

G. Wind Zone Comparisons (HUD's MHCSS and FEMA 85)

G.1 Background

HUD's *Manufactured Home Construction and Safety Standards* (MHCSS; 24 CFR 3280) and its *Model Manufactured Home Installation Standards* (24 CFR 3285) categorize the United States and many of its territories and protectorates into three wind zones: Zone I, Zone II, and the highest wind zone, Zone III.

FEMA 85, NFPA 225 *Model Manufactured Home Installation Standard*, and NFPA 501 *Standard on Manufactured Housing* categorize the U.S. into four wind zones: Zone I, Zone II, Zone III, and the highest wind zone, Zone IV. However, to avoid confusion, in this appendix Zones 1, 2, 3, and 4 will be used to distinguish the NFPA zones from the HUD zones.

This appendix explains the differences between the wind provisions contained in the HUD standards and those contained in FEMA 85 and the NFPA standards.

G.2 Wind Provisions

The HUD standards, FEMA 85, and the NFPA standards all contain wind provisions based on ASCE 7, *Minimum Design Loads for Buildings and Other Structures*; however, they are not all based on the same edition of ASCE 7. HUD documents are based on a modified version of the 1988 edition of ASCE 7. FEMA 85 and the NFPA standards are based on more recent editions. The wind loads used to design FEMA 85 foundations comply with ASCE 7-02; the NFPA standards reference ASCE 7-05.

Only minor differences exist between the wind provisions of ASCE 7-05 and ASCE 7-02; however, the wind provisions of both ASCE 7-05 and ASCE 7-02 differ greatly from the wind provisions of ASCE 7-88.

Two major differences exist between ASCE 7-88 and ASCE 7-05. The basic wind speed map (Figure 6-1) in ASCE 7-88 was completely redrawn in 1995 and revised in 1998. The newer maps show high-wind zones extending much farther inland than those shown on the 1988 map. Also, the basic wind speeds are based on different averaging times. The 1988 edition of ASCE 7 uses

fastest mile wind speeds; ASCE 7-02 and 7-05 use 3-second gust wind speeds. The wind speeds in the older standard are numerically less than those in the contemporary standards. For example, ASCE 7-88 required buildings in the interior portion of the U.S. to be designed for a 70-mph (fastest mile) wind speed; ASCE 7-02 and 7-05 place the interior portions of the U.S. in a 90-mph (3-second gust) wind speed area. While the wind speeds are numerically greater, the design wind loads are often not greater and, in some areas, the wind loads are less.

G.3 Wind Zones

HUD regulates wind zones as:

HUD Zone II: Areas where the basic wind speed is 100 mph (fastest mile)

HUD Zone III: Areas where the basic wind speed is 110 mph (fastest mile)

HUD Zone I includes all areas not identified as either HUD Zone II or HUD Zone III and is not associated with a specific wind speed.

FEMA 85 and the NFPA Codes Zones identify wind zones as:

Zone 1: Areas bounded by the 90-mph isotach¹ in ASCE 7-02 (ASCE 7-05 for the NFPA codes)

Zone 2: Areas between the 90-mph and the 110-mph isotachs

Zone 3: Areas between the 110-mph and the 130-mph isotachs

Zone 4: Areas between the 130-mph and the 150-mph isotachs

Figure G-1 shows the HUD wind speed map contained in 24 CFR 3280. Figure G-2 shows the wind speed map used for FEMA 85 and the NFPA standards.

Note that the 2006 IBC Section §1609.3.1 shows the relationship between fastest mile and 3-second gust wind speeds.

$$V_{fm} = (V_{3\text{ sec}} - 10.5)/1.05$$

Where: V_{fm} = Fastest mile wind speed (mph)

$V_{3\text{ sec}}$ = 3-second gust wind speed (mph)

¹ An isotach is a line in a given surface connecting points with equal wind speeds.

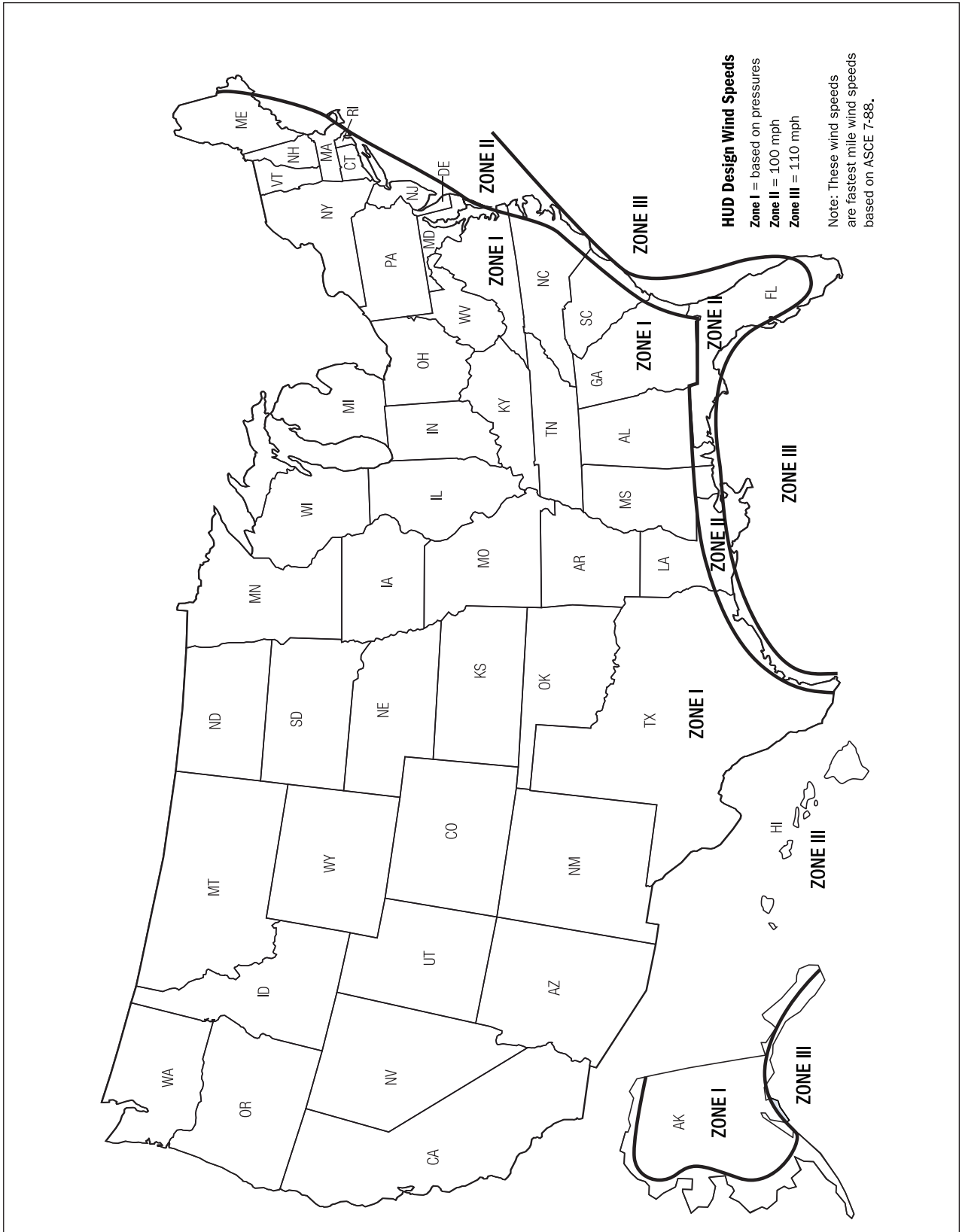


Figure G-1. Basic wind zone map for manufactured housing.

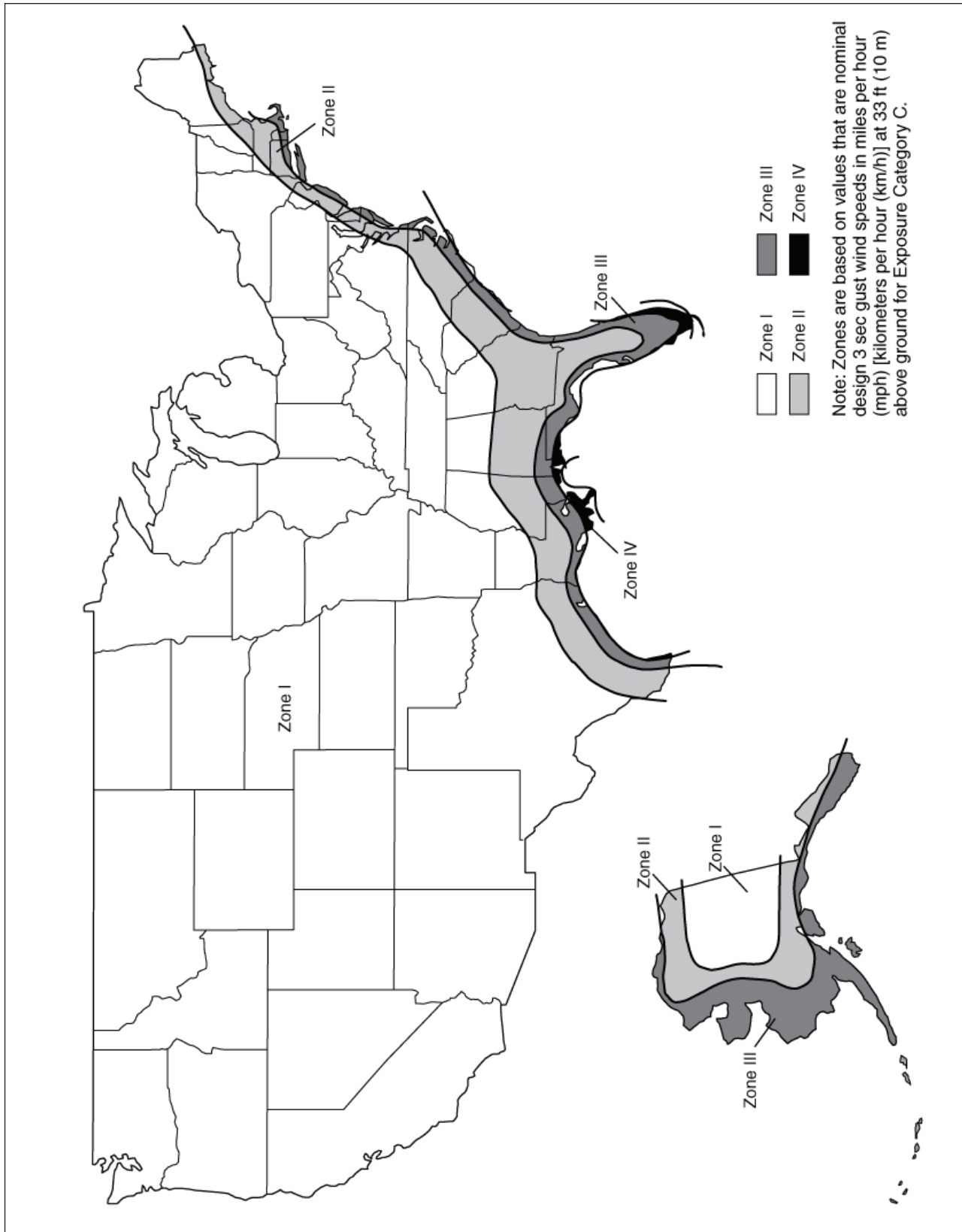


Figure G-2. NFPA 501 wind speed map.

G.4 Wind Speeds and County Lists

Wind speeds for communities are typically determined when building codes are adopted. The wind speeds should agree with those specified by ASCE 7, but are often decided upon by local officials particularly in large municipalities where several wind speeds apply.

For manufactured homes, wind zones are specified by the MHCSS and are listed by State and County. The MHCSS lists Counties contained in Wind Zones II and III. By default, all Counties not listed as either in Zone II or III are in HUD Zone I.

The following list identifies Counties by State for the various wind zones used in FEMA 85. Counties that are not listed or that are within the 90-mph isotach are in Zone I.

Zone 4 (150 mph)

Florida: Broward, Martin, Miami-Dade, Monroe, Palm Beach

Louisiana: Parishes of Cameron, Lafourche, Plaquemines, St. Bernard, St. Mary, Terrebonne, Vermillion

Mississippi: Jackson

North Carolina: Brunswick, Carteret

Texas: Cameron

The U.S. Territories of Guam, Northern Mariana Islands, Puerto Rico, Trust Territory of the Pacific Islands, and the United States Virgin Islands

Zone 3 (130 mph)

American Samoa

Alabama: Baldwin, Mobile

Alaska: The coastal regions seaward of the 110-mph isotach on the ASCE 7 map

Connecticut: Middlesex, New London

Florida: Bay, Brevard, Calhoun, Charlotte, Citrus, Collier, DeSoto, Dixie, Duval, Escambia, Flagler, Gulf, Hendry, Hernando, Hillsborough, Holmes, Indian River, Jackson, Lee, Levy, Liberty, Manatee, Nassau, Okaloosa, Okeechobee, Pasco, Pinellas, Santa Rosa, Sarasota, St. Johns, St. Lucie, Taylor, Volusia, Wakulla, Walton, Washington

Georgia: Bryan, Camden, Chatham, Glynn, Liberty, McIntosh

Louisiana: Parishes of Assumption, Iberia, Lafayette, Orleans, St. Charles, St. James, St. John the Baptist, St. Martin, St. Tammany

Maryland: Somerset, Worcester

Massachusetts: Barnstable, Bristol, Dukes, Nantucket, Plymouth

Mississippi: George, Greene, Hancock, Harrison, Pearl River, Perry, Stone

New Jersey: Atlantic, Cape May, Ocean

New York: Nassau, Suffolk

North Carolina: Beaufort, Camden, Chowan, Columbus, Craven, Currituck, Dare, Hyde, Jones, New Hanover, Onslow, Pamlico, Pasquotank, Pender, Perquimans, Tyrrell, Washington

Rhode Island: Bristol, Kent, Newport, Washington

South Carolina: Beaufort, Charleston, Georgetown, Horry

Texas: Brazoria, Calhoun, Chambers, Galveston, Jefferson, Kenedy, Kleberg, Matagorda, Nueces, Refugio, San Patricio, Willacy

Virginia: Accomack, Northampton

Zone 2 (110 mph)

Alabama: Autauga, Barbour, Bibb, Bullock, Butler, Chambers, Chilton, Choctaw, Coffee, Conecuh, Coosa, Covington, Crenshaw, Dale, Dallas, Elmore, Escambia, Macon, Montgomery, Perry, Pike, Russell, Sumter, Tallapoosa, Washington, Wilcox

Connecticut: Fairfield, Hartford, Litchfield, New Haven, Tolland, Windham

Delaware: Kent, Sussex

Florida: Alachua, Baker, Bradford, Clay, Columbia, De Soto, Gadsden, Gilchrist, Glades, Hamilton, Hardee, Highlands, Jefferson, Lafayette, Lake, Leon, Madison, Marion, Orange, Osceola, Putnam, Polk, Seminole, Sumter, Suwannee, Union

Georgia: Appling, Atkinson, Bacon, Baker, Baldwin, Ben Hill, Berrien, Bibb, Bleckley, Brantley, Brooks, Bulloch, Burke, Calhoun, Charlton, Chattahoochee, Clay, Clinch, Coffee, Colquitt, Columbia, Cook, Crawford, Crisp, Decatur, Dodge, Dooly, Dougherty, Early, Echols, Effingham, Emanuel, Evans, Glascock, Grady, Hancock, Harris, Houston, Irwin, Jeff Davis, Jefferson, Jenkins, Johnson, Jones, Lamar, Lanier, Laurens, Lee, Long, Lowndes, Macon, Marion, McDuffie, Meriwether, Miller, Mitchell, Monroe, Montgomery, Muscogee, Peach, Pierce, Pike, Pulaski, Quitman, Randolph, Richmond, Schley, Screven, Seminole, Stewart, Sumter, Talbot, Tattnall,

Taylor, Telfair, Terrell, Thomas, Tift, Toombs, Treutlen, Troup, Turner, Twigg, Upson, Ware, Warren, Washington, Wayne, Webster, Wheeler, Wilcox, Wilkinson, Worth

Hawaii: the entire state

Louisiana: Parishes of Acadia, Allen, Ascension, Avoyelles, Beauregard, Calcasieu, Catahoula, Concordia, East Baton Rouge, East Feliciana, Evangeline, Iberville, Jefferson Davis, Jefferson, Livingston, Pointe Coupee, Rapides, St. Helena, St. Landry, St. Martin, Tangipahoa, Vermilion, Vernon, Washington, West Baton Rouge, West Feliciana

Maine: Androscoggin, Cumberland, Hancock, Kennebec, Knox, Lincoln, Sagadahoc, Waldo, York

Maryland: Caroline, Dorchester, Queen Annes, Talbot, Wicomico

Massachusetts: Bristol, Essex, Franklin, Hampden, Hampshire, Middlesex, Norfolk, Suffolk, Worcester

Mississippi: Adams, Amite, Claiborne, Clarke, Copiah, Covington, Forrest, Franklin, Hinds, Jasper, Jefferson, Jefferson Davis, Jones, Kemper, Lamar, Lauderdale, Lawrence, Leake, Lincoln, Marion, Neshoba, Newton, Noxubee, Pike, Rankin, Scott, Simpson, Smith, Walthall, Wayne, Wilkinson, Winston

New Hampshire: Cheshire, Hillsborough, Merrimack, Rockingham, Strafford

New Jersey: Bergen, Burlington, Camden, Cumberland, Essex, Gloucester, Hudson, Mercer, Middlesex, Monmouth, Morris, Passaic, Salem, Somerset, Union

New York: Bronx, Kings, New York, Putnam, Queens, Richmond, Rockland, Westchester

North Carolina: Bertie, Bladen, Cumberland, Duplin, Edgecombe, Gates, Greene, Halifax, Harnett, Hertford, Hoke, Johnston, Lenior, Martin, Nash, Northampton, Pitt, Robeson, Sampson, Scotland, Wayne, Wilson

Pennsylvania: none

Rhode Island: Providence

South Carolina: Aiken, Allendale, Bamberg, Barnwell, Berkeley, Calhoun, Chesterfield, Clarendon, Colleton, Darlington, Dillon, Dorchester, Fairfield, Florence, Hampton, Jasper, Kershaw, Lancaster, Lee, Lexington, Marion, Marlboro, Orangeburg, Richland, Sumter, Williamsburg

Texas: Angelina, Atascosa, Austin, Bastrop, Bee, Brooks, Burlison, Caldwell, Colorado, De Witt, Duval, Fayette, Fort Bend, Goliad, Gonzales, Grimes, Guadalupe, Hardin, Harris, Hidalgo, Jackson, Jasper, Jim Hogg, Jim Wells, Karnes, Lavaca, Lee, Liberty, Live Oak, McMullen, Montgomery,

Newton, Orange, Polk, San Jacinto, Starr, Trinity, Tyler, Victoria, Walker, Waller, Washington, Webb, Wharton, Wilson, Zapata

Virginia: Gloucester, Isle of Wight, James City, Lancaster, Mathews, Middlesex, Northumberland, Southampton, Surry, York. Cities of Chesapeake, Hampton, Newport News, Norfolk, Suffolk, Virginia Beach