT CONSTRUCTION

**R322.1 General.** Buildings and structures constructed in whole or in part in flood hazard areas, including A or V Zones and Coastal A Zones, as established in Table R301.2(1), and substantial improvement and repair of substantial damage of buildings and structures in flood hazard areas, shall be designed and constructed in accordance with the provisions contained in this section. Buildings and structures that are located in more than one flood hazard area shall comply with the provisions associated with the most restrictive flood hazard area. Buildings and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.

**R322.1.1 Alternative provisions.** As an alternative to the requirements in Section R322 ASCE 24 is permitted subject to the limitations of this code and the limitations therein.

**R322.1.2 Structural systems.** Structural systems of buildings and structures shall be designed, connected and anchored to resist flotation, collapse or permanent lateral movement due to structural loads and stresses from flooding equal to the design flood elevation.

**R322.1.3 Flood-resistant construction.** Buildings and structures erected in areas prone to flooding shall be constructed by methods and practices that minimize flood damage.

**R322.1.4 Establishing the design flood elevation.** The design flood elevation shall be used to define flood hazard areas. At a minimum, the design flood elevation shall be the higher of the following:

1. The base flood elevation at the depth of peak elevation of flooding, including wave height, that has a 1 percent (100-year flood) or greater chance of being equaled or exceeded in any given year; or
2. The elevation of the design flood associated with the area designated on a flood hazard map adopted by the community, or otherwise legally designated.

**R322.1.4.1 Determination of design flood elevations.** If design flood elevations are not specified, the building official is authorized to require the applicant to comply with either of the following:

1. Obtain and reasonably use data available from a federal, state or other source; or
2. Determine the design flood elevation in accordance with accepted hydrologic and hydraulic engineering practices used to define special flood hazard areas. Determinations shall be undertaken by a registered design professional who shall document that the technical methods used reflect currently accepted engineering practice. Studies, analyses and computations shall be submitted in sufficient detail to allow thorough review and approval.

**R322.1.4.2 Determination of impacts.** In riverine flood hazard areas where design flood elevations are specified but floodways have not been designated, the applicant shall demonstrate that the effect of the proposed buildings and structures on design flood elevations, including fill, when combined with other existing and anticipated flood hazard area encroachments, will not increase the design flood elevation more than 1 foot (305 mm) at any point within the jurisdiction.

**R322.1.5 Lowest floor.** The lowest floor shall be the lowest floor of the lowest enclosed area, including basement, and excluding any unfinished flood-resistant enclosure that is useable solely for vehicle parking, building access or limited storage provided that such enclosure is not built so as to render the building or structure in violation of this section.

**R322.1.6 Protection of mechanical, plumbing and electrical systems.** Electrical systems, equipment and components; heating, ventilating, air conditioning; plumbing appliances and plumbing fixtures; duct systems; and other service equipment shall be located at or above the elevation required in Section R322.2 or R322.3. If replaced as part of a substantial improvement, electrical systems, equipment and components; heating, ventilating, air conditioning and plumbing appliances and plumbing fixtures; duct systems; and other service equipment shall meet the requirements of this section. Systems, fixtures, and equipment and components shall not be mounted on or penetrate through walls intended to break away under flood loads.

**Exception:** Locating electrical systems, equipment and components; heating, ventilating, air conditioning; plumbing appliances and plumbing fixtures; duct systems; and other service equipment is permitted below the elevation required in Section R322.2 or R322.3 provided that they are designed and installed to prevent water from entering or accumulating within the components and to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the design flood elevation in accordance with ASCE 24. Equipment for pools, spas and water features shall be permitted below the elevation required in Section R322.2 or R322.3 provided it is elevated to the extent practical and is anchored to prevent floatation and resist flood forces and is supplied by branch circuits that have ground-fault circuit interrupter protection. Electrical wiring systems are permitted to be located below the required elevation provided that they conform to the provisions of the electrical part of this code for wet locations.

**R322.1.7 Protection of water supply and sanitary sewage systems.** New and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the systems in accordance with the plumbing provisions of this code. New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of floodwaters into systems and discharges from systems into floodwaters in accordance with the plumbing provisions of this code and in accordance with Chapter 64E-6, Florida Administrative Code, Standards for Onsite Sewage Treatment and Disposal Systems.

**R322.1.8 Flood-resistant materials.** Building materials and installation methods used for flooring and interior and exterior walls and wall coverings below the elevation required in Section R322.2 or R322.3 shall be flood damage-resistant materials that conform to the provisions of FEMA TB-2.

**R322.1.9 Manufactured homes.** In addition to the applicable requirements of the state agency with jurisdiction over installation of manufactured homes, installation of manufactured homes in flood hazard areas is subject to the applicable provisions of the local floodplain management ordinance.

**R322.1.10 As-built elevation documentation.** A registered design professional shall prepare and seal documentation of the elevations specified in Section R322.2 or R322.3.

**R322.1.11 Structures seaward of a coastal control construction line.** In addition to the requirements of this section, structures located in flood hazard areas and seaward of the coastal construction line shall be designed to resist the predicted forces of a 100-year storm event in accordance with Section R3109 (*sic*) of the *Florida Building Code, Building,* and the more restrictive provisions shall govern.

**R322.2 Flood hazard areas (including A Zones).** Areas that have been determined to be prone to flooding and that are not subject to high-velocity wave action shall be designated as flood hazard areas. Flood hazard areas that have been delineated as subject to wave heights between 1 ½ feet (457 mm) and 3 feet (914 mm) or otherwise designated by the jurisdiction shall be designated as Coastal A Zones and are subject to the requirements of Section R322.3. Buildings and structures constructed in whole or in part in flood hazard areas shall be designed and constructed in accordance with Sections R322.2.1 through R322.2.3.

**R322.2.1 Elevation requirements.**

1. Buildings and structures in flood hazard areas including flood hazard areas designated as Coastal A Zones, shall have the lowest floors elevated to or above the base flood elevation plus 1 foot (305 mm), or the design flood elevation, whichever is higher.
2. In areas of shallow flooding (AO Zones), buildings and structures shall have the lowest floor (including basement) elevated to a height above the highest adjacent grade of not less than the depth number specified in feet (mm) on the FIRM plus 1 foot (305 mm), or not less than 3 feet (915 mm) if a depth number is not specified.
3. Basement floors that are below grade on all sides shall be elevated to or above base flood elevation plus 1 foot (305 mm), or the design flood elevation, whichever is higher.

**Exception:** Enclosed areas below the design flood elevation, including basements with floors that are not below grade on all sides, shall meet the requirements of Section 322.2.2.

**R322.2.2 Enclosed area below design flood elevation.** Enclosed areas, including crawl spaces, that are below the design flood elevation shall:

1. Be used solely for parking of vehicles, building access or storage.
2. Be provided with flood openings that meet the following criteria and are installed in accordance with Section R322.2.2.1:
    2.1. The total net area of non-engineered openings shall be not less than 1 square inch (645 $mm^2$) for each square foot (0.093 $m^2$) of enclosed area where the enclosed area is measured on the exterior of the enclosure walls, or the openings shall be designed as engineered openings and the construction documents shall include a statement by a registered design professional that the design of the openings will provide for equalization of hydrostatic flood forces on exterior walls by allowing for the automatic entry and exit of floodwaters as specified in Section 2.7.2.2 of ASCE 24.
    2.2. Openings shall be not less than 3 inches (76 mm) in any direction in the plane of the wall.
    2.3 The presence of louvers, blades, screens and faceplates or other covers and devices shall allow the automatic flow of floodwater into and out of the enclosed areas and shall be accounted for in the determination of the net open area.

**R322.2.2.1 Installation of openings.** The walls of enclosed areas shall have openings installed such that:

1. There shall be not less than two openings on different sides of each enclosed area; if a building has more than one enclosed area below the design flood elevation, each area shall have openings.
2. The bottom of each opening shall be not more than 1 foot (305 mm) above the higher of the final interior grade or floor and the finished exterior grade immediately under each opening.
3. Openings shall be permitted to be installed in doors and windows; doors and windows without installed openings do not meet the requirements of this section.

**R322.2.3 Foundation design and construction.** Foundation walls for buildings and structures erected in flood hazard areas shall meet the requirements of Chapter 4.

**Exception:** Unless designed in accordance with Section R404:

1. The unsupported height of 6-inch (152 mm) plain masonry walls shall be not more than 3 feet (914 mm).
2. The unsupported height of 8-inch (203 mm) plain masonry walls shall be not more than 4 feet (1219 mm).
3. The unsupported height of 8-inch (203 mm) reinforced masonry walls shall be not more than 8 feet (2438 mm).

For the purpose of this exception, unsupported height is the distance from the finished grade of the under-floor space to the top of the wall.

**R322.2.4 Tanks.** Underground tanks shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood. Above-ground tanks shall be installed at or above the elevation required in Section R322.2.1 or shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood.

**R322.2.5 Pools in flood hazard areas.** Pools that are located in flood hazard areas established by Table R301.2(1), including above-ground pools, on-ground pools, and in-ground pools that involve placement of fill, shall comply with Sections R322.2.5.1 or R322.2.5.2.

**Exception:** Pools located in riverine flood hazard areas which are outside of designated floodways.

**R322.2.5.1 Pools located in designated floodways.** Where pools are located in designated floodways, documentation shall be submitted to the building official, which demonstrates that the construction of the pool will not increase the design flood elevation at any point within the jurisdiction.

**R322.2.5.2 Pools located where floodways have not been designated.** Where pools are located in riverine flood hazard areas where design flood elevations are specified but floodways have not been designated, the applicant shall provide a floodway analysis that demonstrates that the proposed pool will not increase the design flood elevation more than 1 foot (305 mm) at any point within the jurisdiction.

**R322.3 Coastal high-hazard areas (including V Zones and Coastal A Zones, where designated).** Areas that have been determined to be subject to wave heights in excess of 3 feet (914 mm) or subject to high-velocity wave action or wave-induced erosion shall be designated as coastal high-hazard areas. Flood hazard areas that have been designated as subject to wave heights between 1 ½ (457 mm) and 3 feet (914 mm) or otherwise designated by the jurisdiction shall be designated as Coastal A Zones. Buildings and structures constructed in whole or in part in coastal high-hazard areas and coastal A Zones, where designated, shall be designed and constructed in accordance with Sections R322.3.1 through R322.3.7.

**R322.3.1 Location and site preparation.**

1. New buildings and buildings that are determined to be substantially improved pursuant to the *Florida Building Code, Existing Building* shall be located landward of the reach of mean high tide.
2. For any alteration of sand dunes and mangrove stands, the building official shall require submission of an engineering analysis that demonstrates that the proposed alteration will not increase the potential for flood damage.

**R322.3.2 Elevation requirements.**

1. Buildings and structures erected within coastal high-hazard areas and Coastal A Zones, shall be elevated so that the bottom of the lowest horizontal structure members supporting the lowest floor, with the exception of pilings, pile caps, columns, grade beams and bracing, is elevated to or above the base flood elevation plus 1 foot (305 mm) or the design flood elevation, whichever is higher.
2. Basement floors that are below grade on all sides are prohibited.
3. The use of fill for structural support is prohibited.
4. Minor grading, and the placement of minor quantities of fill, shall be permitted for landscaping and for drainage purposes under and around buildings and for support of parking slabs, pool decks, patios and walkways.
5. Walls and partitions enclosing areas below the design flood elevation shall meet the requirements of Sections R322.3.4 and R322.3.5.

**R322.3.3 Foundations.** Buildings and structures erected in coastal high-hazard areas and Coastal A Zones shall be supported on pilings or columns and shall be adequately anchored to such pilings or columns. The space below the elevated building shall be either free of obstruction or, if enclosed with walls, the walls shall meet the requirements of Section R322.3.4. Pilings shall have adequate soil penetrations to resist the combined wave and wind loads (lateral and uplift). Water-loading values used shall be those associated with the design flood. Wind-loading values shall be those required by this code. Pile embedment shall include consideration of decreased resistance capacity caused by scour of soil strata surrounding the piling. Pile systems design and installation shall be certified in accordance with Section R322.3.6. Spread footing, mat, raft or other foundations that support columns shall not be permitted where soil investigations that are required in accordance with Section R401.4 indicate that soil material under the spread footing, mat, raft or other foundation is subject to scour or erosion from wave-velocity flow conditions. If permitted, spread footing, mat, raft or other foundations that support columns shall be designed in accordance with ASCE 24.

**Exception:** In Coastal A Zones, stem wall foundations supporting a floor system above and backfilled with soil or gravel to the underside of the floor system shall be permitted provided the foundations are designed to account for wave action, debris impact, erosion and local scour. Where soils are susceptible to erosion and local scour, stem wall foundations shall have deep footings to account for the loss of soil.

**R322.3.3.1 Pools.** Pools in coastal high-hazard areas shall be designed and constructed in conformance with ASCE 24.

**R322.3.4 Concrete slabs.** Concrete slabs used for parking, floors of enclosures, landings, decks, walkways, patios and similar uses that are located beneath structures, or slabs that are located such that if undermined or displaced during base flood conditions could cause structural damage to the building foundation, shall be designed and constructed in accordance with one of the following:

1. To be structurally independent of the foundation system of the structure, to not transfer flood loads to the main structure, and to be frangible and break away under flood conditions prior to base flood conditions. Slabs shall be a maximum of 4 inches (102 mm) thick, shall not have turned-down edges, shall not contain reinforcing, shall have isolation joints at pilings and columns, and shall have control or construction joints in both directions spaced not more than 4 feet (1219 mm) apart.

2. To be self-supporting, structural slabs capable of remaining intact and functional under base flood conditions, including erosion and local scour, and the main structure shall be capable of resisting any added flood loads and effects of local scour caused by the presence of the slabs.

**R322.3.5 Walls below design flood elevation.** Walls and partitions are permitted below the elevated floor, provided that such walls and partitions are not part of the structural support of the building or structure and:

1. Electrical, mechanical and plumbing system components are not to be mounted on or penetrate through walls that are designed to break away under flood loads; and
2. Are constructed with insect screening or open lattice; or

3. Are designed to break away or collapse without causing collapse, displacement or other structural damage to the elevated portion of the building or supporting foundation system. Such walls, framing and connections shall have a resistance of not less than 10 (479 Pa) and not more than 20 pounds per square foot (958 Pa) as determined using allowable stress design; or
4. Where wind loading values of this code exceed 20 pounds per square foot (958 Pa), as determined using allowable stress design, the construction documents shall include documentation prepared and sealed by a registered design professional that:
    4.1. The walls and partitions below the design flood elevation have been designed to collapse from a water load less than that which would occur during the base flood.
    4.2. The elevated portion of the building and supporting foundation system have been designed to withstand the effects of wind and flood loads acting simultaneously on structural and nonstructural building components. Water-loading values used shall be those associated with the design flood. Wind-loading values shall be those required by this code.
5. Walls intended to break away under flood loads as specified in Item 3 or 4 have flood openings that meet the criteria in Section R322.2.2, Item 2.

**R322.3.6 Enclosed areas below design flood elevation.** Enclosed areas below the design flood elevation shall be used solely for parking of vehicles, building access or storage.

**R322.3.6.1 Protection of building envelope.** An exterior door that meets the requirements of Section R609 shall be installed at the top of stairs that provide access to the building and that are enclosed with walls designed to break away in accordance with Section 322.3.4.

**R322.3.7 Stairways and ramps.** Stairways and ramps that are located below the lowest floor elevations specified in Section R322.3.2 shall comply with one or more of the following:

1. Be designed and constructed with open or partially open risers and guards.

2. Stairways and ramps not part of the required means of egress shall be designed and constructed to break away during design flood conditions without causing damage to the building or structure, including foundation.

3. Be retractable, or able to be raised to or above the lowest floor elevation, provided that the ability to be retracted or raised prior to the onset of flooding is not contrary to the means of egress requirements of the code.

4. Be designed and constructed to resist flood loads and minimize transfer of flood loads to the building or structure, including foundation.

Areas below stairways and ramps shall not be enclosed with walls below the design flood elevation unless such walls are constructed in accordance with Section R322.3.5.

**R322.3.8 Decks and porches.** Attached decks and porches shall meet the elevation requirements of Section R322.3.2 and shall either meet the foundation requirements of this section or shall be cantilevered from or knee braced to the building or structure. Self-supporting decks and porches that are below the elevation required in Section R322.3.2 shall not be enclosed by solid, rigid walls, including walls designed to break away. Self-supporting decks and porches shall be designed and constructed to remain in place during base flood conditions or shall be frangible and break away under base flood conditions.

**R322.3.9 Construction documents.** The construction documents shall include documentation that is prepared and sealed by a registered design professional that the design and methods of construction to be used meet the applicable criteria of this section.

**R322.3.10 Tanks.** Underground tanks shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood. Above-ground tanks shall be installed at or above the elevation required in Section R322.3.2. Where elevated on platforms, the platforms shall be cantilevered from or knee braced to the building or shall be supported on foundations that conform to the requirements of Section R322.3.

## SECTION R326 SWIMMING POOLS, SPAS AND HOT TUBS

**R326.1 General.** The design and construction of pools and spas shall comply with Chapter 45 of this Code.

## CHAPTER 4 FOUNDATIONS

**R401.1 [General] Application.** The provisions of this chapter shall control the design and construction of the foundation and foundation spaces for buildings. In addition to the provisions of this chapter, the design and construction of foundations in flood hazard areas as established by Table R301.2(1) shall meet the provisions of Section R322. Wood foundations shall be designed and installed in accordance with AWC PWF.

**Exception:** The provisions of this chapter shall be permitted to be used for wood foundations only in the following situations:

3. Buildings and structures located within the High-Velocity Hurricane Zone shall comply with the provisions of Chapter 44 and, as applicable, Section R322 in flood hazard areas.

**R401.2 [General] Requirements.** Foundation construction shall be capable of resisting all loads from roof uplift and building overturn. Foundation uplift for light-frame wood or steel buildings shall be calculated or determined from Table R401.1. Masonry buildings within the dimensional scope of Table R401.1 shall be assumed to be of adequate weight so as not to require uplift resistance greater than that provided by the structure and any normal foundation. Foundation construction shall also be capable of accommodating all gravity loads in accordance with Section R301 and of transmitting the resulting loads to the supporting soil. Fill soils that support footings and foundations shall be designed, installed and tested in accordance with accepted engineering practice. Gravel fill used as footings for wood and precast concrete foundations shall comply with Section R403.

**R401.3 [General] Drainage.** Surface drainage shall be diverted to a storm sewer conveyance or other approved point of collection that does not create a hazard. Lots shall be graded to drain surface water away from foundation walls. The grade shall fall a minimum of 6 inches (152 mm) within the first 10 feet (3048 mm).

**Exception:** Where lot lines, walls, slopes or other physical barriers prohibit 6 inches (152 mm) of fall within 10 feet (3048 mm), drains or swales shall be constructed to ensure drainage away from the structure. Impervious surfaces within 10 feet (3048 mm) of the building foundation shall be sloped a minimum of 2 percent away from the building.

## SECTION R404 FOUNDATION AND RETAINING WALLS

**R404.1.9.5 [Isolated masonry piers] Masonry piers in flood hazard areas.** Masonry piers for dwellings in flood hazard areas shall be designed in accordance with Section R322.

## SECTION R408 UNDER-FLOOR SPACE

**R408.6 Finished grade.** The finished grade of under-floor surface shall be permitted to be located at the bottom of the footings; however, where there is evidence that the groundwater table can rise to within 6 inches (152 mm) of the finished floor at the building perimeter or where there is evidence that the surface water does not readily drain from the building site, the grade in the under-floor space shall be as high as the outside finished grade, unless an approved drainage system is provided.

**R408.7 Flood resistance.** For buildings located in flood hazard areas as established in Table R301.2(1): 1. Walls enclosing the under-floor space shall be provided with flood openings in accordance with Section R322.2.2.

2. The finished ground level of the under-floor space shall be equal to or higher than the outside finished ground level on at least one side.

**Exception:** Under-floor spaces that meet the requirements of FEMA TB-11-1.

## SECTION R506 CONCRETE FLOORS (ON GROUND)

**R506.2.1 [Site Preparation] Fill.** Fill material shall be free of vegetation and foreign material. The fill shall be compacted to ensure uniform support of the slab, and except where approved, the fill depths shall not exceed 24 inches (610 mm) for clean sand or gravel and 8 inches (203 mm) for earth.

## MECHANICAL, FUEL GAS AND PLUMBING

**M1301.1.1 [General Mechanical System Requirements] Flood-resistant installation.** In flood hazard areas as established by Table R301.2(1), mechanical appliances, equipment and systems shall be located or installed in accordance with Section R322.1.6.

**M1401.5 [Heating and Cooling Equipment and Appliances] Flood hazard.** In flood hazard areas as established by Table R301.2(1), heating and cooling equipment and appliances shall be located or installed in accordance with Section R322.1.6.

**M1601.4.10 [Duct Construction; Installation] Flood hazard areas.** In flood hazard areas as established by Table R301.2(1), duct systems shall be located or installed in accordance with Section R322.1.6.

**M1701.2 [Combustion Air] Opening location.** In flood hazard areas as established in Table R301.2(1), combustion air openings shall be located at or above the elevation required in Section R322.2.1 or R322.3.2.

**M2001.4 [Boilers and Water Heaters] Flood-resistant installation.** In flood hazard areas established in Table R301.2(1), boilers, water heaters and their control systems shall be located or installed in accordance with Section R322.1.6.

**M2105.22.1 [Ground-Source Heat-Pump System Loop Piping] Flood hazard.** Piping located in a flood hazard area shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the design flood elevation.

**M2201.6 [Special Piping and Storage Systems] Flood-resistant installation.** In flood hazard areas as established by Table R301.2(1), tanks shall be installed in accordance with Section R322.2.4 or R322.3.7.

**G2404.7 (301.11) [Fuel Gas] Flood hazard.** For structures located in flood hazard areas, the appliance, equipment and system installations regulated by this code shall be located at or above the elevation required by Section R322 for utilities and attendant equipment.

**Exception:** The appliance, equipment and system installations regulated by this code are permitted to be located below the elevation required by Section R322 for utilities and attendant equipment provided that they are designed and installed to prevent water from entering or accumulating within the components and to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to such elevation.

**P2601.3 [General Plumbing Requirements] Flood hazard areas.** In flood hazard areas as established by Table R301.2(1), plumbing fixtures, drains, and appliances shall be located or installed in accordance with Section R322.1.6.

**P2602.2 [Individual Water Supply and Sewage Disposal] Flood-resistant installation.** In flood hazard areas as established by Table R301.2(1):

1. Water supply systems shall be designed and constructed to prevent infiltration of floodwaters.
2. Pipes for sewage disposal systems shall be designed and constructed to prevent infiltration of floodwaters into the systems and discharges from the systems into floodwaters.

**P2705.1 [Plumbing Fixtures, Installation] General.** The installation of fixtures shall conform to the following: *[partial shown]*

7. In flood hazard areas as established by Table R301.2(1), plumbing fixtures shall be located or installed in accordance with Section R322.1.6.

**P3001.3 [Sanitary Drainage] Flood-resistant installation.** In flood hazard areas as established by Table R301.2(1), drainage, waste and vent systems shall be located and installed to prevent infiltration of floodwaters into the systems and discharges from the systems into floodwaters.

**P3101.5 [Vent Systems] Flood resistance.** In flood hazard areas as established by Table R301.2(1), vents shall be located at or above the elevation required in Section R322.1 (flood hazard areas including A Zones) or R322.2 (coastal high-hazard areas including V Zones).

**R4501.4.2.1. [Private Swimming Pools, Mechanical requirements] Flood hazard areas.** Pools installed in flood hazard areas established in Section R322 shall comply with Section R322.2.4 (A Zones) or R322.3.3.1 in coastal high-hazard areas (V Zones).

## CHAPTER 44 REFERENCED STANDARDS

ASCE/SEI 24-14 Flood-resistant Design and Construction

FEMA-TB-2—08 Flood Damage-resistant Materials Requirement

FEMA-TB-11—01 Crawlspace Construction for Buildings Located in Special Flood Hazard Area

# 7th Edition Florida Existing Building Code (2020)

## CHAPTER 1 SCOPE AND ADMINISTRATION

**[A] 101.2 Scope.** The provisions of the *Florida Building Code, Existing Building* shall apply to the *repair*, *alteration*, *change of occupancy*, *addition* to and relocation of *existing buildings*.

**Exception**: For the purpose of public educational facilities and state licensed facilities, see Chapter 4, Special Occupancy, of the *Florida Building Code, Building*.

**[A] 101.3 Intent.** The intent of this code is to provide flexibility to permit the use of alternative approaches to achieve compliance with minimum requirements to safeguard the public health, safety and welfare insofar as they are affected by the *repair*, *alteration*, *change of occupancy*, *addition* and relocation of *existing buildings.*

**101.4 Applicability.** This code shall apply to the repair, alteration, change of occupancy, addition and relocation of all existing buildings, regardless of occupancy, subject to the criteria of Sections 101.4.1 and 101.4.2.

**101.4.1 Buildings not previously occupied.** A building or portion of a building that has not been previously occupied or used for its intended purpose in accordance with the laws in existence at the time of its completion shall comply with the provisions of the *Florida Building Code, Building* or *Florida Building Code, Residential*, as applicable, for new construction or with any current permit for such occupancy.

**101.4.2 Buildings previously occupied.** The legal occupancy of any building existing on the date of adoption of this code shall be permitted to continue without change, except as is specifically covered in this code, the *Florida Fire Prevention Code*, or as is deemed necessary by the code official for the general safety and welfare of the occupants and the public.

**ADDITION.** An extension or increase in floor area, number of stories, or height of a building or structure.

**ALTERATION.** Any construction or renovation to an existing structure other than a repair or addition. Alterations are classified as Level 1, Level 2 and Level 3.

**CHANGE OF OCCUPANCY.** A change in the use of the building or portion of a building which results in any of the following:

1. A change of occupancy classification.
2. A change from one group to another group within an occupancy classification.
3. Any change in use within a group for which there is a change in the application of the requirements of this code.

**EXISTING BUILDING.** A building erected prior to the date of adoption of the appropriate code, or one for which a legal building permit has been issued.

**EXISTING STRUCTURES.** A structure erected prior to the date of adoption of the appropriate code, or one for which a legal building *permit* has been issued.

**BS] FLOOD HAZARD AREA.** The greater of the following two areas:

1. The area within a flood plain subject to a 1-percent or greater chance of flooding in any year.
2. The area designated as a *flood hazard area* on a community's flood hazard map, or otherwise legally designated.

**[A] HISTORIC BUILDING.** See Section 1202.

**REHABILITATION.** Any work, as described by the categories of work defined herein, undertaken in an existing building.

**REPAIR.** The reconstruction or renewal of any part of an existing building for the purpose of its maintenance or to correct damage.

**[BS] SUBSTANTIAL DAMAGE.** For the purpose of determining compliance with the flood provisions of this code, damage of any origin sustained by a structure whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

**[BS] SUBSTANTIAL IMPROVEMENT.** For the purpose of determining compliance with the flood provisions of this code, any *repair*, *alteration*, *addition*, or improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the structure, before the improvement or *repair* is started. If the structure has sustained *substantial damage*, any repairs are considered *substantial improvement* regardless of the actual *repair* work performed. The term does not, however, include either:

1. Any project for improvement of a building required to correct existing health, sanitary, or safety code violations identified by the *code official* and that is the minimum necessary to ensure safe living conditions; or
2. Any *alteration* of a historic structure, provided that the *alteration* will not preclude the structure's continued designation as a historic structure.

## CHAPTER 3 PROVISIONS FOR ALL COMPLIANCE METHODS

**301.1 General.** The *repair*, *alteration*, *change of occupancy*, *addition* or relocation of all *existing buildings* shall comply with Section 301.2 or 301.3, as applicable.

**301.2 Repairs. Repairs shall comply with the requirements of Chapter 4.**

**301.3 Alteration, change of occupancy, addition or relocation.** The *alteration*, *change of occupancy*, *addition* or relocation of all *existing buildings* shall comply with one of the methods listed in Sections 301.3.1 through 301.3.3 as selected by the applicant. Sections 301.3.1 through 301.3.3 shall not be applied in combination with each other. Where this code requires consideration of the seismic-force resisting system of an *existing building* subject to *alteration*, *change of occupancy*, *addition* or relocation of *existing buildings*, the seismic evaluation and design shall be based on Section 301.3.4 regardless of which compliance method is used.

**Exception:** Subject to the approval of the *code official*, *alterations* complying with the laws in existence at the time the building or the affected portion of the building was built shall be considered in compliance with the provisions of this code unless the building is undergoing more than a limited structural *alteration* as defined in Section 907.4.4. New structural members added as part of the *alteration* shall comply with the *Florida Building Code*. *Alteration*s of *existing buildings* in *flood hazard areas* shall comply with Section 701.3. This exception shall not apply to alterations that constitute substantial improvement in flood hazard areas which shall comply with Section 701.3. This exception shall not apply to the structural provisions of Chapter 4 or to the structural provisions of Sections 707, 807, and 907.

**301.3.1 Prescriptive compliance method.** *Alterations*, *additions* and *changes of occupancy* complying with Chapter 5 of this code in buildings complying with the *Florida Fire Prevention Code* shall be considered in compliance with the provisions of this code.

**301.3.2 Work area compliance method.** *Alterations*, *additions*, changes in occupancy and relocated buildings complying with the applicable requirements of Chapters 6 through 13 of this code shall be considered in compliance with the provisions of this code.

**301.3.3 Performance compliance method.** *Alterations*, *additions*, changes in occupancy and relocated buildings complying with Chapter 14 of this code shall be considered in compliance with the provisions of this code.

## CHAPTER 4 REPAIRS

**[BS] 401.3 Flood hazard areas.** In flood hazard areas, repairs that constitute *substantial improvement* shall require that the building comply with Section 1612 of the *Florida Building Code, Building*, or Section R322 of the *Florida Building Code, Residential*, as applicable.

**401.4 Structure seaward of a coastal construction line**. Structures located seaward of the coastal construction line shall be designed to resist the predicted forces of a 100-year storm event in accordance with Section 3109 of the *Florida Building Code, Building*.

**[BS] 406.2.4 [Structural] Flood hazard areas.** In *flood hazard* areas, buildings that have sustained *substantial damage* shall be brought into compliance with Section 1612 of the *Florida Building Code, Building*, or Section R322 of the *Florida Building Code, Residential*, as applicable.

## CHAPTER 5 PRESCRIPTIVE COMPLIANCE METHOD

**[BS] 502.2 [Additions] Flood hazard areas.** For buildings and structures in *flood hazard* areas established in Section 1612.3 of the *Florida Building Code, Building*, or Section R322 of the *Florida Building Code, Residential*, as applicable, any *addition* that constitutes *substantial improvement* of the existing structure shall comply with the flood design requirements for new construction, and all aspects of the existing structure shall be brought into compliance with the requirements for new construction for flood design.

For buildings and structures in *flood hazard areas* established in Section 1612.3 of the *Florida Building Code, Building*, or Section R322 of the *Florida Building Code, Residential*, as applicable, as applicable, any *additions* that do not constitute *substantial improvement* of the existing structure are not required to comply with the flood design requirements for new construction.

**[BS] 503.2 [Alterations] Flood hazard areas.** For buildings and structures in *flood hazard areas* established in Section 1612.3 of the *Florida Building Code, Building*, or Section R322 of the *Florida Building Code, Residential*, as applicable, any *alteration* that constitutes *substantial improvement* of the existing structure shall comply with the flood design requirements for new construction, and all aspects of the existing structure shall be brought into compliance with the requirements for new construction for flood design.

For buildings and structures in *flood hazard areas* established in Section 1612.3 of the *Florida Building Code, Building*, or Section R322 of the *Florida Building Code, Residential*, as applicable, any alterations that do not constitute *substantial improvement* of the existing structure are not required to comply with the flood design requirements for new construction.

## CHAPTER 6 CLASSIFICATION OF WORK

**601.3 Structure seaward of a coastal construction line**. Structures located seaward of the coastal construction line shall be designed to resist the predicted forces of a 100-year storm event in accordance with Section 3109 of the *Florida Building Code, Building*.

## CHAPTER 7 ALTERATIONS – LEVEL 1

**[BS] 701.3 Flood hazard areas.** In *flood hazard areas*, *alterations* that constitute *substantial improvement* shall require that the building comply with Section 1612 of the *Florida Building Code, Building*, or Section R322 of the *Florida Building Code, Residential*, as applicable.

## CHAPTER 8 ALTERATIONS – LEVEL 2

**801.2 Alteration level 1 compliance.** In addition to the requirements of this chapter, all work shall comply with the requirements of Chapter 7.

## CHAPTER 9 ALTERATIONS – LEVEL 3

**901.2 Compliance.** In addition to the provisions of this chapter, work shall comply with all of the requirements of Chapters 7 and 8. The requirements of Sections 803, 804 and 805 shall apply within all *work areas* whether or not they include exits and corridors shared by more than one tenant and regardless of the occupant load.

## CHAPTER 10 CHANGE OF OCCUPANCY

**1001.1 Scope.** The provisions of this chapter shall apply where a *change of occupancy* occurs, as defined in Section 202.

## CHAPTER 11 ADDITIONS

**1101.1 Scope.** An *addition* to a building or structure shall comply with the *Florida Codes* as adopted for new construction without requiring the *existing building* or structure to comply with any requirements of those codes or of these provisions, except as required by this chapter. Where an *addition* impacts the *existing building* or structure, that portion shall comply with this code.

**[BS] 1103.5 Flood Hazard Areas.** *Additions* and *foundations* in *flood hazard areas* shall comply with the following requirements:

1. For horizontal *additions* that are structurally interconnected to the *existing building*:
   1.1. If the *addition* and all other proposed work, when combined, constitute *substantial improvement*, the *existing building* and the *addition* shall comply with Section 1612 of the *Florida Building Code, Building*, or Section R322 of the *Florida Building Code, Residential*, as applicable.
   1.2. If the *addition* constitutes *substantial improvement*, the *existing building* and the *addition* shall comply with Section 1612 of the *Florida Building Code, Building*, or Section R322 of the *Florida Building Code, Residential*, as applicable.
2. For horizontal *additions* that are not structurally interconnected to the *existing building*:
   2.1. The *addition* shall comply with Section 1612 of the *Florida Building Code, Building*, or Section R322 of the *Florida Building Code, Residential*, as applicable.
   2.2. If the *addition* and all other proposed work, when combined, constitute *substantial improvement*, the *existing building* and the *addition* shall comply with Section 1612 of the *Florida Building Code, Building*, or Section R322 of the *Florida Building Code, Residential*, as applicable.
3. For vertical *additions* and all other proposed work that, when combined, constitute *substantial improvement*, the *existing building* shall comply with Section 1612 of the *Florida Building Code, Building*, or Section R322 of the *Florida Building Code, Residential*, as applicable.
4. For a raised or extended foundation, if the foundation work and all other proposed work, when combined, constitute *substantial improvement*, the *existing building* shall comply with Section 1612 of the *Florida Building Code, Building,* or Section R322 of the *Florida Building Code, Residential*, as applicable.
5. For a new foundation or replacement foundation, the foundation shall comply with Section 1612 of the *Florida Building Code, Building*, or Section R322 of the *Florida Building Code, Residential*, as applicable.

## CHAPTER 12 HISTORIC BUILDINGS

**[BS] 1201.3 Flood hazard areas.** In *flood hazard areas*, if all proposed work, including repairs, work required because of a *change of occupancy*, and *alterations*, constitutes *substantial improvement*, then the building shall comply with Section 1612 of the *Florida Building Code, Building*, or Section R322 of the *Florida Building Code, Residential*, as applicable.

**Exception:** If the program that designated the building as historic determines that it will continue to be an *historic building* after the proposed work is completed, then the proposed work is not considered a *substantial improvement*. For the purposes of this exception, an *historic building* is:

1. Listed or preliminarily determined to be eligible for listing in the National Register of Historic Places; or
2. A contributing resource with a National Register of Historic Places listed district; or
3. Designated as historic property under an official municipal, county, special district or state designation, law, ordinance or resolution either individually or as a contributing property in a district, provided the local program making the designation is approved by the Department of the Interior (the Florida state historic preservation officer maintains a list of approved local programs); or
3. Designated eligible by the Florida State Historic Preservation Office for listing in the National Register of Historic Places, either individually or as a contributing property in a district.

**HISTORIC BUILDING.** For the purposes of this code and the referenced documents, an historic building is defined as a building or structure that is:

1. Individually listed in the National Register of Historic Places; or
2. A contributing property in a National Register of Historic Places listed district; or
3. Designated as historic property under an official municipal, county, special district or state designation, law, ordinance or resolution either individually or as a contributing property in a district; or
4. Determined eligible by the Florida State Historic Preservation Officer for listing in the National Register of Historic Places, either individually or as a contributing property in a district.

## CHAPTER 13 RELOCATED OR MOVED BUILDINGS

**[BS] 1302.6 Flood hazard areas.** If relocated or moved into a flood hazard area, structures shall comply with Section 1612 of the *Florida Building Code, Building*, or Section R322 of the *Florida Building Code, Residential*, as applicable.

## CHAPTER 14 PERFORMANCE COMPLIANCE METHOD

**[B] 1401.3 Acceptance.** For *repairs, alterations, additions*, and *changes of occupancy* to *existing buildings* that are evaluated in accordance with this section, compliance with this section shall be accepted by the *code official*.

**[B] 1401.3.3 Compliance with flood hazard provisions.** In *flood hazard areas*, buildings that are evaluated in accordance with this section shall comply with Section 1612 of the *Florida Building Code, Building*, or Section R322 of the *Florida Building Code, Residential*, as applicable if the work covered by this section constitutes *substantial improvement*.

# 7th Edition FBC, Mechanical (2020)

## CHAPTER 1 SCOPE AND ADMINISTRATION

**[A] 101.1 Scope.** The provisions of Chapter 1, *Florida Building Code, Building* shall govern the administration and enforcement of the *Florida Building Code, Mechanical*.

## CHAPTER 2 DEFINITIONS

**[BS] DESIGN FLOOD ELEVATION.** The elevation of the "design flood," including wave height, relative to the datum specified on the community's legally designated flood hazard area map. In areas designated as Zone AO, the design flood elevation shall be the elevation of the highest existing grade of the building's perimeter plus the depth number, in feet, specified on the flood hazard map. In areas designated as Zone AO where a depth number is not specified on the map, the depth number shall be taken as being equal to 2 feet (610 mm).

## CHAPTER 3 GENERAL REGULATIONS

**[BS] 301.16 Flood hazard.** For structures located in flood hazard areas, mechanical systems, equipment and appliances shall be located at or above the elevation required by Section 1612 of the *Florida Building Code, Building* for utilities and attendant equipment.

**Exception:** Mechanical systems, equipment and appliances are permitted to be located below the elevation required by Section 1612 of the *Florida Building Cod, Building* for utilities and attendant equipment provided that they are designed and installed to prevent water from entering or accumulating within the components and to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding up to such elevation.

**[BS] 301.16.1 Coastal high hazard areas and coastal A zones.** In coastal high hazard areas and coastal A zones, mechanical systems and *equipment* shall not be mounted on or penetrate walls intended to break away under flood loads.

## SECTION 401 [VENTILATION] GENERAL

**401.4 Intake opening location.** Air intake openings shall comply with all of the following:

*Only pertinent item shown*

4. Intake openings on structures in flood hazard areas shall be at or above the elevation required by Section 1612 of *the Florida Building Code, Building* for utilities and attendant equipment.

## SECTION 501 [EXHAUST SYSTEMS] GENERAL

**501.3.1 Location of exhaust outlets.** The termination point of exhaust outlets and ducts discharging to the outdoors shall be located with the following minimum distances:

*[only item 4 shown]*

4. Exhaust outlets serving structures in flood hazard areas shall be installed at or above the elevation required by Section 1612 of the *Florida Building Code, Building* for utilities and attendant equipment.

## CHAPTER 6 DUCT SYSTEMS

**[BS] 602.4 [Plenums] Flood hazard.** For structures located in flood hazard areas, plenum spaces shall be located above the elevation required by Section 1612 of the *Florida Building Code, Building* for utilities and attendant equipment or shall be designed and constructed to prevent water from entering or accumulating within the plenum spaces during floods up to such elevation. If the plenum spaces are located below the elevation required by Section 1612 of the *Florida Building Code, Building* for utilities

and attendant equipment, they shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding up to such elevation.

**[BS] 603.13 [Duct Construction and Installation] Flood hazard areas.** For structures in flood hazard areas, ducts shall be located above the elevation required by Section 1612 of the *Florida Building Code, Building* for utilities and attendant equipment or shall be designed and constructed to prevent water from entering or accumulating within the ducts during floods up to such elevation. If the ducts are located below the elevation required by Section 1612 of the *Florida Building Code, Building* for utilities and attendant equipment, the ducts shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding up to such elevation.

## CHAPTER 12 HYDRONIC PIPING

**1206.9.1 [Piping Installation) Flood hazard.** Piping located in a flood hazard area shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the *design flood elevation*.

**1210.8.6 [Plastic Pipe Ground-Source Heat Pump Loop Systems] Flood hazard.** Piping located in a flood hazard area shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the *design flood elevation*.

## CHAPTER 13 FUEL OIL PIPING AND STORAGE

**1305.2.1 [Fuel Oil System Installation] Flood hazard.** Fuel oil pipe, equipment and appliances located in flood hazard areas shall be located above the elevation required by Section 1612 of the *Florida Building Code, Building* for utilities and attendant equipment or shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding up to such elevation.

# 7th Edition FBC, Plumbing (2020)

## CHAPTER 1 SCOPE AND ADMINSITRATION

**[A] 101.1 Scope.** The provisions of Chapter 1, *Florida Building Code, Building* shall govern the administration and enforcement of the *Florida Building Code, Plumbing*.

## CHAPTER 2 DEFINITONS

**[BS] BASE FLOOD ELEVATION.** A reference point, determined in accordance with the building code, based on the depth or peak elevation of flooding, including wave height, which has a 1 percent (100-year flood) or greater chance of occurring in any given year.

**[BS] DESIGN FLOOD ELEVATION.** The elevation of the "design flood," including wave height, relative to the datum specified on the community's legally designated flood hazard map. In areas designated as Zone AO, the *design flood elevation* shall be the elevation of the highest existing grade of the building's perimeter plus the depth number (in feet) specified on the flood hazard map. In areas designated as Zone AO where a depth number is not specified on the map, the depth number shall be taken as being equal to 2 feet (610 mm).

**[BS] FLOOD HAZARD AREA.** The greater of the following two areas:

1. The area within a flood plain subject to a 1-percent or greater chance of flooding in any given year.
2. The area designated as a *flood hazard area* on a community's flood hazard map or as otherwise legally designated.

## CHAPTER 3 GENERAL REGULATIONS
## SECTION 309 FLOOD HAZARD RESISTANCE

**309.1 General.** Plumbing systems and equipment in structures erected in *flood hazard areas* shall be constructed in accordance with the requirements of this section and the *Florida Building Code, Building*.

**[BS] 309.2 Flood hazard.** For structures located in *flood hazard areas*, the following systems and equipment shall be located and installed as required by Section 1612 of the *Florida Building Code, Building*.

1. Water service pipes.
2. Pump seals in individual water supply systems where the pump is located below the *design flood elevation*.
3. Covers on potable water wells shall be sealed, except where the top of the casing well or pipe sleeve is elevated to not less than 1 foot (305 mm) above the *design flood elevation*.
4. Sanitary drainage piping.
5. Storm drainage piping.
6. Manhole covers shall be sealed, except where elevated to or above the *design flood elevation*.
7. Other plumbing fixtures, faucets, fixture fittings, piping systems and equipment.
8. Water heaters.
9. Vents and vent systems.

**Exception:** The systems listed in this section are permitted to be located below the elevation required by Section 1612 of the *Florida Building Code, Building* for utilities and attendant equipment, provided that the systems are designed and installed to prevent water from entering or accumulating within their components and the systems are constructed to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding up to such elevation.

**[BS] P309.3 Coastal high hazard areas and coastal A zones.** Structures located in coastal high hazard areas and coastal A zones shall meet the requirements of Section 309.2. The plumbing systems, pipes and fixtures shall not be mounted on or penetrate through walls intended to break away under flood loads.

# 7th Edition FBC, Fuel Gas (2020)

## CHAPTER 1 SCOPE AND ADMINISTRATION

**[A] 101.1 Scope.** The provisions of Chapter 1, *Florida Building Code, Building* shall govern the administration and enforcement of the *Florida Building Code, Fuel Gas*.

**[A] 101.2** This code shall apply to the installation of fuel-gas *piping* systems, fuel gas appliances, gaseous hydrogen systems and related accessories in accordance with Sections 101.2.1 through 101.2.5.

**Exception:** Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories high with separate means of egress and their accessory structures shall comply with the *Florida Residential Code, Residential*.

## SECTION 202 (IFGC) GENERAL DEFINITIONS

**[BS] DESIGN FLOOD ELEVATION.** The elevation of the "design flood," including wave height, relative to the datum specified on the community's legally designated flood hazard map. In areas designated as Zone AO, the *design flood elevation* shall be the elevation of the highest existing grade of the *building*'s perimeter plus the depth number (in feet) specified on the flood hazard map. In areas designated as Zone AO where a depth number is not specified on the map, the depth number shall be taken as being equal to 2 feet (610 mm).

**[BS] FLOOD HAZARD AREA.** The greater of the following two areas:

1. The area within a floodplain subject to a 1 percent or greater chance of flooding in any given year.
2. This area designated as a *flood hazard area* on a community's flood hazard map, or otherwise legally designated.

## CHAPTER 3 GENERAL REGULATIONS

**[BS] 301.11 [General] Flood hazard.** For structures located in flood hazard areas, the appliance, equipment and system installations regulated by this code shall be located at or above the elevation required by Section 1612 of the *Florida Building Code, Building* for utilities and attendant equipment.

**Exception:** The appliance, equipment and system installations regulated by this code are permitted to be located below the elevation required by Section 1612 of the *Florida Building Code, Building* for utilities and attendant equipment provided that they are designed and installed to prevent water from entering or accumulating within the components and to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to such elevation.

# Flood Damage-Resistant Materials Requirements

## for Buildings Located in Special Flood Hazard Areas in accordance with the National Flood Insurance Program

*Technical Bulletin 2 / August 2008*

FEMA

# Table of Contents



Revision to Table 2 footnote (*) made in October 2010.

Comments on the Technical Bulletins should be directed to:


Department of Homeland Security
FEMA Federal Insurance and Mitigation Administration
500 C Street, SW.
Washington, D.C. 20472


Technical Bulletin 2-08 replaces Technical Bulletin 2-93, *Flood-Resistant Materials Requirements for Buildings Located in Special Flood Hazard Areas in accordance with the National Flood Insurance Program*.

# Introduction

Protecting buildings that are constructed in special flood hazard areas (SFHAs) from damage caused by flood forces is an important objective of the National Flood Insurance Program (NFIP). In support of this objective, the NFIP regulations include minimum building design criteria that apply to new construction, repair of substantially damaged buildings, and substantial improvement of existing buildings in SFHAs. The base flood is used to delineate SFHAs on Flood Insurance Rate Maps (FIRMs) prepared by the NFIP. The base flood is the flood that has a 1-percent chance of being equaled or exceeded in any given year (commonly called the "100-year" flood). Certain terms used in this Technical Bulletin are defined in the Glossary.

The NFIP regulations require the use of construction materials that are resistant to flood damage. The lowest floor of a residential building must be elevated to or above the base flood elevation (BFE), while the lowest floor of a non-residential building must be elevated to or above the BFE or dry floodproofed to the BFE.

All construction below the BFE is susceptible to flooding and must consist of flood damage-resistant building materials. The purpose of this Technical Bulletin is to provide current guidance on what constitute "materials resistant to flood damage" and how and when these materials must be used to improve a building's ability to withstand flooding.

Table 1 describes five classes of materials ranging from those that are highly resistant to floodwater damage, to those that have no resistance to flooding. Materials are broadly described as structural materials and finish materials based on how they are used in normal construction practices. Table 2 lists materials by generic names, and notes whether the materials are acceptable or unacceptable for use below the BFE. All building materials are in some way fastened or connected to the structure. Fasteners and connectors, as described in this Technical Bulletin, also must be resistant to flood damage.

A brief description of the process used to identify or determine whether the materials listed are flood damage-resistant is provided, followed by some simplified examples with diagrams to illustrate the use of these materials below the BFE. Three additional circumstances where flood damage-resistant materials are used or recommended are described: accessory structures, limited use of wet floodproofing, and buildings outside of SFHAs.

Questions about use of flood damage-resistant materials should be directed to the appropriate local official, NFIP State Coordinating Office, or one of the Federal Emergency Management Agency's (FEMA's) Regional Offices.

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

As used by the NFIP, an "enclosure" is an area that is enclosed on all sides by walls.

The NFIP defines a "basement" as any area that is below-grade on all sides. The regulations do not allow basements to extend below the BFE.

# NFIP Regulations

The NFIP regulations for flood damage-resistant materials are codified in Title 44 of the Code of Federal Regulations, in Section 60.3(a)(3), which states that a community shall:

> *"Review all permit applications to determine whether proposed building sites will be reasonably safe from flooding. If a proposed building site is in a floodprone area, all new construction and substantial improvements shall…(ii) be constructed with materials resistant to flood damage…"*

Proposals for substantial improvement of existing buildings in SFHAs, and proposals to repair those that have sustained substantial damage, must comply with the requirements for new construction. As part of issuing permits, community officials must review such proposals to determine whether they comply with the requirements, including the use of flood damage-resistant materials. Refer to the "Classification of Flood Damage-Resistant Materials" section of this Technical Bulletin for additional details. Further information on substantial improvement and substantial damage is found in *Answers to Questions About Substantially Damaged Buildings* (FEMA 213).

The NFIP Technical Bulletins provide guidance on the minimum requirements of the NFIP regulations. Community or State requirements that exceed those of the NFIP take precedence. Design professionals should contact the community to determine whether more restrictive provisions apply to the building or site in question. All other applicable requirements of the State or local building codes must also be met for buildings in all flood hazard areas.

# Required Use of Flood Damage-Resistant Materials

## Flood Damage-Resistant Material

"Flood [damage]-resistant material" is defined by the NFIP as "any building product [material, component or system] capable of withstanding direct and prolonged contact with floodwaters without sustaining significant damage." The term "prolonged contact" means at least 72 hours, and the term "significant damage" means any damage requiring more than cosmetic repair. "Cosmetic repair" includes cleaning, sanitizing, and resurfacing (e.g., sanding, repair of joints, repainting) of the material. The cost of cosmetic repair should also be less than the cost of replacement of affected materials and systems. In addition to these requirements, individual materials that are considered flood damage-resistant must not cause degradation of adjacent materials or the systems of which the material is a part.

The *International Building Code*® (IBC®), by reference to ASCE 24 *Flood Resistant Design and Construction*, and the *International Residential Code*® (IRC®), require the use of flood damage-resistant materials.

**All building materials below the BFE must be flood damage-resistant**, regardless of the expected or historic flood duration. For example, buildings in coastal areas that experience relatively short-duration flooding (generally, flooding with a duration of less than 24 hours) must be constructed with flood damage-resistant materials below the BFE. As noted in Table 2, **only Class 4 and Class 5 materials are acceptable for areas below the BFE in buildings in SFHAs**.

In some instances, materials that are not flood damage-resistant materials, such as wiring for fire alarms and emergency lighting, are allowed below the BFE if specifically required to address life safety and electric code requirements for building access and storage areas.

### How Flood Damage-Resistant Materials Affect Flood Insurance Rates

Careful attention to compliance with the NFIP regulations for flood damage-resistant materials is important during design, plan review, construction, and inspection. Compliance influences both the building's vulnerability to flood damage and the cost of NFIP flood insurance. Flood insurance will not pay a claim for finish materials located in basements or in enclosed areas below the lowest floor of elevated buildings, even if such materials are considered to be flood damage-resistant. NFIP claims for damage below the BFE are limited to utilities and equipment, such as furnaces and water heaters.

## Classification of Flood Damage-Resistant Materials

The information in this Technical Bulletin was initially developed based on information in the U.S. Army Corps of Engineers' *Flood Proofing Regulations* (1995), and has been updated based on additional information from FEMA-funded studies and reports, technical experts, and industry and trade groups. Table 1 classifies building materials according to their ability to resist flood damage.

Table 1. Class Descriptions of Materials

| NFIP | Class | Class Description |
|---|---|---|
| ACCEPTABLE | 5 | Highly resistant to floodwater[1] damage, including damage caused by moving water.[2] These materials can survive wetting and drying and may be successfully cleaned after a flood to render them free of most harmful pollutants.[3] Materials in this class are permitted for partially enclosed or outside uses with essentially unmitigated flood exposure. |
| | 4 | Resistant to floodwater[1] damage from wetting and drying, but less durable when exposed to moving water.[2] These materials can survive wetting and drying and may be successfully cleaned after a flood to render them free of most harmful pollutants.[3] Materials in this class may be exposed to and/or submerged in floodwaters in interior spaces and do not require special waterproofing protection. |
| UNACCEPTABLE | 3 | Resistant to clean water[4] damage, but not floodwater damage. Materials in this class may be submerged in clean water during periods of flooding. These materials can survive wetting and drying, but may not be able to be successfully cleaned after floods to render them free of most[3] harmful pollutants. |
| | 2 | Not resistant to clean water[4] damage. Materials in this class are used in predominantly dry spaces that may be subject to occasional water vapor and/or slight seepage. These materials cannot survive the wetting and drying associated with floods. |
| | 1 | Not resistant to clean water[4] damage or moisture damage. Materials in this class are used in spaces with conditions of complete dryness. These materials cannot survive the wetting and drying associated with floods. |

Notes:

1. Floodwater is assumed to be considered "black" water; black water contains pollutants such as sewage, chemicals, heavy metals, or other toxic substances that are potentially hazardous to humans.

2. Moving water is defined as water moving at low velocities of 5 feet per second (fps) or less. Water moving at velocities greater than 5 fps may cause structural damage to building materials.

3. Some materials can be successfully cleaned of most of the pollutants typically found in floodwater. However, some individual pollutants such as heating oil can be extremely difficult to remove from uncoated concrete. These materials are flood damage-resistant except when exposed to individual pollutants that cannot be successfully cleaned.

4. Clean water includes potable water as well as "gray" water; gray water is wastewater collected from normal uses (laundry, bathing, food preparation, etc.).

MODIFIED FROM: USACE 1995 *Flood Proofing Regulations*

Table 2 lists structural materials and finish materials commonly used in construction of floors, walls, and ceilings. For the purpose of this Technical Bulletin, structural materials and finish materials are defined as follows:

- **Structural materials** include all elements necessary to provide structural support, rigidity, and integrity to a building or building component. Structural materials include floor slabs, beams, subfloors, framing, and structural building components such as trusses, wall panels, I-joists and headers, and interior/exterior sheathing.

- **Finish materials** include all coverings, finishes, and elements that do not provide structural support or rigidity to a building or building component. Finish materials include floor coverings, wall and ceiling surface treatments, insulation, cabinets, doors, partitions, and windows.

## Notes Regarding Classification of Materials

The classifications in Table 2 are based on the best information available at the time of publication. However, flood damage-resistance is determined by factors that may be a function of the specific application and by the characteristics of the floodwaters. Each situation requires sound judgment and knowledge of probable contaminants in local floodwaters to select materials that are required to resist flood damage. For materials and products that are listed in Table 2, manufacturers' use and installation instructions must be followed to ensure maximum performance. Masonry and wood products used below the BFE must comply with the applicable standards published by the American Society for Testing and Materials (ASTM), the American Concrete Institute (ACI), the Truss Plate Institute (TPI), the American Forest & Paper Association (AF&PA), and other appropriate organizations.

1. **Materials Not Listed:** Table 2 does not list all available structural materials and finish materials. For materials and products not listed, manufacturers' literature (i.e., specifications, materials safety data sheets, test reports) should be evaluated to determine if the product meets flood damage-resistance requirements. Materials and products that are not listed in Table 2 may be used if accepted by the local official. Acceptance should be based on sufficient evidence, provided by the applicant, that the materials proposed to be used below the BFE will resist flood damage without requiring more than cosmetic repair and cleaning.

2. **Unacceptable Materials:** Class 1, 2, and 3 materials are unacceptable for below-BFE applications for one or more of the following reasons:

   - Normal adhesives specified for above-grade use are water soluble or are not resistant to alkali or acid in water, including groundwater seepage and vapor.

   - The materials contain wood or paper products, or other materials that dissolve or deteriorate, lose structural integrity, or are adversely affected by water.

   - Sheet-type floor coverings (linoleum, rubber tile) or wall coverings (wallpaper) restrict drying of the materials they cover.

   - Materials are dimensionally unstable.

   - Materials absorb or retain excessive water after submergence.

3. **Impact of Material Combinations:** In some cases, the combination of acceptable structural and finish materials can negatively impact the classification of individual materials. This is illustrated by the following examples:

- Vinyl tile with chemical-set adhesives is an acceptable finish flooring material when placed on a concrete structural floor. However, when the same vinyl tile is applied over a plywood structural floor, it is no longer considered acceptable because the vinyl tile must be removed to allow the plywood to dry.

- Polyester-epoxy or oil-based paints are acceptable wall finishes when applied to a concrete structural wall. However, when the same paint is applied to a wood wall, it is no longer considered acceptable. Recent FEMA-supported studies by Oak Ridge National Laboratory have found that low-permeability paint can inhibit drying of the wood wall.

4. **Impact of Long-Duration Exposure and/or Contaminants:** The classifications of materials listed in Table 2 do not take into account the effects of long-duration exposure to floodwaters or contaminants carried by floodwaters. This is illustrated by the following examples:

   - Following Hurricane Katrina, FEMA deployed a Mitigation Assessment Team (MAT) to examine how building materials performed after long-duration exposure (2 to 3 weeks) to floodwaters (FEMA 549). The field survey revealed that some materials absorbed floodborne biological and chemical contaminants. However, it is not known at this time if a shorter duration flood event would have significantly altered the absorption rates of those contaminants.

   - Building owners, design professionals, and local officials should consider potential exposure to floodborne contaminants when selecting flood damage-resistant materials. For example, Table 2 lists cast-in-place concrete, concrete block, and solid structural wood (2x4s, etc.), as acceptable flood damage-resistant materials. However, experience has shown that buildings with those materials can be rendered unacceptable for habitation after being subjected to floodwaters with significant quantities of petroleum-based products such as home heating oil. Commonly used cleaning and remediation practices do not reduce the "off-gassing" of volatile hydrocarbons from embedded oil residues to acceptable levels that are established by the U.S. Environmental Protection Agency. Other materials, when exposed to these types of contaminants, may also not perform acceptably as flood damage-resistant materials.

Table 2. Types, Uses, and Classifications of Materials

| Types of Building Materials | Uses of Building Materials | | Classes of Building Materials | | | | |
|---|---|---|---|---|---|---|---|
| | | | Acceptable | | Unacceptable | | |
| | Floors | Walls/ Ceilings | 5 | 4 | 3 | 2 | 1 |
| **Structural Materials (floor slabs, beams, subfloors, framing, and interior/exterior sheathing)** | | | | | | | |
| Asbestos-cement board | | ■ | ■ | | | | |
| Brick | | | | | | | |
| Face or glazed | | ■ | ■ | | | | |
| Common (clay) | | ■ | | ■ | | | |
| Cast stone (in waterproof mortar) | | ■ | ■ | | | | |
| Cement board/fiber-cement board | | ■ | ■ | | | | |
| Cement/latex, formed-in-place | ■ | | | ■ | | | |
| Clay tile, structural glazed | | ■ | ■ | | | | |
| Concrete, precast or cast-in-place | ■ | ■ | ■ | | | | |
| Concrete block[1] | | ■ | ■ | | | | |
| Gypsum products | | | | | | | |
| Paper-faced gypsum board | | ■ | | | ■ | | |
| Non-paper-faced gypsum board | | ■ | | ■ | | | |
| Greenboard | | ■ | | | | ■ | |
| Keene's cement or plaster | | ■ | | | ■ | | |
| Plaster, otherwise, including acoustical | | ■ | | | | ■ | |
| Sheathing panels, exterior grade | | ■ | | | ■ | | |
| Water-resistant, fiber-reinforced gypsum exterior sheathing | | ■ | | ■ | | | |
| Hardboard (high-density fiberboard) | | | | | | | |
| Tempered, enamel or plastic coated | | ■ | | | | ■ | |
| All other types | | ■ | | | | | ■ |
| Mineral fiberboard | | ■ | | | | | ■ |
| Oriented-strand board (OSB) | | | | | | | |
| Exterior grade | ■ | ■ | | | | ■ | |
| Edge swell-resistant OSB | ■ | ■ | | | | ■ | |
| All other types | ■ | ■ | | | | | ■ |
| Particle board | ■ | | | | | | ■ |
| Plywood | | | | | | | |
| Marine grade | ■ | ■ | ■ | | | | |
| Preservative-treated, alkaline copper quaternary (ACQ) or copper azole (C-A) | ■ | ■ | | ■ | | | |

Table 2. Types, Uses, and Classifications of Materials (continued)

| Types of Building Materials | Uses of Building Materials | | Classes of Building Materials | | | | |
|---|---|---|---|---|---|---|---|
| | | | Acceptable | | Unacceptable | | |
| | Floors | Walls/ Ceilings | 5 | 4 | 3 | 2 | 1 |
| **Structural Materials (floor slabs, beams, subfloors, framing, and interior/exterior sheathing)** | | | | | | | |
| Preservative-treated, Borate[2] | ■ | ■ | ■ | | | | |
| Exterior grade/Exposure1 (WBP – weather and boil proof) | ■ | ■ | | ■ | | | |
| All other types | ■ | ■ | | | | | ■ |
| Recycled plastic lumber (RPL) | | | | | | | |
| Commingled, with 80-90% polyethylene (PE) | ■ | | ■ | | | | |
| Fiber-reinforced, with glass fiber strands | ■ | | ■ | | | | |
| High-density polyethylene (HDPE), up to 95% | ■ | | ■ | | | | |
| Wood-filled, with 50% sawdust or wood fiber | ■ | | | | ■ | | |
| Stone | | | | | | | |
| Natural or artificial non-absorbent solid or veneer, waterproof grout | ■ | ■ | ■ | | | | |
| All other applications | | ■ | | | | ■ | |
| Structural Building Components | | | | | | | |
| Floor trusses, wood, solid (2x4s), decay-resistant or preservative-treated | ■ | ■ | | ■ | | | |
| Floor trusses, steel[3] | ■ | | ■ | | | | |
| Headers and beams, solid (2x4s) or plywood, exterior grade or preservative-treated | | ■ | | ■ | | | |
| Headers and beams, OSB, exterior grade or edge-swell resistant | | ■ | | | | ■ | |
| Headers and beams, steel[3] | | ■ | ■ | | | | |
| I-joists | ■ | | | | | ■ | |
| Wall panels, plywood, exterior grade or preservative-treated | | ■ | | ■ | | | |
| Wall panels, OSB, exterior grade or edge-swell resistant | | ■ | | | | ■ | |
| Wall panels, steel[3] | | ■ | | ■ | | | |

Table 2. Types, Uses, and Classifications of Materials (continued)

| Types of Building Materials | Uses of Building Materials | | Classes of Building Materials | | | | |
|---|---|---|---|---|---|---|---|
| | | | Acceptable | | Unacceptable | | |
| | Floors | Walls/ Ceilings | 5 | 4 | 3 | 2 | 1 |
| **Structural Materials (floor slabs, beams, subfloors, framing, and interior/exterior sheathing)** | | | | | | | |
| Wood | | | | | | | |
| Solid, standard, structural (2x4s) | | ■ | | ■ | | | |
| Solid, standard, finish/trim | | ■ | | | ■ | | |
| Solid, decay-resistant[4] | ■ | ■ | ■ | | | | |
| Solid, preservative-treated, ACQ or C-A | | ■ | | ■ | | | |
| Solid, preservative-treated, Borate[2] | | ■ | | ■ | | | |
| **Finish Materials (floor coverings, wall and ceiling finishes, insulation, cabinets, doors, partitions, and windows)** | | | | | | | |
| Asphalt tile[5] | | | | | | | |
| With asphaltic adhesives | ■ | | | | ■ | | |
| All other types | ■ | | | | | | ■ |
| Cabinets, built-in | | | | | | | |
| Wood | | ■ | | | | ■ | |
| Particle board | | ■ | | | | | ■ |
| Metal[3] | | ■ | | ■ | | | |
| Carpeting | ■ | | | | | | ■ |
| Ceramic and porcelain tile | | | | | | | |
| With mortar set | ■ | ■ | | ■ | | | |
| With organic adhesives | ■ | ■ | | | | ■ | |
| Concrete tile, with mortar set | ■ | | ■ | | | | |
| Corkboard | | ■ | | | | ■ | |
| Doors | | | | | | | |
| Wood, hollow | | ■ | | | | ■ | |
| Wood, lightweight panel construction | | ■ | | | | ■ | |
| Wood, solid | | ■ | | | | ■ | |
| Metal, hollow[3] | | ■ | | ■ | | | |
| Metal, wood core[3] | | ■ | | ■ | | | |
| Metal, foam-filled core[3] | | ■ | | ■ | | | |
| Fiberglass, wood core | | ■ | | ■ | | | |
| Epoxy, formed-in-place | ■ | | ■ | | | | |

Table 2. Types, Uses, and Classifications of Materials (continued)

| Types of Building Materials | Uses of Building Materials | | Classes of Building Materials | | | | |
|---|---|---|---|---|---|---|---|
| | | | Acceptable | | Unacceptable | | |
| | Floors | Walls/ Ceilings | 5 | 4 | 3 | 2 | 1 |
| **Finish Materials (floor coverings, wall and ceiling finishes, insulation, cabinets, doors, partitions, and windows)** | | | | | | | |
| Glass (sheets, colored tiles, panels) | | ■ | | ■ | | | |
| Glass blocks | | ■ | ■ | | | | |
| Insulation | | | | | | | |
| Sprayed polyurethane foam (SPUF) or closed-cell plastic foams | ■ | ■ | ■ | | | | |
| Inorganic – fiberglass, mineral wool: batts, blankets, or blown | ■ | ■ | | | ■ | | |
| All other types (cellulose, cotton, open-cell plastic foams, etc.) | ■ | ■ | | | | ■ | |
| Linoleum | ■ | | | | | | ■ |
| Magnesite (magnesium oxychloride) | ■ | | | | | | ■ |
| Mastic felt-base floor covering | ■ | | | | | | ■ |
| Mastic flooring, formed-in-place | ■ | | ■ | | | | |
| Metals, non-ferrous (aluminum, copper, or zinc tiles) | | ■ | | | ■ | | |
| Metals | | | | | | | |
| Non-ferrous (aluminum, copper, or zinc tiles) | | ■ | | | ■ | | |
| Metals, ferrous[3] | | ■ | | ■ | | | |
| Paint | | | | | | | |
| Polyester-epoxy and other oil-based waterproof types | | ■ | | ■ | | | |
| Latex | | ■ | | ■ | | | |
| Partitions, folding | | | | | | | |
| Wood | | ■ | | | | ■ | |
| Metal[3] | | ■ | | ■ | | | |
| Fabric-covered | | ■ | | | | | ■ |
| Partitions, stationary (free-standing) | | | | | | | |
| Wood frame | | ■ | | ■ | | | |
| Metal[3] | | ■ | | ■ | | | |
| Glass, unreinforced | | ■ | | ■ | | | |
| Glass, reinforced | | ■ | | ■ | | | |
| Gypsum, solid or block | | ■ | | | | | ■ |

Table 2. Types, Uses, and Classifications of Materials (continued)

| Types of Building Materials | Uses of Building Materials | | Classes of Building Materials | | | | |
|---|---|---|---|---|---|---|---|
| | | | Acceptable | | Unacceptable | | |
| | Floors | Walls/ Ceilings | 5 | 4 | 3 | 2 | 1 |
| **Finish Materials (floor coverings, wall and ceiling finishes, insulation, cabinets, doors, partitions, and windows)** | | | | | | | |
| Polyurethane, formed-in-place | ■ | | ■ | | | | |
| Polyvinyl acetate (PVA) emulsion cement | ■ | | | | | | ■ |
| Rubber | | | | | | | |
| Moldings and trim with epoxy polyamide adhesive or latex-hydraulic cement | | ■ | | ■ | | | |
| All other applications | | ■ | | | | | ■ |
| Rubber sheets or tiles[5] | | | | | | | |
| With chemical-set adhesives[6] | ■ | | ■ | | | | |
| All other applications | ■ | | | | | | ■ |
| Silicone floor, formed-in-place | ■ | | ■ | | | | |
| Steel (panels, trim, tile) | | | | | | | |
| With waterproof adhesives[3] | | ■ | ■ | | | | |
| With non-waterproof adhesives | | ■ | | | | ■ | |
| Terrazo | ■ | | | ■ | | | |
| Vinyl asbestos tile (semi-flexible vinyl)[5] | | | | | | | |
| With asphaltic adhesives | ■ | | ■ | | | | |
| All other applications | ■ | | | | | | ■ |
| Vinyl sheets or tiles (coated on cork or wood product backings) | ■ | | | | | | ■ |
| Vinyl sheets or tiles (homogeneous)[5] | | | | | | | |
| With chemical-set adhesives[6] | ■ | | | ■ | | | |
| All other applications | ■ | | | | | | ■ |
| Wall coverings | | | | | | | |
| Paper, burlap, cloth types | | ■ | | | | | ■ |
| Vinyl, plastic, wall paper | | ■ | | | | | ■ |
| Wood floor coverings | | | | | | | |
| Wood (solid) | ■ | | | | | | ■ |
| Engineered wood flooring | ■ | | | | | ■ | |
| Plastic laminate flooring | ■ | | | | | ■ | |
| Wood composition blocks, laid in cement mortar | ■ | | | | | ■ | |
| Wood composition blocks, dipped and laid in hot pitch or bitumen | ■ | | | | | ■ | |

Notes*:

1 Unfilled concrete block cells can create a reservoir that can hold water following a flood, which can make the blocks difficult or impossible to clean if the floodwaters are contaminated.

2 Borate preservative-treated wood meets the NFIP requirements for flood damge-resistantce; however, the borate can leach out of the wood if the material is continuously exposed to standing or moving water.

3 Not recommended in areas subject to salt-water flooding.

4 Examples of decay-resistant lumber include heart wood of redwood, cedar, and black locust. Refer to Section 2302 of the International Building Code® (IBC®) and Section R202 of the International Residential Code® (IRC®) for guidance.

5 Using normally specified suspended flooring (i.e., above-grade) adhesives, including sulfite liquor (lignin or "linoleum paste"), rubber/asphaltic dispersions, or "alcohol" type resinous adhesives (culmar, oleoresin).

6 Examples include epoxy-polyamide adhesives or latex-hydraulic cement.

* In addition to the requirements of TB 2 for flood damage resistance, building materials must also comply with any additional requirements of applicable building codes. For example, for wood products such as solid 2x4s and plywood, applicable building code requirements typically include protection against decay and termites and will specify use of preservative-treated or decay-resistant wood for certain applications. Applications that require preservative-treated or decay-resistant species include wood in contact with the ground, wood exposed to weather, wood on exterior foundation walls, or wood members close to the exposed ground. In some cases, applicable building code requirements (such as those in ASCE 24-05 and IRC 2006) do not reflect updated guidance in TB 2 and specify that all wood used below the design flood elevation be preservative-treated or naturally decay-resistant regardless of proximity to ground or exposure to weather. (Revision made in October 2010)

## Fasteners and Connectors

The term “fasteners” typically refers to nails, screws, bolts, and anchors. The term “connectors” typically refers to manufactured devices used to connect two or more building components. Joist hangers, post bases, hurricane ties and clips, and mud-sill anchors are examples of connectors. Fasteners and connectors are materials and thus must be made of flood damage-resistant materials in order to comply with the NFIP requirements.

Specifications for fasteners and connectors used in buildings in SFHAs are in ASCE 24, a standard referenced by the IBC. Chapter 23 of the IBC has specific requirements for connections and fasteners used with wood, including preservative-treated wood. Similar specifications are in Chapter 3 of the IRC.

Table 2 does not specifically address fasteners and connectors. However, it is clear that the performance of buildings that are exposed to flooding is, at least in part, a function of the fasteners and connectors used to put the components together. When preservative-treated woods are used, particular attention is required for fasteners and connectors because some treatments are more corrosive than others, which could shorten the service life of the fasteners and connectors. For example, alkaline copper quaternary (ACQ) treatments are more corrosive than traditional acid copper chromate (ACC) treatments. If corrosion occurs, buildings are less likely to withstand flood loads and other loads. Fasteners and connectors made of stainless steel, hot-dipped zinc-coated galvanized steel, silicon bronze, or copper are recommended for use with preservative-treated wood.

This Technical Bulletin, consistent with ASCE 24 and the International Code Series, recommends that stainless steel or hot-dip galvanized fasteners and connectors be used below the BFE in both inland (noncorrosive) and coastal (corrosive) areas. In coastal environments where airborne salts contribute to corrosion, it is recommended that corrosion-resistant fasteners and connectors be used throughout the building where they may be exposed. For

additional guidance, see Technical Bulletin 8, *Corrosion Protection for Metal Connectors in Coastal Areas*. Also see TPI/WTCA *Guidelines for Use of Alternative Preservative Treatments with Metal Connector Plates* for further guidance on metal plate connected wood trusses manufactured with preservative treated lumber (http://www.sbcindustry.com/images/PTWGuidelines.pdf).

# Construction Examples

## Buildings in Zones A, AE, A1-A30, AR, AO, and AH

Figure 1 illustrates a solid foundation wall (crawlspace) elevated to meet the minimum requirement that the lowest floor be at the BFE. Figure 2 illustrates framed walls that may be used for enclosures below the BFE that are used for parking of vehicles, building access, and storage.

To maximize allowable use of enclosures below the BFE, it is a common practice to extend the foundation a full story, even though that puts the lowest floor well above the BFE. In such cases, while the NFIP requirement is that flood damage-resistant materials be used only below the BFE, it is strongly recommended that such materials be used for all construction below the lowest floor. This will reduce flood damage to the enclosed area in the event flooding exceeds the BFE. For additional guidance on enclosures in A zones, see Technical Bulletin 1, *Openings in Foundation Walls and Walls of Enclosures Below Elevated Buildings in Special Flood Hazard Areas*.

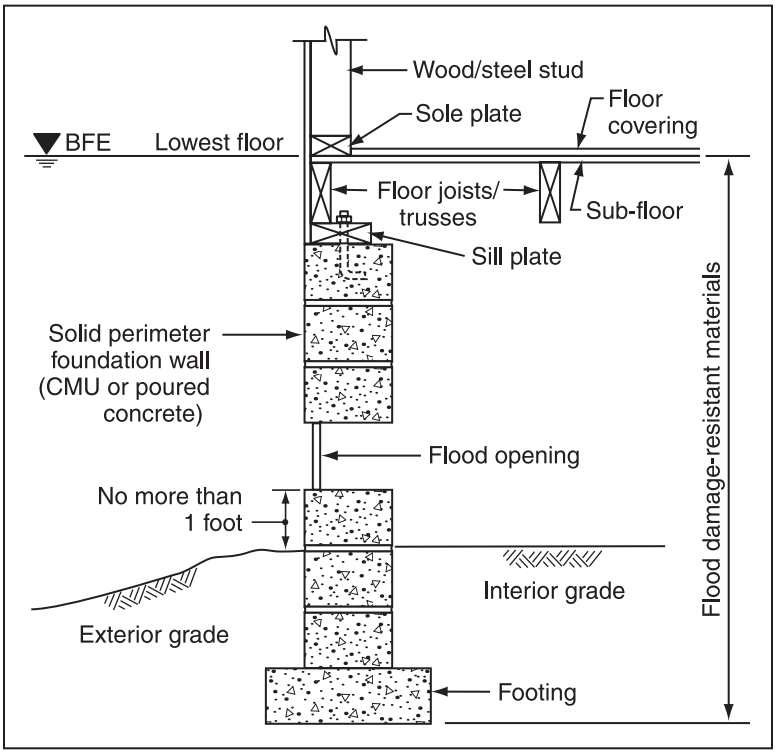



**Figure 1. Building elevated on solid foundation walls meeting the minimum NFIP requirements for Zones A, AE, A1-A30, AR, AO, and AH**

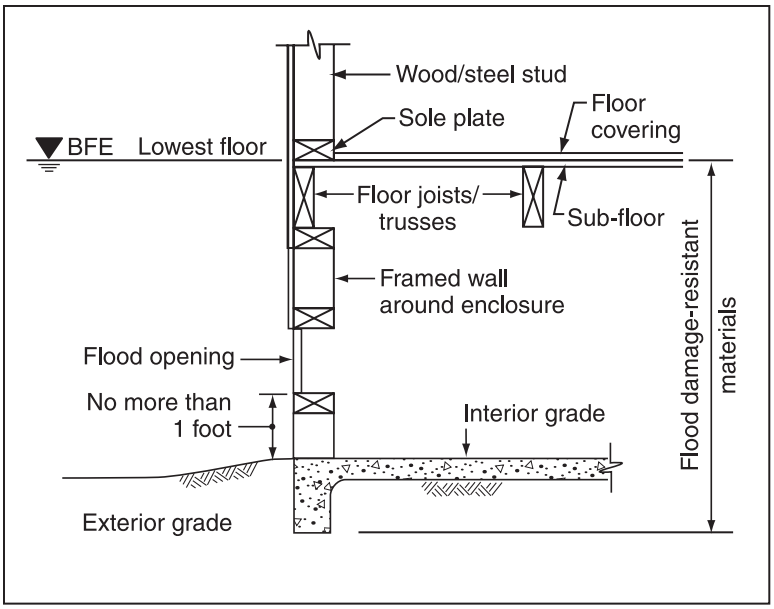



**Figure 2. Framed enclosure under building elevated in accordance with NFIP requirements for Zones A, AE, A1-A30, AO, and AH**

### Buildings in Zones V, VE, and V1-V30

The NFIP regulations require that the bottom of the lowest horizontal structural member of the lowest floor (usually the floor beam or girder) of buildings in Zones V, VE, and Vl-V30 be at or above the BFE. Therefore, all materials below the bottom of those members must be flood damage-resistant materials. This requirement applies to lattice work and screening, and also to materials used to construct breakaway walls that enclose areas below the lowest floor. Depending on the design parameters selected, breakaway walls may remain in place during low-level floods and must be flood damage-resistant so that they can be readily cleaned and not deteriorate over time due to wetting. Figure 3 illustrates the requirement. For additional guidance on breakaway walls used to enclose areas under buildings in V zones, see Technical Bulletin 9, *Design and Construction Guidance for Breakaway Walls Below Elevated Coastal Buildings.*

## Additional Uses of Flood Damage-Resistant Materials

### Accessory Structures

Accessory structures may be allowed in SFHAs provided they are located, installed, and constructed in ways that comply with NFIP requirements. Some communities allow accessory structures that are limited to the uses specified for enclosures below the BFE: parking of vehicles and storage. As with other buildings, accessory structures below the BFE are required to be constructed with flood damage-resistant materials. In addition, accessory structures must be anchored to resist flotation, collapse, and lateral movement and comply with other requirements based on the flood zone. For additional information and requirements, contact the appropriate community permitting office.

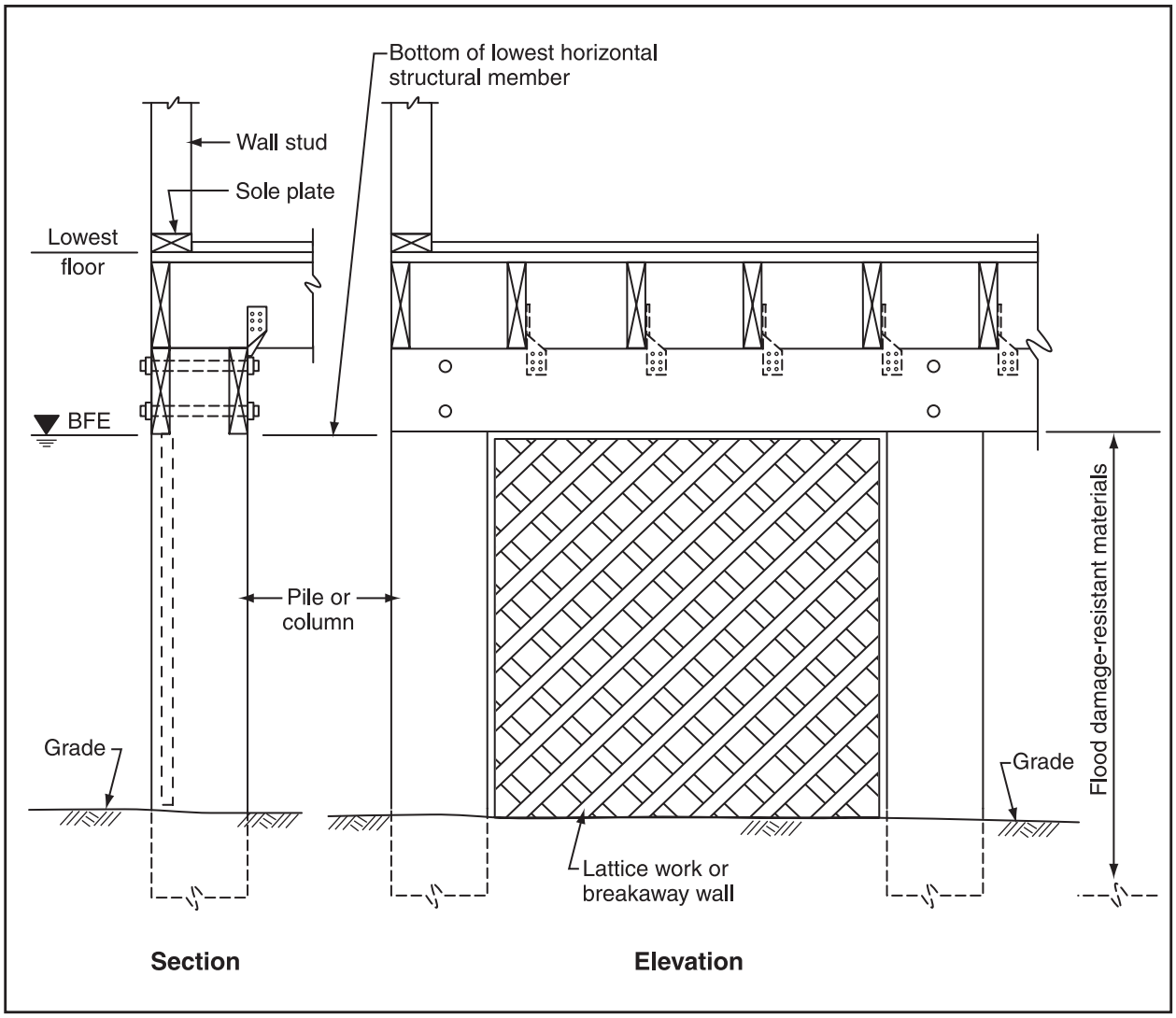



**Figure 3. Flood damage-resistant building material requirements for buildings elevated in accordance with NFIP requirements for Zones V, VE, and V1-V30**

## Wet Floodproofing

Wet floodproofing is a method to reduce damage that typically involves three elements: allowing floodwaters to enter and exit to minimize structural damage, using flood damage-resistant materials, and elevating utility service and equipment. When a building is retrofitted to be wet floodproofed, non-flood damage-resistant materials that are below the BFE should be removed and replaced with flood damage-resistant materials. This will reduce the costs of repair and facilitate faster recovery.

Wet floodproofing is not allowed in lieu of complying with the lowest floor elevation requirements for new residential buildings (or dry floodproofing of nonresidential buildings in A zones). The exception is accessory structures, as noted on the previous page. Wet floodproofing may also be used to voluntarily retrofit buildings that are older than the date of the community's first FIRM (commonly referred to as "pre-FIRM"), provided the requirement to

bring such buildings into compliance is not triggered (called "substantial improvement"). Figure 4 illustrates some suggested retrofitting of interior walls in a pre-FIRM building. However, please note that the techniques illustrated in Figure 4 cannot be used to bring a substantially damaged or substantially improved building into compliance with the NFIP. For additional information on wet floodproofing, see Technical Bulletin 7, *Wet Floodproofing Requirements*.

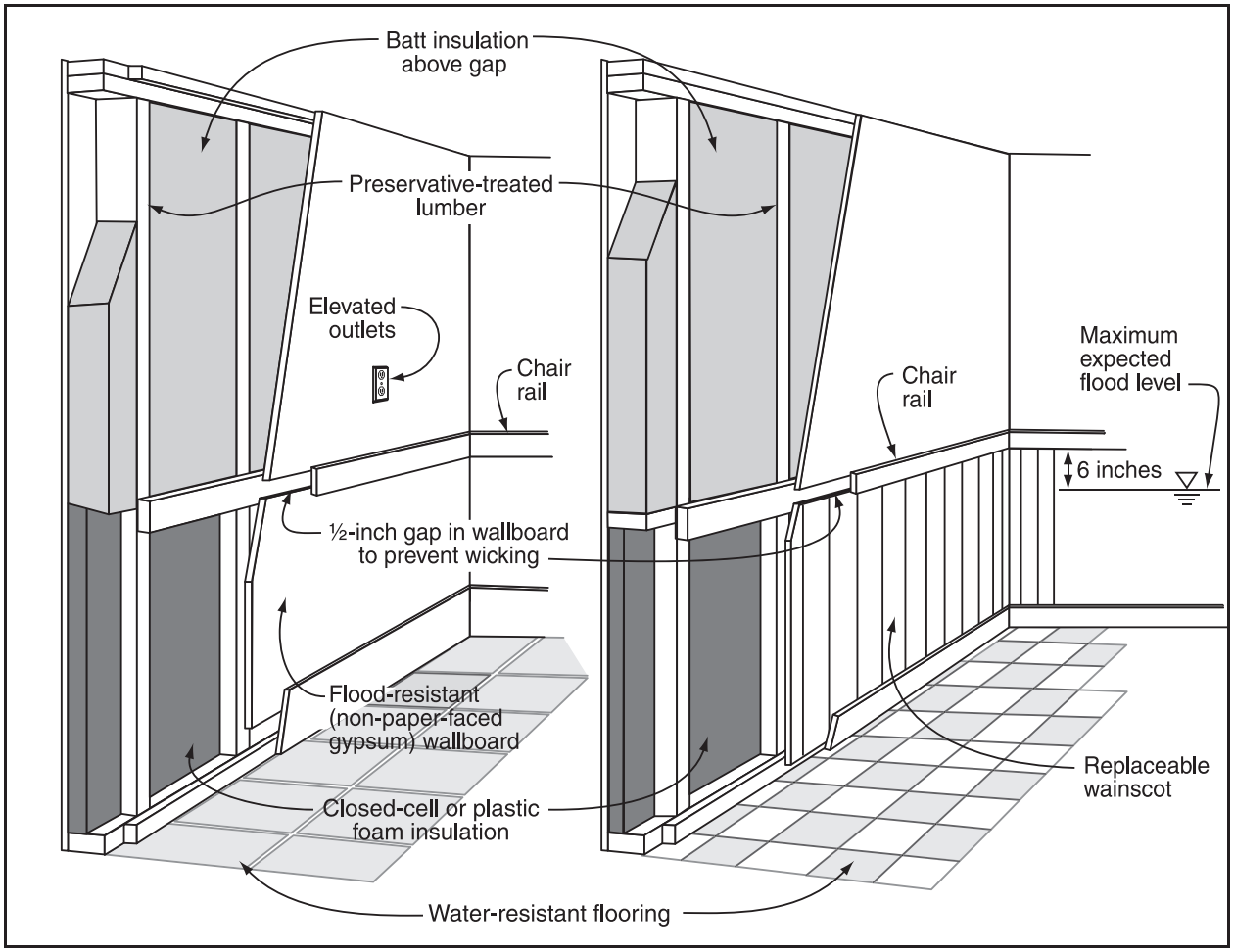



**Figure 4. Partial wet floodproofing technique using flood damage-resistant materials for finished wall construction.**

## Buildings Outside of SFHAs

FEMA reports that up to 25 percent of NFIP flood insurance claims are paid on buildings that are outside of the mapped SFHA. This occurs for many reasons, including out-of-date maps and local drainage problems. In areas known to be prone to flooding that are not subject to the NFIP requirements, it is recommended that flood damage-resistant materials be used for construction of new buildings and for repair or renovation of existing buildings. Figure 4 illustrates some options.

## The NFIP

The U.S. Congress established the NFIP with the passage of the National Flood Insurance Act of 1968. The NFIP is a Federal program enabling property owners in participating communities to purchase insurance as protection against flood losses, in exchange for State and community floodplain management regulations that reduce future flood damages. Participation in the NFIP is based on an agreement between communities and the Federal Government. If a community adopts and enforces adequate floodplain management regulations, FEMA will make flood insurance available within the community.

Title 44 of the U.S. Code of Federal Regulations contains the NFIP criteria for floodplain management, including design and construction standards for new and substantially improved buildings located in SFHAs identified on the NFIP's FIRMs. FEMA encourages communities to adopt floodplain management regulations that exceed the NFIP criteria. As an insurance alternative to disaster assistance, the NFIP reduces the escalating costs of repairing damage to buildings and their contents caused by floods.

## NFIP Technical Bulletins

This is one of a series of Technical Bulletins that FEMA has produced to provide guidance concerning the building performance requirements of the NFIP. These requirements are contained in Title 44 of the U.S. Code of Federal Regulations at Section 60.3. The bulletins are intended for use by State and local officials responsible for interpreting and enforcing the requirements in their floodplain management regulations and building codes, and by members of the development community, such as design professionals and builders. New bulletins, as well as updates of existing bulletins, are issued periodically, as necessary. The bulletins do not create regulations; rather, they provide specific guidance for complying with the requirements of existing NFIP regulations. Users of the Technical Bulletins who need additional guidance should contact their NFIP State Coordinator or the appropriate FEMA regional office. *The User's Guide to Technical Bulletins* (http://www.fema.gov/pdf/fima/guide01.pdf) lists the bulletins issued to date.

## Ordering Technical Bulletins

The quickest and easiest way to acquire copies of FEMA's Technical Bulletins is to download them from the FEMA website (http://www.fema.gov/plan/prevent/floodplain/techbul.shtm).

Technical Bulletins also may be ordered free of charge from the FEMA Distribution Center by calling 1-800-480-2520, or by faxing a request to 1-240-699-0525, Monday through Friday between 8 a.m. and 5 p.m. EST. Please provide the FEMA publication number, title, and quantity of each publication requested, along with your name, address, zip code, and daytime telephone number. Written requests may be submitted by email to: FEMA-Publications-Warehouse@dhs.gov

## Further Information

The following publications provide further information concerning the use of flood damage-resistant materials.


Algan, H. and Wendt, R. 2005. *Pre-Standard Development for the Testing of Flood-Damage-Resistant Residential Envelope Systems, Comparison of Field and Laboratory Results - Summary Report*, Oak Ridge National Laboratory, June 2005.

American Red Cross, FEMA. 1992. *Repairing Your Flooded Home*, FEMA 232, ARC 4477.

American Society of Civil Engineers, Structural Engineering Institute. 2005. *Flood Resistant Design and Construction*, ASCE/SEI 24-05.

American Society of Civil Engineers, Structural Engineering Institute. 2005. *Minimum Design Loads for Buildings and Other Structures*, ASCE/SEI 7-05.

Brick Institute of America, n.d. *Technical Notes for Brick Construction*, Brick Institute of America, McLean, Virginia.

California Integrated Waste Management Board. 2004. "Recycled Plastic Lumber," California Integrated Waste Management Board, web page, last updated June 22, 2004 (http://www.ciwmb.ca.gov/Plastic/Recycled/Lumber).

Department of Energy. 2005. *Energy-Efficient Flood-Damage-Resistant Home Reconstruction*, (http://www.ornl.gov/sci/res_buildings/FEMA-attachments/Flood_damage-reconstruction.pdf).

FEMA. 1991. *Answers to Questions About Substantially Damaged Buildings*, FEMA 213.

FEMA. 1993. *Wet Floodproofing Requirements*, Technical Bulletin 7-93, FIA-TB-7.

FEMA. 1996. *Corrosion Protection for Metal Connectors in Coastal Areas*, Technical Bulletin 8-96, FIA-TB-8.

FEMA. 2000. *Coastal Construction Manual*, FEMA 55CD (3rd edition).

FEMA. 2005. *Home Builder's Guide to Coastal Construction: Technical Fact Sheet Series*, FEMA 499.

FEMA. 2006. *Mitigation Assessment Team Report: Hurricane Katrina in the Gulf Coast*, FEMA 549.

FEMA. 2007. *National Flood Insurance Program: Flood Insurance Manual*, Revised October 2007.

International Code Council, Inc. 2006. International Building Code®, IBC® 2006.

International Code Council, Inc. 2006. International Residential Code®, IRC® 2006.

Simpson Strong-Tie. 2008. *Technical Bulletin: Preservative-Treated Wood*, Simpson Strong-Tie T-PTWOOD08-R, July 2008 (http://www.strongtie.com/ftp/bulletins/T-PTWOOD08-R.pdf).

TPI/WTCA. 2004. TPI/WTCA *Guidelines for Use of Alternative Preservative Treatments with Metal Connector Plates*, updated June 4, 2007, (http://www.sbcindustry.com/images/PTWGuidelines.pdf).

U.S. Army Corps of Engineers. 1984. *Flood Proofing Systems and Techniques*, U.S. Army Corps of Engineers, December 1984.

U.S. Army Corps of Engineers. 1995. *Flood Proofing Regulations*, Chapters 9 and 10, U.S. Army Corps of Engineers, EP 1165-2-314.

Wood Truss Council of America (WTCA). 2005. *The Load Guide: Guide to Good Practice for Specifying and Applying Loads to Structural Building Components*, (http://www.sbcindustry.com/loads.php).

World Floor Covering Association (WFCA). n.d., Anaheim, California (http://www.wfca.org/index.html).

## Glossary

**Accessory structure —** A structure that is on the same parcel of property as a principal structure, the use of which is incidental to the use of the principal structure.

**Base flood —** The flood having a 1-percent chance of being equaled or exceeded in any given year, commonly referred to as the "100-year flood." The base flood is the national standard used by the NFIP and all Federal agencies for the purposes of requiring the purchase of flood insurance and regulating new development.

**Base flood elevation (BFE) —** The height of the base (1-percent annual chance or 100-year) flood in relation to a specified datum, usually the National Geodetic Vertical Datum of 1929, or the North American Vertical Datum of 1988.

**Basement —** Any area of a building having its floor subgrade (below ground level) on all sides.

**Enclosure or enclosed area —** Areas created by a crawlspace or solid walls that fully enclose areas below the BFE.

**Federal Emergency Management Agency (FEMA) —** The Federal agency that, in addition to carrying out other activities, administers the National Flood Insurance Program.

**Federal Insurance and Mitigation Administration (FIMA) —** The component of FEMA directly responsible for administering the flood hazard identification and floodplain management aspects of the NFIP.

**Flood Insurance Rate Map (FIRM) —** The official map of a community on which FEMA has delineated both the special flood hazard areas (SFHAs) and the risk premium zones applicable to the community.

**Floodprone area —** Any land area susceptible to being inundated by floodwater from any source.

**Lowest floor —** The lowest floor of the lowest enclosed area of a building, including a basement. Any NFIP-compliant unfinished or flood-resistant enclosure usable solely for parking of vehicles, building access, or storage (in an area other than a basement) is not considered a building's lowest floor, provided the enclosure does not render the structure in violation of the applicable design requirements of the NFIP.

**Registered Design Professional —** An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the State or jurisdiction in which the project is to be constructed.

**Special Flood Hazard Area (SFHA) —** An area delineated on a FIRM as being subject to inundation by the base flood and designated as Zone A, AE, A1-A30, AR, AO, AH, A99, V, VE, or V1-V30.

**Substantial damage —** Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred. Structures that are determined to be substantially damaged are considered to be substantial improvements, regardless of the actual repair work performed.

**Substantial improvement —** Any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure (or smaller percentage if established by the community) before the "start of construction" of the improvement. This term includes structures that have incurred "substantial damage," regardless of the actual repair work performed.

# TOWN OF GOLDEN BEACH

One Golden Beach Drive, Golden Beach, FL 33160
Phone: (305) 932-0744 Fax: (305) 933-3825
www.goldenbeach.us


## NON-CONVERSION AGREEMENT FOR ENCLOSURES BELOW THE BASE FLOOD ELEVATION OR DESIGN FLOOD ELEVATION

This DECLARATION made this __day of , 20_____, by _____ ("Owner") having an address at _____ in the Town of Golden Beach, Florida designated in the Tax Records as Folio #_____as recorded in the public records of Miami Dade County in Book No._____, Page No. _____.

WITNESSETH:

WHEREAS, the Owner has applied for a permit to construct, improve, or repair the property owned by _____ (name) at _____ (address) in the Town of Golden Beach and:

1) It is identified by building Permit No. _____, dated _____;
2) It is located on a flood hazard area identified on Flood Insurance Rate Map Panel # _____ ,dated _____;
3) It is located in flood zone(s):

_____ Base Flood Elevation _____
_____ Base Flood Elevation _____
_____ Base Flood Elevation _____

Seaward of LiMWA or community defined Coastal A Zone limit: ☐ Yes ☐ No

Seaward of Coastal Construction Control Line: ☐ Yes ☐ No
Florida Department of Environmental Protection 100-Year Storm Elevation _____ (NGVD).

4) It is designed to conform to the requirements of the Town of Golden Beach Floodplain Management Ordinance referred herein as "Land Development Regulations," of Golden Beach and the most current edition of the Florida Building Code - Residential; and
5) If unauthorized improvements, modifications, alterations, conversions or repairs are made to it in the future, the structure could be made noncompliant by such unauthorized actions, including such actions by future owners.

WHEREAS, the Owner agrees to record this DECLARATION OF LAND RESTRICTION (NON-CONVERSION AGREEMENT) in the public records of Miami Dade County and certifies, accepts and declares that the following covenants, conditions and restrictions are placed on the affected property as a condition of granting the Permit, and affects rights and obligations of the Owner and any future owners, and shall be binding on the Owner, his heirs, personal representatives, successors and assigns.

THE PERMITTED STRUCTURE SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE FLORIDA BUILDING CODE – RESIDENTIAL AND/OR LOCAL FLOODPLAIN MANAGEMENT REGULATIONS, AS APPLICABLE AND SUBJECT TO THE CONDITIONS, as follows:

1. The structure or part thereof to which these conditions apply is:
   ☐ An enclosure that is below the Base Flood Elevation or Design Flood Elevation.

☐ A detached, allowable accessory structure that is not elevated.

2. Enclosed areas below the Base Flood Elevation or Design Flood Elevation, whichever is higher, shall be used solely for parking of vehicles, limited storage, or access to the building. All interior walls, ceilings and floors within the enclosed area shall be unfinished or constructed of flood damage-resistant materials and shall not be used for recreational or habitable purposes. Installation of minimal electrical, mechanical and plumbing equipment, devices and fixtures as allowed by the Florida Building Code.
3. The walls of the enclosed areas below the Base Flood Elevation or Design Flood Elevation of the structure or part thereof identified in #1 shall be designed to breakaway. The breakaway walls shall not be altered in any way that prevents the walls from breaking away, as designed, under flood conditions.
4. The breakaway walls of the enclosed areas below the Base Flood Elevation or Design Flood Elevation of the structure or part thereof identified in #1 shall be equipped with flood openings. The flood openings shall not be blocked, covered, manually closed or modified in any way that would alter the intended performance to allow floodwaters to automatically enter and exit.
5. Any conversion, alteration, modification, improvement, repair or changes from these conditions constitute a violation of the Permit and this agreement, and may render the structure non-compliant with minimum requirements, and result in higher NFIP flood insurance rates. The Town of Golden Beach, as the jurisdiction issuing the Permit and enforcing this agreement, may take any appropriate legal action to correct any violation.
6. A duly appointed representative of the City is authorized to enter the property for the purpose of inspecting the exterior and interior of the enclosed area to verify compliance with this Declaration. Such inspections will be conducted upon due notice to the Owner and no more frequently than once year. More frequent inspections may be conducted if the annual inspection discovers a violation of the Permit
7. Other conditions: _____

_____

In witness whereof the undersigned set hands and seals this ____day of _____, 20_____.

| | | |
|---|---|---|
| _____ | _____ | _____ |
| Owner's Name (Printed) | Signature of Owner | Date |
| _____ | _____ | _____ |
| Owner's Name (Printed) | Signature of Owner | Date |
| _____ | _____ | _____ |
| Witness's Name (Printed) | Signature of Witness | Date |

Sworn to and Subscribed before me this _____ day of _____, 20 _____.

_____ (SEAL)
Signature – State of Florida Notary Public

Personally known _____ OR, Produced Identification _____
Type of ID Produced _____

**(DOCUMENT MUST BE RECORDED AND PROOF OF RECORDING PROVIDED)**