

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 according to 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.

2. Add new tables as follows:

**TABLE R401.1  
FOUNDATION UPLIFT LIGHT STEEL AND WOOD FRAME  
BUILDINGS IN EXPOSURE B (pf) <sup>5,6</sup>**

Roof Angle	Bldg Width	Minimum Building Length	WIND VELOCITY / VELOCITY PRESSURE						
			100	110	120	130	140	150	
			15	18	22	26	30	34	
45	3 Stories <sup>3</sup>	20	12	173	276	389	512	644	787
		25	14	73	165	265	374	492	618
		30	19	0	81	174	275	384	502
		35	25	17	48	104	200	305	417
		40	35	33	69	109	152	240	349
	2 Stories <sup>2</sup>	20	12	64	126	195	270	350	437
		25	15	17	66	129	198	272	352
		30	22	38	62	90	146	217	294
		35	35	56	86	118	154	192	252
		40	40	74	108	146	186	230	277
	1 Story <sup>1</sup>	20	12	33	46	61	94	132	173
		25	22	57	75	96	118	142	167
		30	18	79	103	129	157	187	219
		35	16	100	128	159	192	229	267
		40	16	120	152	188	226	268	312
30	3 Stories <sup>3</sup>	20	12	92	177	271	373	483	601
		25	17	0	63	143	230	324	425
		30	25	0	23	52	125	209	300
		35	35	13	44	78	115	154	206
		40	40	28	64	102	145	190	239
	2 Stories <sup>2</sup>	20	13	1	50	103	162	224	292
		25	23	16	35	57	84	139	199
		30	30	36	60	87	116	148	181
		35	35	54	83	115	150	187	227
		40	36	71	104	141	181	224	270
	1 Story <sup>1</sup>	20	20	32	46	60	76	93	112
		25	15	56	74	95	117	140	166
		30	13	78	102	127	155	185	217
		35	14	99	127	157	190	226	264
		40	16	118	150	185	223	264	308

Roof Angle	Bldg Width	Minimum Building Length <sup>4</sup>	WIND VELOCITY / VELOCITY PRESSURE						
			100	110	120	130	140	150	
			15	18	22	26	30	34	
20	3 Stories <sup>3</sup>	20	12	113	203	301	408	523	647
		25	14	45	130	222	322	431	547
		30	17	4	85	177	277	385	501
		35	19	20	58	154	257	369	489
		40	21	35	72	141	249	367	493
	2 Stories <sup>2</sup>	20	12	43	100	163	231	304	384
		25	13	22	79	143	214	289	371
		30	15	42	72	141	217	298	386
		35	15	61	92	150	232	321	417
		40	16	78	114	164	254	352	457
	1 Story <sup>1</sup>	20	12	38	57	94	135	179	226
		25	12	62	82	122	171	223	280
		30	12	85	110	154	212	275	342
		35	14	107	136	190	257	330	409
		40	16	126	160	227	304	388	478
Rf Angle	Bldg Width	Minimum Building Length <sup>4</sup>	WIND VELOCITY / VELOCITY PRESSURE						
			100	110	120	130	140	150	
			21	26	31	36	42	48	
45	3 Stories <sup>3</sup>	20	12	370	515	673	845	1031	1231
		25	13	249	377	518	670	836	1013
		30	17	159	278	408	550	703	867
		35	21	89	203	328	463	610	767
		40	26	102	153	262	394	537	691
	2 Stories <sup>2</sup>	20	12	184	271	368	472	585	706
		25	13	119	200	288	385	489	601
		30	18	85	147	233	326	426	533
		35	24	113	155	200	284	383	489
		40	36	139	187	240	297	358	457
	1 Story <sup>1</sup>	20	12	58	95	140	189	243	300
		25	16	92	118	147	178	224	281
		30	19	124	157	193	233	275	321
		35	17	154	193	236	283	334	388
		40	16	182	227	277	331	389	452

30	3 Stories <sup>3</sup>	20	12	256	376	507	650	804	970
		25	15	130	232	344	466	598	740
		30	21	47	127	228	337	455	582
		35	31	72	116	163	241	351	469
		40	40	96	146	200	259	323	392
	2 Stories <sup>2</sup>	20	12	95	163	238	320	408	502
		25	18	53	85	151	223	301	385
		30	30	83	117	154	195	239	304
		35	35	110	150	195	244	296	353
		40	37	135	182	233	289	350	415
	1 Story <sup>1</sup>	20	20	58	76	97	119	143	169
		25	16	91	117	145	176	210	245
		30	13	123	156	191	230	272	317
		35	14	152	191	234	280	330	384
		40	16	179	224	273	327	384	446

Rf Angle	Bldg Width	Minimum Building Length <sup>4</sup>	WIND VELOCITY / VELOCITY PRESSURE						
			100	110	120	130	140	150	
			21	26	31	36	42	48	
20	3 Stories <sup>3</sup>	20	12	285	411	549	698	860	1034
		25	13	207	325	455	595	748	911
		30	15	162	280	409	549	701	863
		35	17	138	260	393	538	695	863
		40	18	124	252	392	545	709	886
	2 Stories <sup>2</sup>	20	12	152	233	320	416	519	630
		25	12	133	215	306	404	511	625
		30	13	130	219	316	422	536	658
		35	14	138	235	341	456	581	715
		40	16	150	257	373	500	636	783
	1 Story <sup>1</sup>	20	12	88	136	188	245	307	373
		25	12	114	172	235	303	377	457
		30	12	146	214	288	370	457	552
		35	14	180	259	346	441	543	653
		40	16	215	306	406	515	632	758

Notes to Tables 401.1B and 401.1C:

1. Based on 1<sup>st</sup> floor height = 10 ft. or 11 ft. floor to floor in multi-story.
2. Based on 2<sup>nd</sup> floor height = 8 ft. or 9 ft. floor to floor in multi-story.
3. Based on 3<sup>rd</sup> floor height = 8 ft.
4. Building length shall be equal to or greater than that shown in tables.
5. Roof and floor framing shall span in the same direction.
6. Includes provision for 2 foot roof overhang.

**Reason:** To make it clear that foundations shall be capable of resisting uplift. The tables cover a wide range of building shapes and sizes to provide the user some guidance where the uplift might exceed the allowable uplift on the footing.

The current code only addresses gravity loads on foundations and neglects those instances where footing size needs to be increased to resist uplift.

**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing: Committee: AS AM D  
 Assembly: ASF AMF DF

# RB140-06/07

## R401.4

**Proponent:** Richard E. Bartell, Hanover County, VA, representing VBCOA, DHCD

### Revise as follows:

**401.4 Soil tests.** In areas likely proven by quantifiable data created by accepted soil science methodologies to have expansive, compressible, shifting or other questionable soil characteristics, the building official shall determine whether to require a soil test to determine the soil's characteristics at a particular location. This test shall be made by an approved agency using an approved method.

**Reason:** The term "likely" is subjective and vulnerable to many interpretations. We feel the proposed language better addresses the criteria for when soil tests are needed. Our intentions are that any existing soil maps or documentation suggesting these soils are present in an area would fit the criteria for additional testing at a particular location within that area. This would limit requirements for testing all building sites in a jurisdiction simply because of isolated or low percentage problem areas.

**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing: Committee:	AS	AM	D
Assembly:	ASF	AMF	DF

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# RB141-06/07

## R402.3, R402.3.1 (New), Chapter 43 (New)

**Proponent:** Brian D. Miller, National Precast Concrete Association, representing same

### 1. Revise as follows:

**R402.3 Precast concrete.** ~~Approved~~ Precast concrete foundations shall be designed and meet the minimum requirements of section R402.3.1 and shall be installed with the provisions of this code and the manufacturer's installation instructions.

### 2. Add new text as follows:

#### R402.3.1 Minimum requirements for materials used to make precast concrete foundations.

1. All concrete used in the manufacture of precast concrete foundations shall have a minimum compressive strength of 5000 psi (34,470 kPa) at 28 days. Concrete exposed to a freezing and thawing environment shall be air entrained with a minimum total air content of 5%.
2. Structural reinforcing steel shall meet the requirements of ASTM A615, A706 or A996. The minimum yield strength of reinforcing steel shall be 40,000 psi (Grade 40) (276 MPa). Steel reinforcement for precast concrete foundation walls shall have a minimum concrete cover of 5/8 in (16 mm).
3. Panel-to-panel connections shall be made with Grade II steel fasteners.
4. The use of non structural fibers shall conform to ASTM C 1116
5. Grout used for bedding precast foundations placed upon concrete footings shall meet ASTM C 1107.

### CHAPTER 43 REFERENCED STANDARDS

ASTM C 1107-04 Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

ASTM C 1116-03 Standard Specification for Fiber-Reinforced Concrete and Shotcrete

**Reason:** The purpose of this change is to clarify code and add new requirements to code. In 2003, precast foundations were added to the IRC, additional information and guidance is needed to clarify details of their use for building officials. Since precast concrete foundations are pre-engineered systems, the addition of section R402.3.1 will ensure that minimum quality materials are used in their manufacturing.

**Cost Impact:** The code change proposal will not increase the cost of construction.

**Analysis:** Results of review of the proposed standard will be posted on the ICC website by August 20, 2006.

Public Hearing: Committee:	AS	AM	D
Assembly:	ASF	AMF	DF

# RB142-06/07

## R403.1, R403.4 (New), R403.4.1 (New), R403.4.2 (New), Table R403.4(1)-(New), Figure R403.4(1)-(New), Figure R403.4(2)-(New)

Proponent: Brian D. Miller, National Precast Concrete Association

### 1. Revise as follows:

**R403.1 General.** All exterior walls shall be supported on continuous solid or fully grouted masonry or concrete footings, crushed stone footings, wood foundations, or other approved structural systems which shall be of sufficient design to accommodate all loads according to Section R301 and to transmit the resulting loads to the soil within the limitations as determined from the character of the soil. Footings shall be supported on undisturbed natural soils or engineered fill.

### 2. Add new text as follows:

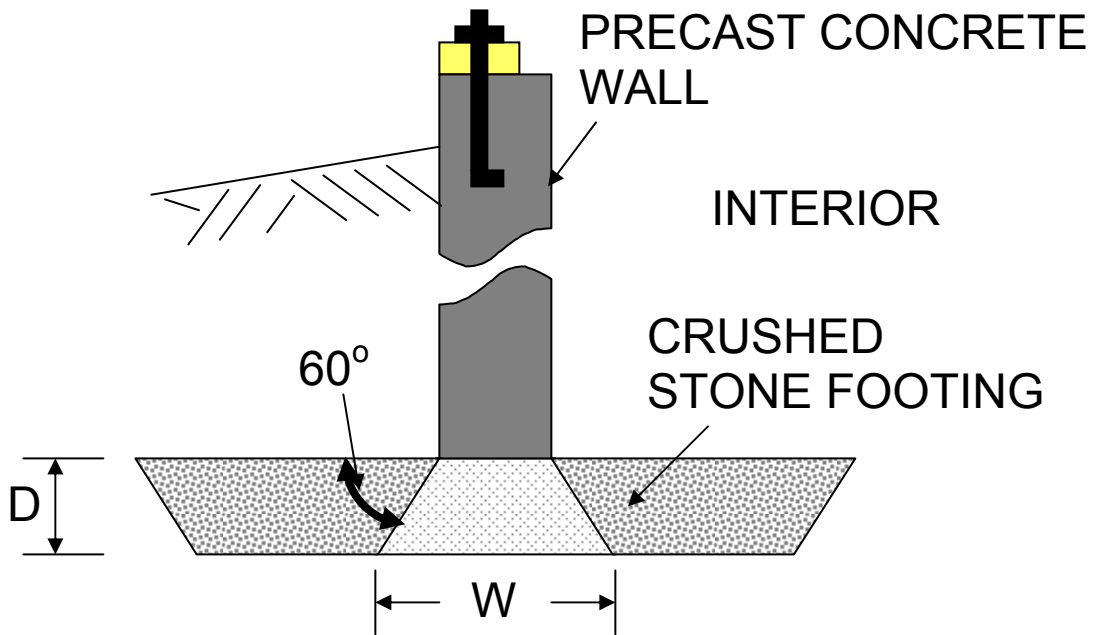
**R403.4 Footings for precast concrete foundations.** Footings for precast foundations shall comply with Section R403.4.

**R403.4.1 Crushed Stone Footings.** Clean crushed stone shall have a maximum size of ½ inch (12.7 mm). Crushed stone footings for precast foundations shall be installed in accordance with Figure R403.4 (1) and Table R403.4 (1). Crushed stone footings shall be consolidated using a vibratory plate in a maximum of eight-inch lifts.

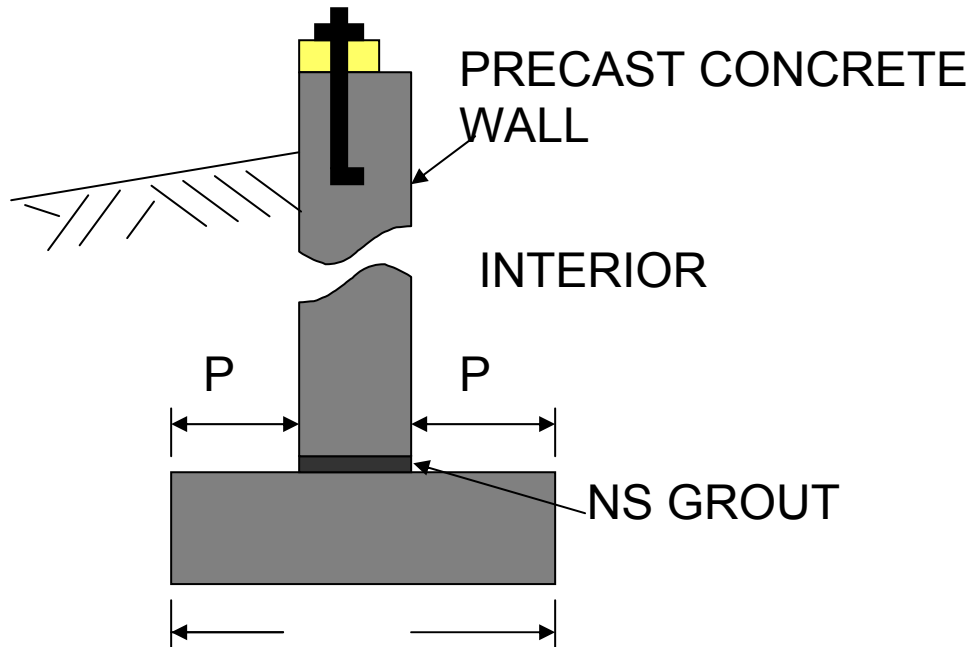
**R403.4.2 Concrete Footings.** Concrete footings shall be installed in accordance with Section 403.1 and Figure R403.4 (2).

**TABLE R403.4(1)  
MINIMUM DEPTH OF CRUSHED STONE FOOTINGS**

Minimum Depth of Crushed Stone Footing (Inches)																	
		Load Bearing Value of Soil (psf)															
		1500				2000				3000				4000			
		MH, CH, CL, ML				SC, GC, SM, GM, SP, SW				GP, GW				Wall Width			
		Wall Width				Wall Width				Wall Width				Wall Width			
		6"	8"	10"	12"	6"	8"	10"	12"	6"	8"	10"	12"	6"	8"	10"	12"
<b>Conventional light-frame construction</b>																	
1 - Story	(1100 plf)	6"	4"	4"	4"	6"	4"	4"	4"	6"	4"	4"	4"	6"	4"	4"	4"
2 - Story	(1800 plf)	8"	6"	4"	4"	6"	4"	4"	4"	6"	4"	4"	4"	6"	4"	4"	4"
3 - Story	(2900 plf)	16"	14"	12"	10"	10"	8"	6"	6"	6"	4"	4"	4"	6"	4"	4"	4"
<b>4-inch brick veneer over light frame or 8-inch hollow concrete masonry</b>																	
1 - Story	(1500 plf)	6"	4"	4"	4"	6"	4"	4"	4"	6"	4"	4"	4"	6"	4"	4"	4"
2 - Story	(2700 plf)	14"	12"	10"	8"	10"	8"	6"	4"	6"	4"	4"	4"	6"	4"	4"	4"
3 - Story	(4000 plf)	22"	22"	20"	18"	16"	14"	12"	10"	10"	8"	6"	4"	6"	4"	4"	4"
<b>8-inch solid or fully grouted masonry</b>																	
1 - Story	(2000 plf)	10"	8"	6"	4"	6"	4"	4"	4"	6"	4"	4"	4"	6"	4"	4"	4"
2 - Story	(3600 plf)	20"	18"	16"	16"	14"	12"	10"	8"	8"	6"	4"	4"	6"	4"	4"	4"
3 - Story	(5300 plf)	32"	30"	28"	26"	22"	22"	20"	18"	14"	12"	10"	8"	10"	8"	6"	4"



**FIGURE R403.4(1)**  
**BASEMENT OR CRAWL SPACE WITH PRECAST FOUNDATION WALL BEARING ON CRUSHED STONE**



**FIGURE R403.4(2)**  
**BASEMENT OR CRAWL SPACE WITH PRECAST FOUNDATION WALL ON SPREAD FOOTING**

**Reason:** The purpose of this change is to clarify the code. In 2003, precast foundations were added to the IRC, additional information and guidance is needed to clarify details of their use for building officials. This text and figures will provide for crushed stone footings, a common footing for precast concrete foundations. They will also provide necessary information to assist the building official.

**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing: Committee: AS AM D  
 Assembly: ASF AMF DF

# RB143-06/07

## R403.1.2 (New), Table R403.1.2 (New), Figure R403.1.2 (New)

Proponent: Charles O. Everly, PE, CBO, representing Building Officials Association of Florida

Add new text as follows:

**R403.1.2. High wind regions.** In regions where the basic wind speeds from Figure R301.2(4) equal or exceed 100 miles per hour (45 m/s) in hurricane-prone regions, or 110 miles per hour (49m/s) elsewhere, concrete and masonry footings shall also be sized to provide adequate resistance to uplift and overturn of the building as determined from Table 401.1 or as calculated using engineered design in accordance with the International Building Code. Uplift resistance of common foundations are given in Table R403.1.2. Uplift resistance of these foundations may be increased by increasing the size of the concrete footing. When determining the modified uplift resistance the added weight shall be reduced by multiplying by a factor of 0.6. Other foundation systems shall be engineered in accordance with the *International Building Code*.

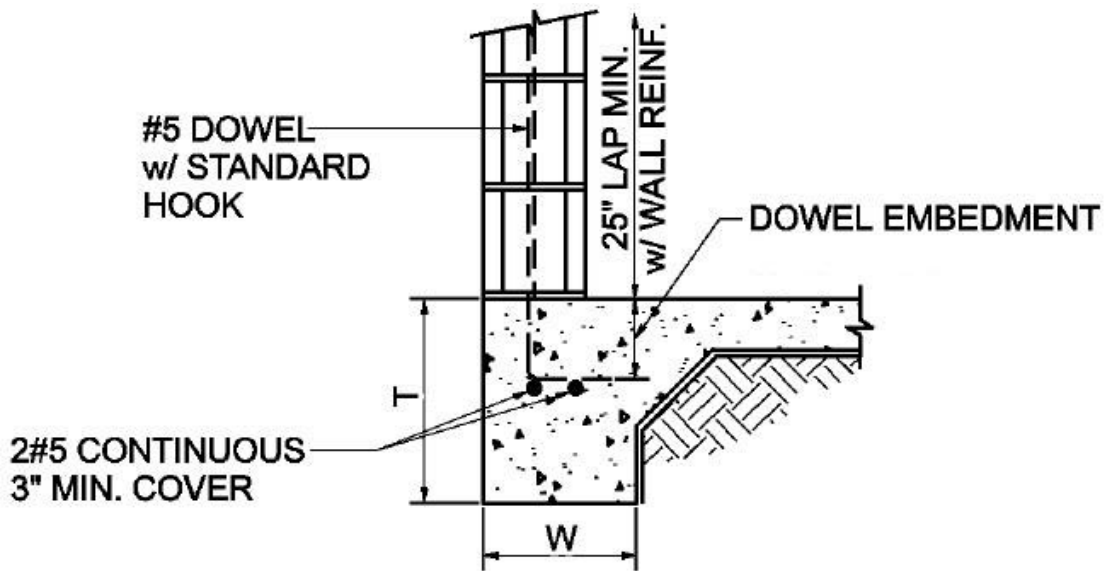
**TABLE R403.1.2  
HIGH WIND FOUNDATION UPLIFT DESIGN**

FOOTING	TYPE	T	W	SLAB / WALL <sup>1</sup>	RESISTANCE	NOTES
A	Mono	20	12	6	502	3
	Mono	20	16	6	585	3
B	Mono Interior	20	12	13	796	3
	Mono Interior	20	16	13	879	3
C	12" Stem/Joist	10	20	228	436	1,2,3
D	Mono	20	12	6	502	-
	Mono	20	16	6	585	-
E	Mono Interior	20	12	13	796	-
	Mono Interior	20	16	13	879	-
F	Stem/Joist	10	20	-	208	2,3
G	Stem/slab	10	20	6	460	3
H	Stem/slab	10	12	6	377	3
	Stem/slab	10	20	6	460	3

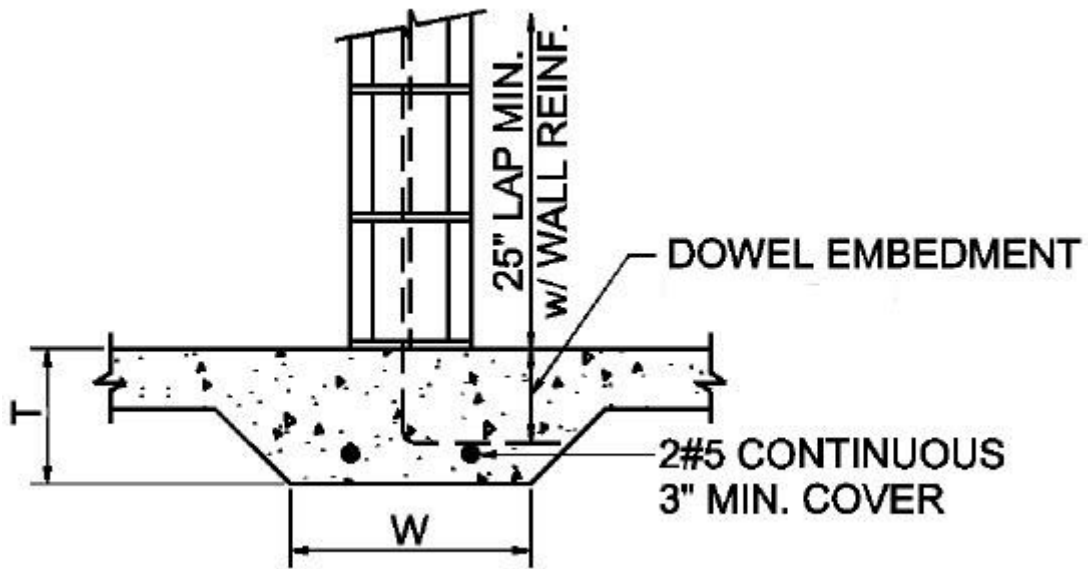
Note 1. Tributary width of 3½" slab or weight of stemwall and bond beam

Note 2. 1st floor dead load multiplied by 0.6 may also be included.

Note 3. All footing dowel bars shall be same size as wall steel, shall have a standard 90-degree hook, and shall be embedded a minimum of 6 inches. Dowel bars shall lap vertical wall reinforcement a minimum of 25 inches.

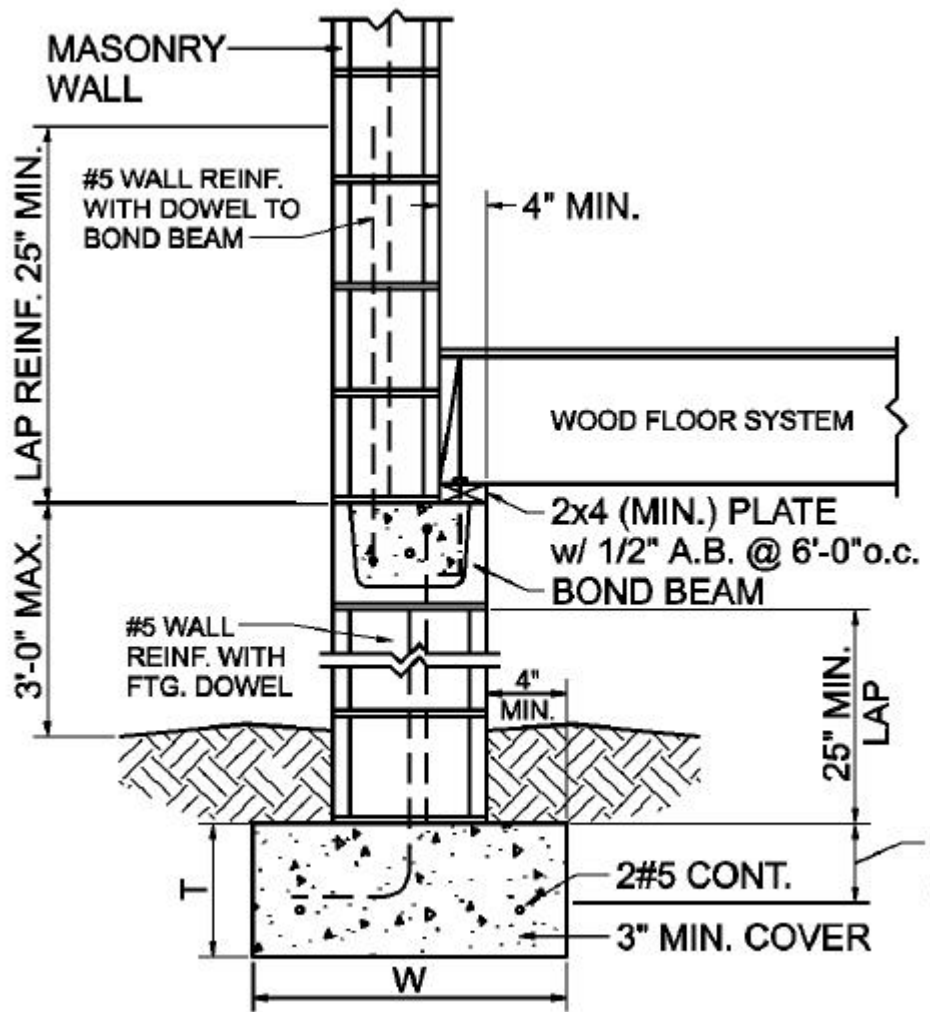


**FOOTING A**  
**MONOLITHIC SLAB ON GRADE EXTERIOR WALL**

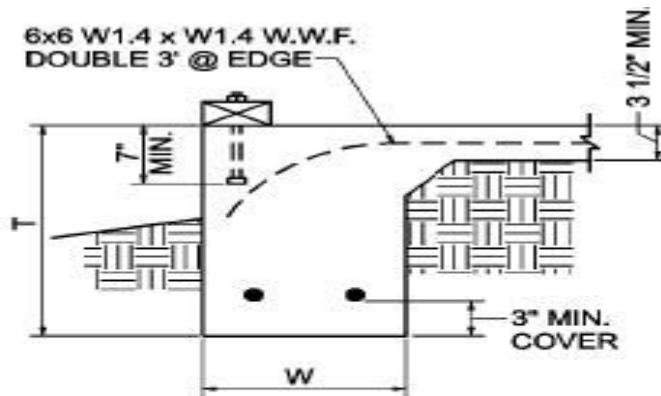


**FOOTING B**  
**MONOLITHIC SLAB ON GRADE INTERIOR WALL**

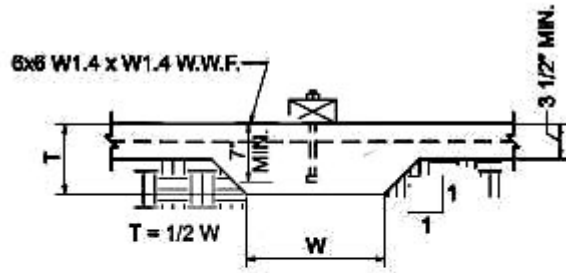




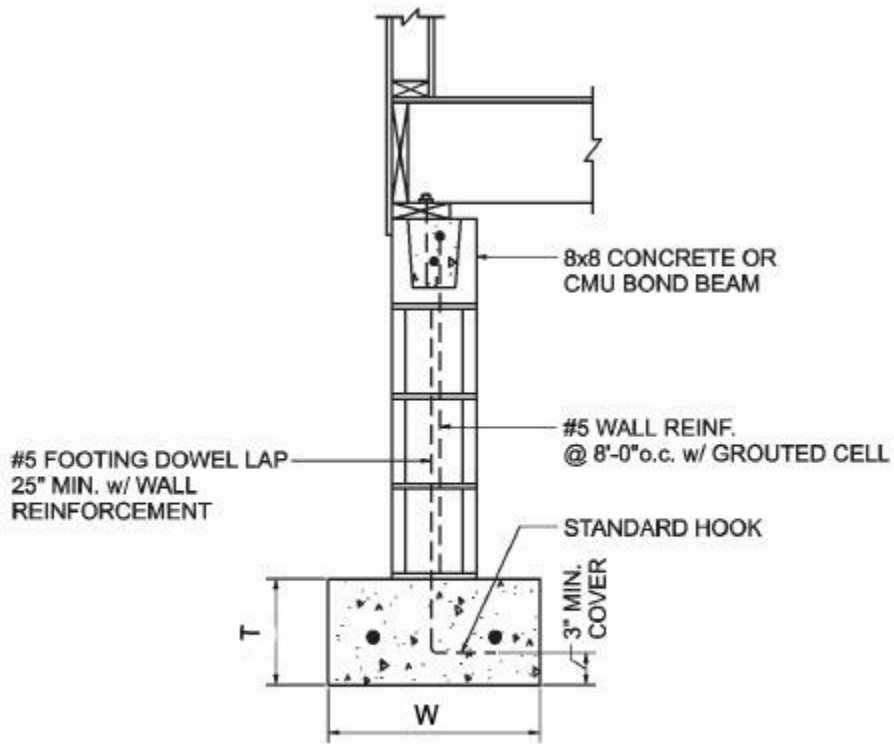
**FOOTING C**  
**STEM WALL WOOD JOIST FLOOR**



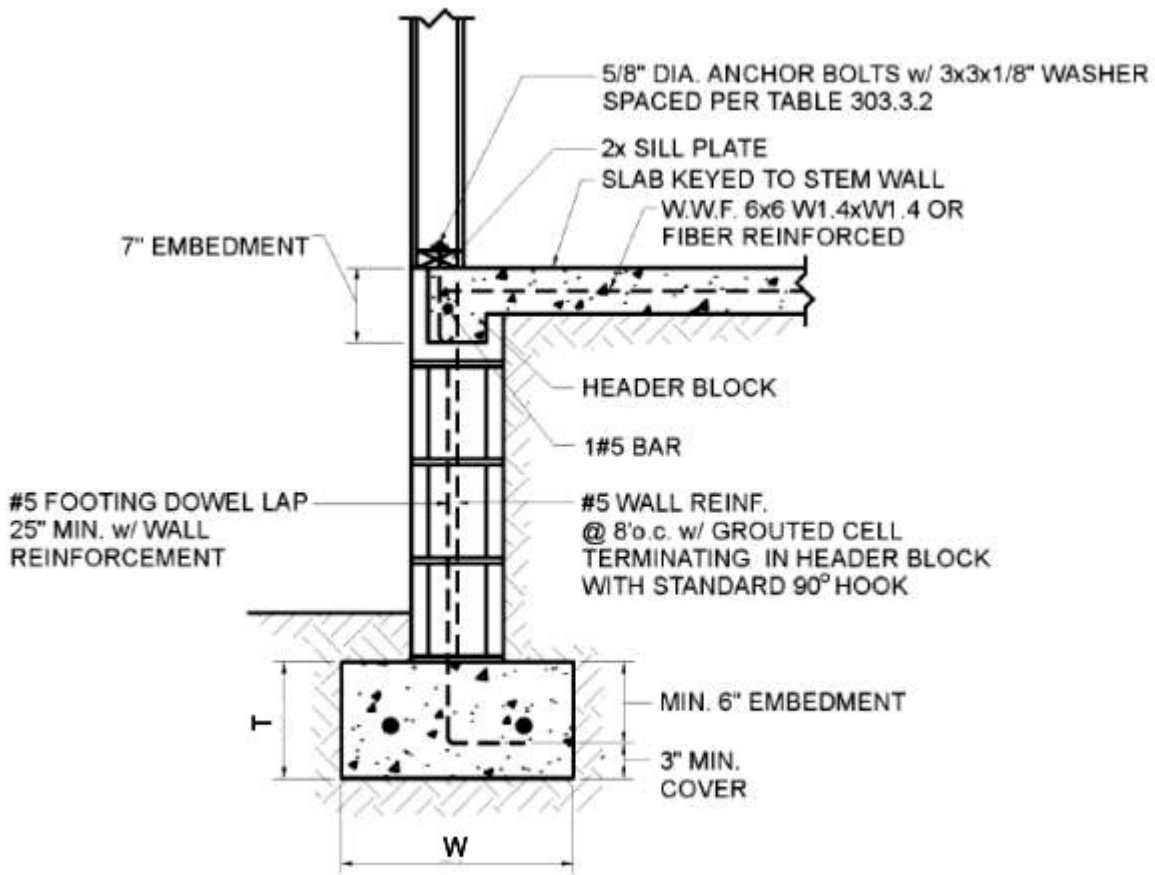
**FOOTING D**  
**MONOLITHIC EXTERIOR FOOTING**



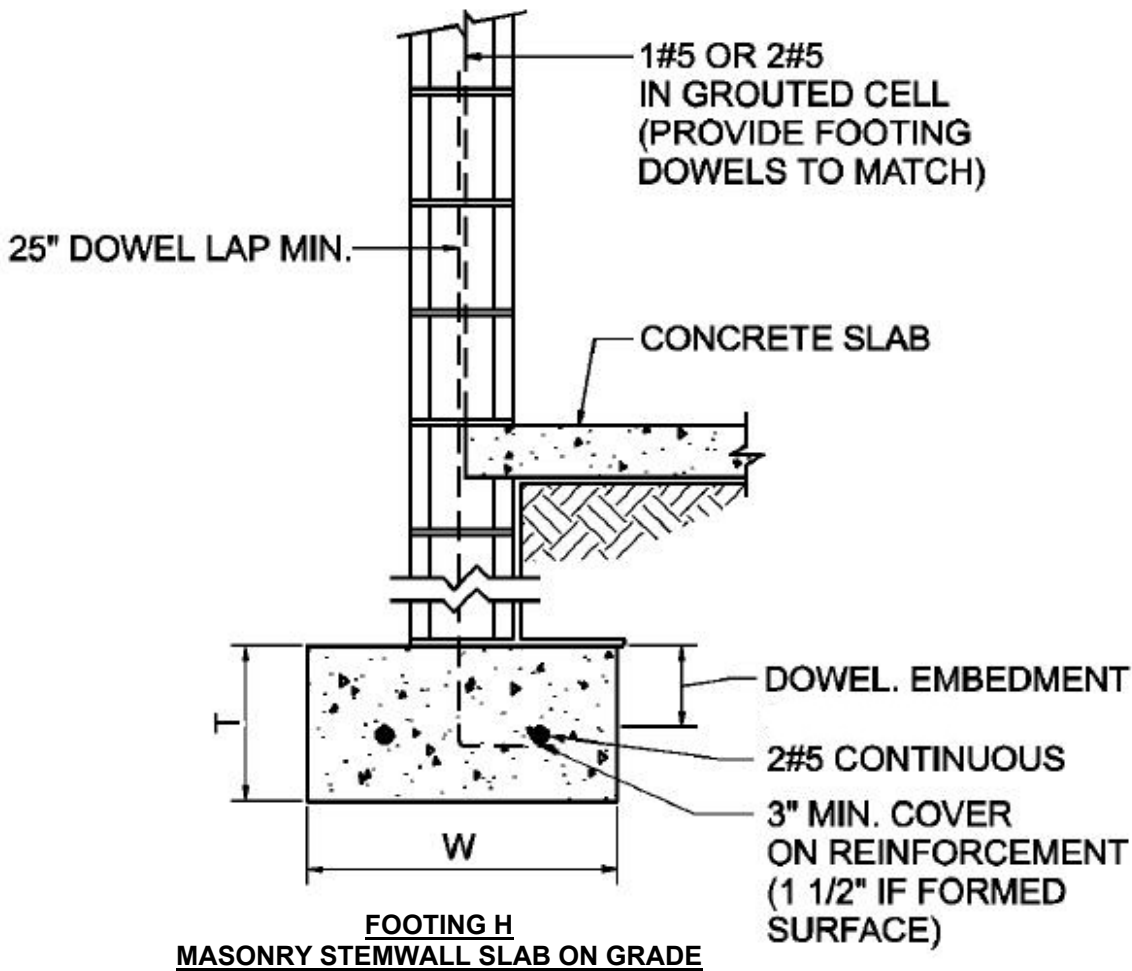
**FOOTING E**  
**MONOLITHIC INTERIOR FOOTING**



**FOOTING F**  
**WOOD FLOOR TO CONCRETE OR MASONRY STEMWALL**



**FOOTING G**  
**STEMWALL FOUNDATION WITH SLAB-ON-GRADE**



**FIGURE R403.1.2  
HIGH WIND FOUNDATION DETAILS**

**Reason:** To make it clear that foundations shall be capable of resisting uplift. The tables cover a wide range of building shapes and sizes to provide the user some guidance where the uplift might exceed the allowable uplift on the footing.

The current code only addresses gravity loads on foundations and neglects those instances where footing size needs to be increased to resist uplift.

**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

## RB144-06/07

### R403.1.3.2, Figure R403.1.3.2 (New)

**Proponents:** Jim W. Sealy, AIA and Kelly Cobeen, FEMA/BSSC Code Resource Support Committee

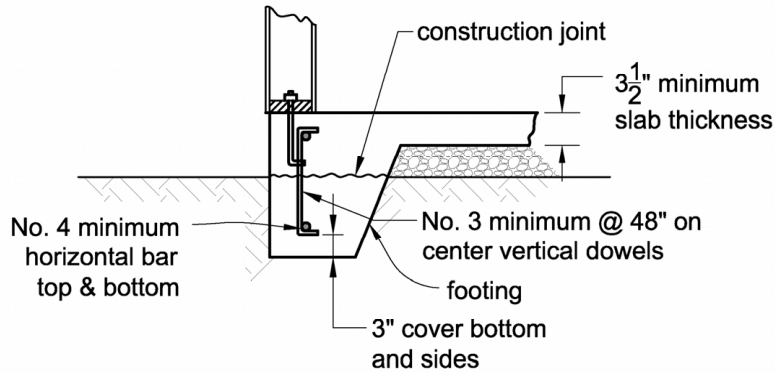
#### 1. Revise as follows:

**R403.1.3.2 Slabs-on-ground with turned-down footings.** Slabs on ground with turned down footings shall have a minimum of one No. 4 bar at the top and the bottom of the footing.

**Exception:** For slabs-on-ground cast monolithically with the footing, one No. 5 bar or two No. 4 bars shall be permitted to be located in the middle third of the footing depth.

Where the slab is not cast monolithically with the footing, No. 3 or larger vertical dowels with standard hooks each end shall be provided in accordance with Figure R403.1.3.2.

2. Add new figure as follows:



**FIGURE R403.1.3.2**  
**DOWELS FOR SLABS-ON-GROUND WITH TURNED-DOWN FOOTINGS**

**Reason:** The exception is revised because placement of the reinforcing at the top and bottom of the footing provides much better crack control and stiffness and should always be an option. The addition of vertical dowels in slabs cast separately is in response to observation of wide-spread damage due to slippage on the construction joint during the 1994 Northridge Earthquake.

**Cost Impact:** The code change proposal will increase the cost of construction.

Public Hearing: Committee: AS AM D  
Assembly: ASF AMF DF

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## RB145-06/07

### R403.3. Table R403.3, R403.3.1.1, R403.3.1.2, Table R403.3(2)-(New)

**Proponent:** Ronald Majette, representing the United States Department of Energy

#### 1. Revise as follows:

**R403.3 Frost protected shallow foundations.** For buildings where the monthly mean temperature of the building is maintained at a minimum of 64°F (18°C), footings are not required to extend below the frost line when protected from frost by insulation in accordance with Figure R403.3(1) and Table R403.3(1). Foundations protected from frost in accordance with Figure R403.3(1) and Table R403.3(1) shall not be used for unheated spaces such as porches, utility rooms, garages and carports, and shall not be attached to basements or crawl spaces that are not maintained at a minimum monthly mean temperature of 64°F (18°C).

Materials used below grade for the purpose of insulating footings against frost shall be labeled as complying with ASMT C 578.

**TABLE R403.3(1)**  
**MINIMUM INSULATION REQUIREMENTS FOR FROST-PROTECTED FOOTINGS IN HEATED BUILDINGS<sup>a</sup>**

(Portions of table not shown do not change)

- Insulation requirements are for protection against frost damage in heated buildings. Greater values may be required to meet energy conservation standards. Interpolation between values is permissible.
- See Figure R403.3(2) or Table R403.3(2) for Air Freezing Index values.
- Insulation materials shall provide the stated minimum *R*-values under long-term exposure to moist, below-ground conditions in freezing climates. The following *R*-values shall be used to determine insulation thicknesses required for this application: Type II expanded polystyrene— 2.4*R* per inch; Type IV extruded polystyrene— 4.5*R*per inch; Type VI extruded polystyrene—4.5*R*per inch ;Type IX expanded polystyrene—3. 2*R*per inch; TypeXextruded polystyrene—4.5*R*per inch.
- Vertical insulation shall be expanded polystyrene insulation or extruded polystyrene insulation.
- Horizontal insulation shall be extruded polystyrene insulation.

**R403.3.1.1 Attachment to unheated slab-on-ground structure.** Vertical wall insulation and horizontal insulation of frost protected shallow foundations that adjoin a slab-on-ground foundation that does not have a monthly mean temperature maintained at a minimum of 64°F (18°C), shall be in accordance with Figure R403.3(3) and Table R403.3(1). Vertical wall insulation shall extend between the frost protected shallow foundation and the adjoining slab foundation. Required horizontal insulation shall be continuous under the adjoining slab foundation and through any foundation walls adjoining the frost protected shallow foundation. Where insulation passes through a foundation wall, it shall either be of a type complying with this section and having bearing capacity equal to or greater than the structural loads imposed by the building, or the building shall be designed and constructed using beams, lintels, cantilevers or other means of transferring building loads such that the structural loads of the building do not bear on the insulation.

**R403.3.1.2 Attachment to heated structure.** Where a frost protected shallow foundation abuts a structure that has a monthly mean temperature maintained at a minimum of 64°F (18°C), horizontal insulation and vertical wall insulation shall not be required between the frost protected shallow foundation and the adjoining structure. Where the frost protected shallow foundation abuts the heated structure, the horizontal insulation and vertical wall insulation shall extend along the adjoining foundation in accordance with Figure R403.3(4) a distance of not less than Dimension A in Table R403.3(1).

**Exception:** Where the frost protected shallow foundation abuts the heated structure to form an inside corner, vertical insulation extending along the adjoining foundation is not required.

**2. Add new text as follows:**

**TABLE R403.3(2)**  
**AIR-FREEZING INDEX FOR U.S. LOCATIONS BY COUNTY**

**ALABAMA**

**1,500 or less:** *All counties*

**ALASKA**

**1,500 or less:** *Ketchikan Gateway, Prince of Wales-Outer Ketchikan (CA), Sitka, Wrangell-Petersburg (CA)*

**2,500:** *Aleutians West (CA), Haines, Juneau, Skagway-Hoonah-Angoon (CA), Yakutat*

**4,000:** *All counties not listed*

**ARIZONA**

**1,500 or less:** *All counties*

**ARKANSAS**

**1,500 or less:** *All counties*

**CALIFORNIA**

**1,500 or less:** *All counties not listed*

**2,000:** *Nevada, Sierra*

**COLORADO**

**1,500 or less:** *All counties not listed*

**2,000:** *Archuleta, Custer, Fremont, Huerfano, Las Animas, Ouray, Pitkin, San Miguel*

**2,500:** *Clear Creek, Conejos, Costilla, Dolores, Eagle, La Plata, Park, Routt, San Juan, Summit*

**3,000:** *Alamosa, Grand, Jackson, Larimer, Moffat, Rio Blanco, Rio Grande*

**3,500:** *Chaffee, Gunnison, Lake, Saguache*

**4,000:** *Hinsdale, Mineral*

**CONNECTICUT**

**1,500 or less:** *All counties not listed*

**2,000:** *Hartford, Litchfield*

**DELAWARE**

**1,500 or less:** *All counties*

**DISTRICT OF COLUMBIA**

**1,500 or less:** *All counties*

**FLORIDA**

**1,500 or less:** *All counties*

## **GEORGIA**

**1,500 or less: All counties**

## **HAWAII**

**1,500 or less: All counties**

## **IDAHO**

**1,500 or less: All counties not listed**

**2,000: Adams, Bannock, Blaine, Clearwater, Idaho, Lincoln, Oneida, Power, Valley, Washington**

**2,500: Bingham, Bonneville, Camas, Caribou, Elmore, Franklin, Jefferson, Madison, Teton**

**3,000: Bear Lake, Butte, Custer, Fremont, Lemhi**

**3,500: Clark**

## **ILLINOIS**

**1,500 or less: All counties not listed**

**2,000: Boone, Bureau, Cook, DeKalb, DuPage, Fulton, Grundy, Henderson, Henry, Iroquois, Jo Daviess, Kane, Kankakee, Kendall, Knox, La Salle, Lake, Lee, Livingston, Marshall, Mason, McHenry, McLean, Mercer, Peoria, Putnam, Rock Island, Stark, Tazewell, Warren, Whiteside, Will, Woodford**

**2,500: Carroll, Ogle, Stephenson, Winnebago**

## **INDIANA**

**1,500 or less: All counties not listed**

**2,000: Allen, Benton, Cass, Fountain, Fulton, Howard, Jasper, Kosciusko, La Porte, Lake, Marshall, Miami, Newton, Porter, Pulaski, Starke, Steuben, Tippecanoe, Tipton, Wabash, Warren, White**

## **IOWA**

**1,500 or less: Appanoose, Davis, Fremont, Lee, Van Buren**

**2,000: All counties not listed**

**2,500: Allamakee, Black Hawk, Boone, Bremer, Buchanan, Buena Vista, Butler, Calhoun, Cerro Gordo, Cherokee, Chickasaw, Clay, Clayton, Delaware, Dubuque, Fayette, Floyd, Franklin, Grundy, Hamilton, Hancock, Hardin, Humboldt, Ida, Jackson, Jasper, Jones, Linn, Marshall, Palo Alto, Plymouth, Pocahontas, Poweshiek, Sac, Sioux, Story, Tama, Webster, Winnebago, Woodbury, Worth, Wright**

**3,000: Dickinson, Emmet, Howard, Kossuth, Lyon, Mitchell, O'Brien, Osceola, Winneshiek**

## **KANSAS**

**1,500 or less: All counties**

## **KENTUCKY**

**1,500 or less: All counties**

## **LOUISIANA**

**1,500 or less: All counties**

## **MAINE**

**1,500 or less: York**

**2,000: Knox, Lincoln, Sagadahoc**

**2,500: Androscoggin, Cumberland, Hancock, Kennebec, Waldo, Washington**

**3,000: Aroostook, Franklin, Oxford, Penobscot, Piscataquis, Somerset**

## **MARYLAND**

**1,500 or less: All counties**

## **MASSACHUSETTS**

**1,500 or less: All counties not listed**

**2,000: Berkshire, Franklin, Hampden, Worcester**

## **MICHIGAN**

**1,500 or less: Berrien, Branch, Cass, Kalamazoo, Macomb, Ottawa, St. Clair, St. Joseph**

**2,000: All counties not listed**

**2,500: Alger, Charlevoix, Cheboygan, Chippewa, Crawford, Delta, Emmet, Iosco, Kalkaska, Lake, Luce, Mackinac, Menominee, Missaukee, Montmorency, Ogemaw, Osceola, Otsego, Roscommon, Schoolcraft, Wexford**

**3,000: Baraga, Dickinson, Iron, Keweenaw, Marquette**

**3,500: Gogebic, Houghton, Ontonagon**

**MINNESOTA**

2,500: Houston, Winona

3,000: All counties not listed

3,500: Aitkin, Big Stone, Carlton, Crow Wing, Douglas, Itasca, Kanabec, Lake, Morrison, Pine, Pope, Stearns, Stevens, Swift, Todd, Wadena

4,000: Becker, Beltrami, Cass, Clay, Clearwater, Grant, Hubbard, Kittson, Koochiching, Lake of the Woods, Mahanomen, Marshall, Norman, Otter Tail, Pennington, Polk, Red Lake, Roseau, St. Louis, Traverse, Wilkin

**MISSISSIPPI**

1,500 or less: All counties

**MISSOURI**

1,500 or less: All counties not listed

2,000: Atchison, Mercer, Nodaway, Putnam

**MONTANA**

1,500 or less: Mineral

2,000: Broadwater, Golden Valley, Granite, Lake, Lincoln, Missoula, Ravalli, Sanders, Sweet Grass

2,500: Big Horn, Carbon, Jefferson, Judith Basin, Lewis and Clark, Meagher, Musselshell, Powder River, Powell, Silver Bow, Stillwater, Wheatland

3,000: Carter, Cascade, Deer Lodge, Fallon, Fergus, Flathead, Gallatin, Glacier, Madison, Park, Petroleum, Pondera, Rosebud, Teton, Treasure, Yellowstone

3,500: Beaverhead, Blaine, Chouteau, Custer, Dawson, Garfield, Liberty, McCone, Prairie, Toole, Wibaux

4,000: Daniels, Hill, Phillips, Richland, Roosevelt, Sheridan, Valley

**NEBRASKA**

1,500 or less: Adams, Banner, Chase, Cheyenne, Clay, Deuel, Dundy, Fillmore, Franklin, Frontier, Furnas, Gage, Garden, Gosper, Harlan, Hayes, Hitchcock, Jefferson, Kimball, Morrill, Nemaha, Nuckolls, Pawnee, Perkins, Phelps, Red Willow, Richardson, Saline, Scotts Bluff, Seward, Thayer, Webster

2,000: All counties not listed

2,500: Boyd, Burt, Cedar, Cuming, Dakota, Dixon, Dodge, Knox, Thurston

**NEVADA**

1,500 or less: All counties not listed

2,000: Elko, Eureka, Nye, Washoe, White Pine

**NEW HAMPSHIRE**

2,000: All counties not listed

4,000: Carroll, Coos, Grafton

**NEW JERSEY**

1,500 or less: All counties

**NEW MEXICO**

1,500 or less: All counties not listed

2,000: Rio Arriba

2,500: Colfax, Mora, Taos

**NEW YORK**

1,500 or less: Albany, Bronx, Cayuga, Columbia, Cortland, Dutchess, Genesee, Kings, Livingston, Monroe, Nassau, New York, Niagara, Onondaga, Ontario, Orange, Orleans, Putnam, Queens, Richmond, Rockland, Seneca, Suffolk, Wayne, Westchester, Yates

2,000: All counties not listed

2,500: Clinton, Essex, Franklin, Hamilton, Herkimer, Jefferson, Lewis, St. Lawrence, Warren

**NORTH CAROLINA**

1,500 or less: All counties

**NORTH DAKOTA**

3,000: Billings, Bowman

3,500: Adams, Dickey, Golden Valley, Hettinger, LaMoure, McIntosh, Oliver, Ransom, Sargent, Sioux, Slope, Stark

4,000: All counties not listed

**OHIO**

1,500 or less: All counties not listed

2,000: Ashland, Crawford, Defiance, Holmes, Huron, Knox, Licking, Morrow, Paulding, Putnam, Richland, Seneca, Williams



**OKLAHOMA**

**1,500 or less:** *All counties*

**OREGON**

**1,500 or less:** *All counties not listed*

**2,000:** Baker, Crook, Grant, Harney

**PENNSYLVANIA**

**1,500 or less:** *All counties not listed*

**2,000:** Berks, Blair, Bradford, Cambria, Cameron, Centre, Clarion, Clearfield, Clinton, Crawford, Elk, Forest, Huntingdon, Indiana, Jefferson, Lackawanna, Lycoming, McKean, Pike, Potter, Susquehanna, Tioga, Venango, Warren, Wayne, Wyoming

**RHODE ISLAND**

**1,500 or less:** *All counties*

**SOUTH CAROLINA**

**1,500 or less:** *All counties*

**SOUTH DAKOTA**

**2,000:** Bennett, Custer, Fall River, Lawrence, Mellette, Shannon, Todd, Tripp

**2,500:** Bon Homme, Charles Mix, Davison, Douglas, Gregory, Jackson, Jones, Lyman

**3,000:** *All counties not listed*

**3,500:** Beadle, Brookings, Brown, Campbell, Codington, Corson, Day, Deuel, Edmunds, Faulk, Grant, Hamlin, Kingsbury, Marshall, McPherson, Perkins, Roberts, Spink, Walworth

**TENNESSEE**

**1,500 or less:** *All counties*

**TEXAS**

**1,500 or less:** *All counties*

**UTAH**

**1,500 or less:** *All counties not listed*

**2,000:** Box Elder, Morgan, Weber

**2,500:** Garfield, Salt Lake, Summit

**3,000:** Carbon, Daggett, Duchesne, Rich, Sanpete, Uintah, Utah, Wasatch

**VERMONT**

**2,000:** Bennington, Grand Isle, Rutland, Windham

**2,500:** Addison, Chittenden, Franklin, Orange, Washington, Windsor

**3,000:** Caledonia, Essex, Lamoille, Orleans

**VIRGINIA**

**1,500 or less:** *All counties*

**WASHINGTON**

**1,500 or less:** *All counties not listed*

**2,000:** Chelan, Douglas, Ferry, Okanogan

**WEST VIRGINIA**

**1,500 or less:** *All counties*

**WISCONSIN**

**2,000:** Kenosha, Kewaunee, Racine, Sheboygan, Walworth

**2,500:** *All counties not listed*

**3,000:** Ashland, Barron, Burnett, Chippewa, Clark, Dunn, Eau Claire, Florence, Forest, Iron, Jackson, La Crosse, Langlade, Marathon, Monroe, Pepin, Pierce, Polk, Portage, Price, Rusk, St. Croix, Taylor, Trempealeau, Vilas, Wood

**3,500:** Bayfield, Douglas, Lincoln, Oneida, Sawyer, Washburn

**WYOMING**

**1,500 or less:** Goshen, Platte

**2,000:** Converse, Crook, Laramie, Niobrara

**2,500:** Campbell, Carbon, Hot Springs, Johnson, Natrona, Sheridan, Uinta, Weston

**3,000:** Albany, Big Horn, Park, Washakie

**3,500:** Fremont, Teton

**4,000:** Lincoln, Sublette, Sweetwater

**Reason:** The purpose of this change is to simplify the code. This proposed change adds a county-based table as an alternative source for Air-Freezing Index values.

The air-freezing index (AFI) contour map in Figure R403.3(2) is difficult to read and use for many locations. This proposal adds an alternative table that lists AFI by county. The proposed code change will help code users determine the air-freezing index range for any given location easily and correctly based on the county.

The National Climatic Data Center makes available the AFI data that underlie Figure R403.3(2) for 3110 distinct locations (cities) in the U.S. The geographical coverage of these "AFI cities" was expanded by mapping each location in the USGS "Populated Places" (PPL) dataset (about 165,000 locations) to its nearest neighboring AFI city (with ties broken based on elevation).

The proposed table categorizes each county based on the maximum (i.e., worst-case) AFI occurring for any PPL location within its boundaries.

**Bibliography:** The data underlying the new Table R403.3(2) are available from:

1. <http://www4.ncdc.noaa.gov/ol/9712/AFI-pubreturn.xls>
2. <http://www4.ncdc.noaa.gov/ol/9712/AFI-pubreturn.pdf>
3. <http://geonames.usgs.gov/fips55.html>

**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing: Committee: AS AM D  
Assembly: ASF AMF DF

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## **RB146-06/07**

### **R404.1**

**Proponent:** Scott Beard, SE, City of Tacoma, WA

**Revise as follows:**

**R404.1 Concrete and masonry foundation walls.** Concrete and masonry foundation walls shall be selected and constructed in accordance with the provisions of Section R404 or in accordance with ACI 318, ACI 332, NCMATR68-A or ACI 530/ASCE 5/TMS 402 or other approved structural standards. When ACI 318, ACI 332 or ACI 530/ASCE 5/TMS 402 or the provisions of Section R404 are used to design concrete or masonry foundation walls, project drawings, typical details and specifications are not required to bear the seal of the architect or engineer responsible for design, unless otherwise required by the state law of the jurisdiction having authority.

Foundation walls that meet all of the following shall be considered laterally supported:

1. Full basement floor shall be 3.5 inches (89 mm) thick concrete slab poured tight against the bottom of the foundation wall. A single layer of building paper or similar non-compressive material of the same thickness may be placed tight between the concrete slab and the bottom of the foundation.
2. Floor joists and blocking shall be connected to the sill plate at the top of wall by the prescriptive method called out in Table R404.1(1), or; shall be connected with an approved connector with listed capacity meeting Table R404.1(1).
3. Bolt spacing for the sill plate shall be no greater than per Table R404.1(2).
4. Floor shall be blocked perpendicular to the floor joists. Blocking shall be full depth within two joist spaces of the foundation wall, and be flat-blocked with minimum 2-inch by 4-inch (51mm by 102mm) blocking elsewhere.
5. Where foundation walls support unbalanced load on opposite sides of the building, such as a daylight basement, the building aspect ratio, L/W, shall not exceed the value specified in Table R404.1(3). For such foundation walls, the rim board shall be attached to the sill with a 20 gage metal angle clip at 24 inches (610 mm) on center, with five 8d nails per leg, or an approved connector supplying 230 pounds per linear foot (3.36 kN/m) capacity.

**Reason:** A building official, after this code section was passed last cycle, expressed concern that if taken literally, building paper could not be installed between the slab and basement wall, which is a common practice in his jurisdiction.

Checking with the original drafter of this section (Phil Brazil), the intent was to prevent foam insulation and similar compressible materials from being placed in that location, which would adversely affect the structural restraint being counted on.

Building paper and similar thin non-compressive materials are structurally acceptable.

**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing: Committee: AS AM D  
Assembly: ASF AMF DF

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# RB147-06/07

## R404.1

**Proponent:** Scott Beard, SE, City of Tacoma, WA, representing same

**Revise as follows:**

**R404.1 Concrete and masonry foundation walls.** Concrete and masonry foundation walls shall be selected and constructed in accordance with the provisions of Section R404 or in accordance with ACI 318, ACI 332, NCMATR68-A or ACI 530/ASCE 5/TMS 402 or other approved structural standards. When ACI 318, ACI 332 or ACI 530/ASCE 5/TMS 402 or the provisions of Section R404 are used to design concrete or masonry foundation walls, project drawings, typical details and specifications are not required to bear the seal of the architect or engineer responsible for design, unless otherwise required by the state law of the jurisdiction having authority.

Foundation walls that meet all of the following shall be considered laterally supported:

1. Full basement floor shall be 3.5 inches (89 mm) thick concrete slab poured tight against the bottom of the foundation wall.
2. Floor joists and blocking shall be connected to the sill plate at the top of wall by the prescriptive method called out in Table R404.1(1), or; shall be connected with an approved connector with listed capacity meeting Table R404.1(1).
3. Bolt spacing for the sill plate shall be no greater than per Table R404.1(2).
4. Floor shall be blocked perpendicular to the floor joists. Blocking shall be full depth within ~~two~~ three joist spaces of the foundation wall, ~~and be flat blocked with minimum 2-inch by 4-inch (51mm by 102mm) blocking elsewhere.~~
5. Where foundation walls support unbalanced load on opposite sides of the building, such as a daylight basement, the building aspect ratio, L/W, shall not exceed the value specified in Table R404.1(3). For such foundation walls, the rim board shall be attached to the sill with a 20 gage metal angle clip at 24 inches (610 mm) on center, with five 8d nails per leg, or an approved connector supplying 230 pounds per linear foot (3.36 kN/m) capacity.

**Reason:** When this item was written originally, for ease of putting together the code proposal, the blocking requirements were lifted wholesale out of SSTD-10 and SSTD-13, where the retaining wall provisions originally came from.

A closer look at the flat blocking requirement has been performed. (Column on elastic foundation analysis.) The flat blocking can safely be eliminated for the load condition of the retaining wall. (There may be other times that you would want flat blocking, but this isn't one of them.)

NCSEA has indicated that they would oppose the change unless a minimum of three joists were blocked. This amount of blocking is typical practice among engineers in this part of the country too.

**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing: Committee:	AS	AM	D
Assembly:	ASF	AMF	DF

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# RB148-06/07

## R404.1

**Proponent:** Scott Beard, SE, City of Tacoma, WA

**Revise as follows:**

**R404.1 Concrete and masonry foundation walls.** Concrete and masonry foundation walls shall be selected and constructed in accordance with the provisions of Section R404 or in accordance with ACI 318, ACI 332, NCMATR68-A or ACI 530/ASCE 5/TMS 402 or other approved structural standards. When ACI 318, ACI 332 or ACI 530/ASCE 5/TMS 402 or the provisions of Section R404 are used to design concrete or masonry foundation walls, project drawings, typical details and specifications are not required to bear the seal of the architect or engineer responsible for design, unless otherwise required by the state law of the jurisdiction having authority.

Foundation walls that meet all of the following shall be considered laterally supported:

1. Full basement floor shall be 3.5 inches (89 mm) thick concrete slab poured tight against the bottom of the foundation wall.
2. Floor joists and blocking shall be connected to the sill plate at the top of wall by the prescriptive method called out in Table R404.1(1), or; shall be connected with an approved connector with listed capacity meeting Table R404.1(1).

3. Bolt spacing for the sill plate shall be no greater than per Table R404.1(2).
4. Floor shall be blocked perpendicular to the floor joists. Blocking shall be full depth within two joist spaces of the foundation wall, and be flat-blocked with minimum 2-inch by 4-inch (51mm by 102mm) blocking elsewhere.
5. Where foundation walls support unbalanced load on opposite sides of the building, such as a daylight basement, the building aspect ratio, L/W, shall not exceed the value specified in Table R404.1(3). For such foundation walls, the rim board shall be attached to the sill with a 20 gage metal angle clip at 24 inches (610 mm) on center, with five 8d nails per leg, or an approved connector supplying 230 pounds per linear foot (3.36 kN/m) capacity.

**Exception:** Foundation walls that are self-bracing may be considered to be laterally supported. Self-bracing walls do not need to comply with items 2 through 5 above, but shall meet all of the following conditions:

1. Basement floor shall meet item 1, above.
2. Basement walls shall form a complete closed loop around the enclosed basement, such that each length of basement wall shall have an adjoining wall segment at each end, perpendicular to the wall segment.
3. Basement walls shall be concrete.
4. Length of wall segments between corners shall be no greater than the following:
  - 4.1. 2 times the height of the concrete wall for concrete compressive strength  $f'_c$  of 2,500 psi
  - 4.2. 3 times the height of the concrete wall for concrete compressive strength  $f'_c$  of 3,000 psi
  - 4.3. 4 times the height of the concrete wall for concrete compressive strength  $f'_c$  of 3,500 psi
5. Walls shall meet the requirements of Table R404.1.1(5), except that footnotes h and i shall not apply.

**Reason:** When a basement wall is self-bracing, the walls do not span vertically as in the prescriptive retaining walls already described in the Code. Rather, they act like 2-D supported plates, spanning laterally from corner to corner. As a result, no bracing is required at the top of the wall.

Many older basements without top connections have been successfully functioning this way. If a basement can meet the geometric constraints, there is no reason why we cannot let new basement walls do similar. This cannot be a replacement for the current basement rules and tables, because not all new basements meet either the span limits or the fully enclosed requirements. It is a helpful new addition, though.

Analysis was performed on RISA 3-D finite element program. Plates were modeled as simply supported on three sides, as required by ACI-318, section 22.4.7.

Back check was performed by the following analytical references:

Theory of Plates and Shells – Timoshenko

Rectangular Concrete Tanks – PCA

Formulas for Stress and Strain – Roark and Young

Plate Design Nomograph – US Department of the Interior

**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing: Committee:	AS	AM	D
Assembly:	ASF	AMF	DF

## RB149–06/07

### R404.1, Tables R404.1(1), R404.1(2) and R404.1(3)

**Proponents:** Lionel Lemay, National Ready Mixed Concrete Association; Ed Sauter, AIA, Concrete Foundation Association; Stephen V. Skalko, P.E., Portland Cement Association; Edgar Sutton, P.E., National Association of Home Builders; Jason Thompson, P.E., National Concrete Masonry Association

#### 1. Revise as follows:

**R404.1 Concrete and masonry foundation walls.** Concrete and masonry foundation walls shall be selected and constructed in accordance with the provisions of Section R404 or in accordance with ACI 318, ACI 332, NCMATR68–A or ACI 530/ASCE 5/TMS 402 or other approved structural standards. When ACI 318, ACI 332 or ACI 530/ASCE 5/TMS 402 or the provisions of Section R404 are used to design concrete or masonry foundation walls, project drawings, typical details and specifications are not required to bear the seal of the architect or engineer responsible for design, unless otherwise required by the state law of the jurisdiction having authority.

~~Foundation walls that meet all of the following shall be considered laterally supported:~~

1. ~~Full basement floor shall be 3.5 inches (89 mm) thick concrete slab poured tight against the bottom of the foundation wall.~~
2. ~~Floor joists and blocking shall be connected to the sill plate at the top of wall by the prescriptive method called out in Table R404.1(1), or; shall be connected with an approved connector with listed capacity meeting Table R404.1(1).~~
3. ~~Bolt spacing for the sill plate shall be no greater than per Table R404.1(2).~~

4. Floor shall be blocked perpendicular to the floor joists. Blocking shall be full depth within two joist spaces of the foundation wall, and be flat blocked with minimum 2 inch by 4 inch (51mm by 102mm) blocking elsewhere.
5. Where foundation walls support unbalanced load on opposite sides of the building, such as a daylight basement, the building aspect ratio,  $L/W$ , shall not exceed the value specified in Table R404.1(3). For such foundation walls, the rim board shall be attached to the sill with a 20 gage metal angle clip at 24 inches (610 mm) on center, with five 8d nails per leg, or an approved connector supplying 230 pounds per linear foot (3.36 kN/m) capacity.

**2. Delete without substitution:**

~~**TABLE R404.1(1)  
TOP REACTIONS AND PRESCRIPTIVE SUPPORT FOR FOUNDATION WALLS<sub>a</sub>**~~

~~**TABLE R404.1(2)  
MAXIMUM PLATE ANCHOR BOLT SPACING FOR SUPPORTED FOUNDATION WALLS<sub>a</sub>**~~

~~**TABLE R404.1(3)  
MAXIMUM ASPECT RATIO,  $L/W$  FOR UNBALANCED FOUNDATIONS**~~

**Reason:** The provisions for laterally supporting basement walls at the top and bottom in the 2000 & 2003 IRC and were previously in the CABO One and Two Family Dwelling Code for many years. Basement walls constructed in accordance with these provisions have performed successfully with no evidence of code deficiencies. Code change S89-04/05 revised the lateral support provisions based on engineering analysis that indicate the 2003 IRC provisions were unconservative. In the reason statement for the code change, the proponent suggested there have been failures of foundation walls built according to these provisions but no detailed data to substantiate these failures was provided. Absent sufficient technical justification for the change, the IBC Structural Committee correctly took action to recommend its disapproval.

During the challenge process public comments were submitted requesting that code change S89-05 be approved as modified. These challenges again alluded to foundation wall failures but no data to substantiate a deficiency with the existing provisions was offered. Unfortunately, the challenges to S89-05 were discussed in Detroit very late one evening of the public hearings. With a very small representation of the voting membership present, the action of the IBC Structural Committee was overturned and the foundation provisions revised to include three new tables and additional limitations to be evaluated for applying prescriptive provisions to foundation walls.

This proposed change deletes these new tables and additional limitations placed on foundation walls so that the requirements for constructing foundation walls will be permitted to follow the prescriptive provisions that have been in the national model residential codes and performed successfully for many years.

**Cost Impact:** The code change proposal will reduce the cost of construction.

Public Hearing: Committee:	AS	AM	D
Assembly:	ASF	AMF	DF

## **RB150-06/07**

### **R404.1.4 (New), R404.1.4.1 (New), R404.1.4.2 (New)**

**Proponent:** Charles O. Everly, PE, CBO, representing the Building Officials Association of Florida

**Add new text as follows:**

**R404.1.4 Anchorage of wood and steel light-frame wall systems in high wind regions.** In regions where the basic wind speeds from Figure R301.2(4) equal or exceed 100 miles per hour (45 m/s) in hurricane-prone regions, or 110 miles per hour (49m/s) elsewhere, anchorage of wood or steel light framed first story walls shall be in accordance with the following:

**R404.1.4.1 For wood light-frame walls, sill plate anchorage.** Wall stud to foundation uplift anchorage and hold down post anchorage shall be in accordance with AF&PA WFCM

**R404.1.4.2 For steel light-frame walls, Wall bottom and braced wall chord stud anchorage shall be in accordance with AISI COFS/PM**

**Reason:** This section is intended to direct the user to information on anchorage of light frame to foundation systems covered elsewhere in this code. Please note that the prescriptive documents referenced by the code do not contain foundation information. The intent is to fill that void.

**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing: Committee:	AS	AM	D
Assembly:	ASF	AMF	DF

# RB151-06/07

## R404.4

**Proponent:** James Gorman, BLUE STAR Insulated Concrete Forms

### Revise as follows:

**R 404.4 Insulating concrete form foundation walls.** Insulating concrete form (ICF) foundation walls shall be designed and constructed in accordance with the provisions of this section or in accordance with the provisions of ACI 318. Vertical rebar may be used to dowel ICF walls to their foundation footings by drilling holes for the vertical rebar 4" into the foundation footings (typically at 24" intervals and at 12" intervals at the corners of ICF walls) and then inserting the vertical rebar into these holes. When ACI 318 or the provisions of this section are used to design insulating concrete form foundation walls, project drawings, typical details and specifications are not required to bear the seal of the architect or engineer responsible for design unless otherwise required by the state law of the jurisdiction having authority.

**Reason:** This alternative method of securing ICF walls to their foundation footings permits the same surface area of rebar to be dowelled into the foundation footings as 8" deep holes at 48" intervals.

**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing: Committee: AS AM D  
Assembly: ASF AMF DF

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# RB152-06/07

## R404.4.7.2, Chapter 43

**Proponent:** James Gorman, BLUE STAR Insulated Concrete Forms

### 1. Revise as follows:

**R404.4.7.2 Termite hazards.** In areas where hazard of termite damage is very heavy in accordance with Figure R301.2(6), foam plastic insulation shall be permitted below grade on foundation walls in accordance with one of the following conditions:

1. When in addition to the requirements in Section R320.1, an approved method of protecting the foam plastic and structure from subterranean termite damage is provided. This section shall authorize as a termite and insect barrier the use of, on the exterior side of ICF walls a non-flammable, cementitious acrylic polymer stucco-like ICF wall finish that meets or exceeds the termite hazard protections in accordance with:

<u>ASTM C-109</u>	<u>("Compressive Strength")</u>
<u>ASTM C-348</u>	<u>("Flexural Strength")</u>
<u>ASTM C-190</u>	<u>("Tensile Strength")</u>
<u>ASTM C-882</u>	<u>("Shear Bond Adhesion")</u>
<u>ASTM C-994</u>	<u>("Abrasion Resistance")</u>
<u>ASTM C-642</u>	<u>("Water Absorption")</u>
<u>ASTM C-666</u>	<u>("Freeze-Thaw")</u>
<u>ASTM D-2299</u>	<u>("Chemical Resistance")</u>
<u>ASTM D-2247</u>	<u>("Moisture Resistance")</u>
<u>ASTM G-23</u>	<u>("Accelerated Weathering")</u>
<u>ASTM G-21</u>	<u>("Mildew Resistance")</u>
<u>Mil 810-B</u>	<u>("Mildew Resistance")</u>
<u>ASTM C-596</u>	<u>("Shrinkage")</u>

2. The structural members of walls, floors, ceilings and roofs are entirely of noncombustible materials or pressure preservative treated wood.
3. On the interior side of basement walls.

### 2. Add new standards to Chapter 43 as follows:

<u>ASTM C-109</u>	<u>Compressive Strength</u>
<u>ASTM C-348</u>	<u>Flexural Strength</u>
<u>ASTM C-190</u>	<u>Tensile Strength</u>

<u>ASTM C-882</u>	<u>Shear Bond Adhesion</u>
<u>ASTM C-994</u>	<u>Abrasion Resistance</u>
<u>ASTM C-642</u>	<u>Water Absorption</u>
<u>ASTM C-666</u>	<u>Freeze-Thaw</u>
<u>ASTM D-2299</u>	<u>Chemical Resistance</u>
<u>ASTM D-2247</u>	<u>Moisture Resistance</u>
<u>ASTM G-23</u>	<u>Accelerated Weathering</u>
<u>ASTM G-21</u>	<u>Mildew Resistance</u>
<u>Mil 810-B</u>	<u>Mildew Resistance</u>
<u>ASTM C-596</u>	<u>Shrinkage</u>

**Reason:** This alternative method of providing ICF walls and masonry walls with appropriate below-grade and above-grade termite barrier permits the use of PermaCrete as such a termite barrier.

**Cost Impact:** The code change proposal will not increase the cost of construction.

**Analysis:** Results of review of the proposed standard will be posted on the ICC website by August 20, 2006.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

## **RB153-06/07**

### **R404.6 (New), R404.6.1 (New), R404.6.2 (New), R404.6.3 (New)**

**Proponent:** Brian D. Miller, National Precast Concrete Association

**Add new text as follows:**

**R404.6 Precast concrete foundation walls.** Precast concrete foundation walls shall be manufactured and installed in accordance with Section R 404.6.

**R404.6.1 Design.** The design and manufacture of precast foundation systems shall be in accordance with Section R404.6.2 and ACI 318. The system design shall be sealed by a registered professional engineer. Individual projects built from the system design, drawings, manuals and fabrication procedures shall not be required to bear the seal of the architect or engineer unless otherwise required by state law of the jurisdiction having authority. Fabrication plants shall be inspected annually by an approved third-party inspection agency.

**R404.6.2 Minimum design criteria for precast concrete foundation walls:**

1. Total uniform load applied to the top of foundation walls, lbs/ft, 5300
2. Lateral earth pressure, lbs/ft<sup>2</sup>/ft of depth, 60
3. Accommodate concentrated loads in excess of the uniform load.
4. Precast foundations are assumed not to be subject to hydrostatic pressure from ground water

**R404.6.3 Precast concrete foundation wall design drawings.** Precast concrete panel systems used as foundations shall be pre-engineered systems and shall have all applicable design criteria and rated capacities noted on the panel design drawings. The panel design drawings shall be available to the building official. Precast concrete panel design drawings shall include at a minimum, the information specified below.

1. Soil bearing capacity (psf)
2. Footing design and material
3. Maximum allowable total uniform load (lbs/linear foot)
4. Concentrated loads and their points of application

**Reason:** To clarify the code and add new requirements to code. In 2003, precast foundations were added to the IRC, additional information and guidance is needed to clarify details of their use for building officials. Precast foundation systems are pre-engineered systems with quality control in place at the manufacture, similar to trusses and other pre-engineered products. This language sets the minimum design criteria for precast concrete foundation systems and performance data that shall be communicated to the building official and contractor in the form of drawings.

**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

# RB154-06/07

## R405.1

**Proponent:** Alan Seymour, Oregon Department of Energy

### Revise as follows:

**R405.1 Concrete or masonry foundations drainage systems.** Drains shall be provided around all concrete or masonry foundations that retain earth and enclose habitable or usable spaces located below grade, or crawlspaces in conjunction with soils according to the Unified Soil Classification System, Groups III, and IV Soils, as detailed in Table R405.1. Drainage tiles, gravel or crushed stone drains, perforated pipe or other approved systems or materials shall be installed at or below the area to be protected and shall discharge by gravity or mechanical means into an approved drainage system. Gravel or crushed stone drains shall extend at least 1 foot (305 mm) beyond the outside edge of the footing and 6 inches (153 mm) above the top of the footing and be covered with an approved filter membrane material. The top of open joints of drain tiles shall be protected with strips of building paper, and the drainage tiles or perforated pipe shall be placed on a minimum of 2 inches (51 mm) of washed gravel or crushed rock at least one sieve size larger than the tile joint opening or perforation and covered with not less than 6 inches (153 mm) of the same material.

### Exceptions:

1. A drainage system is not required when the foundation is installed on well-drained ground or sand-gravel mixture soils [~~according to the Unified Soil Classification System~~], Group I Soils, as detailed in Table R405.1.
2. Crawlspaces, where determined by the building official as not needing a drainage system as determined by site specific soil and drainage conditions.

**Reason:** This code section currently addresses foundation drainage systems for basements. The IRC also allows conditioned crawlspaces (not allowed in Oregon) and ventilated crawlspaces. Both of these conditions, especially the conditioned crawlspace must not allow bulk water in the crawlspace and a drainage system must be required to prevent moisture-related problems and damage from occurring during the life of the structure.

Group III and IV Soils have either poor or unsatisfactory drainage characteristics. Bulk water in crawlspaces is a major contributor to increased (problematic) humidity levels in homes. Even in ventilated crawlspaces, saturated air (100% RH) will infiltrate into conditioned spaces and cause moisture related problems. This is especially problematic in unvented conditioned crawlspaces as the water is now contained in the conditioned space.

The potential for moisture-related problems exist in buildings. Measures necessary to prevent moisture into a structure are lacking in code. A major vehicle for water intrusion into buildings is through the foundation for specific soil types and climatic conditions. As stated in Reasons above, this is problematic in more types of construction than covered in current code. In addition, as specified in Cost Impact below, these measures are very expensive, if not nearly impossible to install after a building has been constructed.

**Cost Impact:** This proposal is related to reducing moisture-related problems within a building. Increased levels of moisture in homes contribute to mold, which can become health issues and lead to dry rot damage in wood components of the building. Insurance for a contractor, architect, or homeowner does not cover damages due to moisture related issues.

While most molds are benign, some can cause devastating health problems and lead to dry rot in wood building components. Requiring replacement of wood components due to dry rot after a building is constructed is much more expensive to mitigate and repair than during construction of a new building.

There is an increased cost associated with the proposal. The cost for mitigation during construction would be less a fraction of the cost associated with mitigating and repairing damage. One of the mitigating measures to prevent damage from occurring again may be the measure that being proposed. Due to the magnitude of the potential problems, a cost cannot be associated with this proposal.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

# RB155-06/07

## R405.1.1 (New)

**Proponent:** Brian D. Miller, National Precast Concrete Association

### Add new text as follows:

**R405.1.1 Precast concrete foundation.** Precast concrete foundation walls that retain earth and enclose habitable or useable space located below grade that rest on crushed stone footings shall have a perforated drainage pipe installed below the base of the wall on either the exterior or the interior side of the wall, at least one-foot (305 mm) beyond the edge of the wall. If the exterior drainage pipe is used, an approved filter membrane material must cover the pipe.

**Reason:** The purpose of the change is to clarify the code. In 2003, precast foundations were added to the IRC, additional information and guidance is needed to clarify details of their use for building officials. This section provides clarity on proper drainage systems for precast concrete foundation systems that utilize a crushed stone footing.



**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing: Committee: AS AM D  
Assembly: ASF AMF DF

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## **RB156-06/07**

### **R406.3.2, Chapter 43**

**Proponent:** James Gorman, BLUE STAR Insulated Concrete Forms

#### **1. Revise as follows:**

**R406.3.2 Below-grade moisture barrier.** A 6-mil-thick (0.15 mm) polyethylene film shall be applied over the below-grade portion of exterior foundation walls prior to backfilling. Joints in the polyethylene film shall be lapped 6 inches (152 mm) and sealed with adhesive. The top edge of the polyethylene film shall be bonded to the sheathing to form a seal. Film areas at grade level shall be protected from mechanical damage and exposure by a pressure preservatively treated lumber or plywood strip attached to the wall several inches above finish grade level and extending approximately 9 inches (229 mm) below grade. The joint between the strip and the wall shall be caulked full length prior to fastening the strip to the wall. Other coverings appropriate to the architectural treatment may also be used. The polyethylene film shall extend down to the bottom of the wood footing plate but shall not overlap or extend into the gravel or crushed stone footing. This section shall also authorize as a below-grade moisture barrier the use of a non-flammable, cementitious, acrylic polymer stucco-like ICF wall finish to meets or exceeds moisture barrier protections in accordance with:

ASTM D-2247 ("Moisture Resistance")  
ASTM C-642 ("Water Absorption")  
ASTM C-666 ("Freeze Thaw")  
ASTM C-882 (Shear Bond Adhesion)  
ASTM D-2299 ("Chemical Resistance")  
ASTM G-21 ("Mildew Resistance")  
ASTM C-596 ("Shrinkage")

#### **2. Add new standards to Chapter 43 as follows:**

ASTM D-2247 Moisture Resistance  
ASTM C-642 Water Absorption  
ASTM C-666 Freeze Thaw  
ASTM C-882 Shear Bond Adhesion  
ASTM D-2299 Chemical Resistance  
ASTM G-21 Mildew Resistance  
ASTM C-596 Shrinkage

**Reason:** This alternative method of providing ICF walls with appropriate moisture barrier protections permits the use of PermaCrete as an approved moisture barrier.

**Cost Impact:** The code change proposal will not increase the cost of construction.

**Analysis:** Results of review of the proposed standard will be posted on the ICC website by August 20, 2006.

Public Hearing: Committee: AS AM D  
Assembly: ASF AMF DF

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## **RB157-06/07**

### **R406.4 (New), R406.4.1 (New), Chapter 43 (New)**

**Proponent:** Brian D. Miller, National Precast Concrete Association

#### **Add new text as follows:**

**R406.4 Dampproofing for Precast Concrete Foundations.** Precast concrete foundation walls that retain earth and enclose interior spaces and floors below grade shall be dampproofed in accordance with R406.1.

**Exception:** Where precast concrete foundations are manufactured according to ACI 318 durability standards (Table 4.2.1 and Table 4.2.2), no additional dampproofing materials are required.

**R406.4.1 Panel Joints Sealed.** Precast concrete foundation panel joints shall be sealed full height with a sealant meeting ASTM C920, Type S or M, Grade NS, Class 25, Use NT, M or A. Joint sealant shall be installed in accordance with manufacturer's installation instructions.

## CHAPTER 43 REFERENCED STANDARDS

### ASTM C 920-05 Standard Specification for Elastomeric Joint Sealants

**Reason:** The purpose of the change is to clarify the code. In 2003, precast foundations were added to the IRC, additional information and guidance is needed to clarify details of their use for building officials.

**Cost Impact:** The code change proposal will not increase the cost of construction.

**Analysis:** Results of review of the proposed standard will be posted on the ICC website by August 20, 2006.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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## **RB158-06/07**

### **R502**

**Proponent:** Bob Boyer, Building Officials Association of Florida Code Development Committee, representing Building Officials Association of Florida

**Delete current Section 502 and substitute as follows:**

### **SECTION R502 WOOD FLOOR FRAMING**

**R502.1 General Requirements.** Floor framing of light-frame wood construction shall be in accordance with the provisions of this Section.

**R502.1.1 Identification.** Load-bearing dimension lumber for joists, beams and girders shall be identified by a grade mark of a lumber grading or inspection agency that has been approved by an accreditation body that complies with DOC PS 20. In lieu of a grade mark, a certificate of inspection issued by a lumber grading or inspection agency meeting the requirements of this section shall be accepted.

**R502.1.1.1 Preservatively treated lumber.** Preservatively treated dimension lumber shall also be identified as required by Section R319.1.

**R502.1.1.2 Blocking and subflooring.** Blocking shall be a minimum of utility grade lumber. Subflooring may be a minimum of utility grade lumber or No. 4 common grade boards.

**R502.1.1.3 End-jointed lumber.** Approved end-jointed lumber identified by a grade mark conforming to Section R501.2 may be used interchangeably with solid-sawn members of the same species and grade.

**R502.1.1.4 Prefabricated wood I-joists.** Structural capacities and design provisions for prefabricated wood I-joists shall be established and monitored in accordance with ASTM D 5055.

**R502.1.1.5 Structural glued laminated timbers.** Glued laminated timbers shall be manufactured and identified as required in AITC A190.1 and ASTM D3737.

**R502.1.1.6 Structural log members.** Stress grading of structural log members of nonrectangular shape, as typically used in log buildings, shall be in accordance with ASTM D 3957. Such structural log members shall be identified by the grade mark of an approved lumber grading or inspection agency. In lieu of a grade mark on the material, a certificate of inspection as to species and grade issued by a lumber-grading or inspection agency meeting the requirements of this section shall be permitted to be accepted.

**R502.1.2 Draftstopping required.** When there is usable space both above and below the concealed space of a floor/ceiling assembly, draftstops shall be installed so that the area of the concealed space does not exceed 1,000 square feet (92.9 m<sup>2</sup>). Draftstopping shall divide the concealed space into approximately equal areas. Where the assembly is enclosed by a floor membrane above and a ceiling membrane below draftstopping shall be provided in floor/ceiling assemblies under the following circumstances:

1. Ceiling is suspended under the floor framing.
2. Floor framing is constructed of truss-type open-web or perforated members.

**R502.1.2.1 Materials.** Draftstopping materials shall not be less than 1/2-inch (12.7 mm) gypsum board, 3/8-inch (9.5 mm) wood structural panels, 3/8-inch (9.5 mm) Type 2-M-W particleboard or other approved materials adequately supported. Draftstopping shall be installed parallel to the floor framing members unless otherwise approved by the building official. The integrity of all draftstops shall be maintained.

**R502.1.2.2 Fireblocking required.** Fireblocking shall be provided in wood-frame floor construction and floor-ceiling assemblies in accordance with Section R602.8.

### **R502.1.3 Wood trusses.**

**R502.1.3.1 Design.** Wood trusses shall be designed in accordance with approved engineering practice. The design and manufacture of metal plate connected wood trusses shall comply with ANSI/TPI 1. The truss design drawings shall be prepared by a registered professional where required by the statutes of the jurisdiction in which the project is to be constructed in accordance with Section R106.1.

**R502.1.3.2 Bracing.** Trusses shall be braced to prevent rotation and provide lateral stability in accordance with the requirements specified in the construction documents for the building and on the individual truss design drawings. In the absence of specific bracing requirements, trusses shall be braced in accordance with the Building Component Safety Information (BCSI 1-03) Guide to Good Practice for Handling, Installing & Bracing of Metal Plate Connected Wood Trusses.

**R502.1.3.3 Alterations to trusses.** Truss members and components shall not be cut, notched, spliced or otherwise altered in anyway without the approval of a registered design professional. Alterations resulting in the addition of load (e.g., HVAC equipment, water heater, etc.), that exceed the design load for the truss, shall not be permitted without verification that the truss is capable of supporting the additional loading.

**R502.1.3.4 Truss design drawings.** Truss design drawings, prepared in compliance with Section R502.11.1, shall be provided to the building official and approved prior to installation. Truss design drawing shall be provided with the shipment of trusses delivered to the job site. Truss design drawings shall include, at a minimum, the information specified below:

1. Slope or depth, span, and spacing.
2. Location of all joints.
3. Required bearing widths.
4. Design loads as applicable.
  - 4.1. Top chord live load.
  - 4.2. Top chord dead load.
  - 4.3. Bottom chord live load.
  - 4.4. Bottom chord dead load.
  - 4.5. Concentrated loads and their points of application.
  - 4.6. Controlling wind and earthquake loads.
5. Adjustments to lumber and joint connector design values for conditions of use.
6. Each reaction force and direction.
7. Joint connector type and description (e.g., size, thickness or gauge); and the dimensioned location of each joint connector except where symmetrically located relative to the joint interface.
8. Lumber size, species and grade for each member.
9. Connection requirements for:
  - 9.1. Truss-to-truss girder.
  - 9.2. Truss ply-to-ply.
  - 9.3. Field splices.
10. Calculated deflection ratio and/or maximum description for live and total load.
11. Maximum axial compression forces in the truss members to enable the building designer to design the size, connections and anchorage of the permanent continuous lateral bracing. Forces shall be shown on the truss drawing or on supplemental documents.
12. Required permanent truss member bracing location.

**R502.2 Design and construction where basic wind speed is less than 100 mph (160.9 km/h) in hurricane-prone regions or 110 miles per hour (177.1 km/h) elsewhere.** Floors shall be designed and constructed in accordance with the provisions of this Section and Figure R502.1 and Sections R319 and R320 or in accordance with AF&PA's NDS.

**R502.2.1 Framing at braced wall lines.** A load path for lateral forces shall be provided between floor framing and braced wall panels located above or below a floor, as specified in Section R602.10.8.

**R502.2.2 Decks.** Where supported by attachment to an exterior wall, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads as applicable. Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting. For decks with cantilevered framing members, connections to exterior walls or other framing members, shall be designed and constructed to resist uplift resulting from the full live load specified in Table R301.5 acting on the cantilevered portion of the deck.

**R502.2.3 Allowable joist spans.** Spans for floor joists shall be in accordance with Tables R502.2.3(1) and R502.2.3(2). For other grades and species and for other loading conditions, refer to the AF&PA Span Tables for Joists and Rafters.

**R502.2.3.1 Sleeping areas and attic joists.** Table R502.2.3(1) shall be used to determine the maximum allowable span of floor joists that support sleeping areas and attics that are accessed by means of a fixed stairway in accordance with Section R311.5 provided that the design live load does not exceed 30 psf (1.44 kPa) and the design dead load does not exceed 20 psf (0.96 kPa). The allowable span of ceiling joists that support attics used for limited storage or no storage shall be determined in accordance with Section R802.4.

**TABLE R502.2.3(1)**  
**FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES**  
**(Residential sleeping areas, live load = 30 psf, L/Δ = 360)**

(No changes to existing tables or figures except for renumbering)

**TABLE R502.2.3(2)**  
**FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES**  
**(Residential living areas, live load = 40 psf, L/Δ = 360)<sup>b</sup>**

(No changes to existing tables or figures except for renumbering)

**R502.2.3.2 Other floor joists.** Table R502.3.1(2) shall be used to determine the maximum allowable span of floor joists that support all other areas of the building, other than sleeping rooms and attics, provided that the design live load does not exceed 40 psf (1.92 kPa) and the design dead load does not exceed 20 psf (0.96 kPa).

**R502.2.3.3 Floor cantilevers.** Floor cantilever spans shall not exceed the nominal depth of the wood floor joist. Floor cantilevers constructed in accordance with Table R502.2.3.3(1) shall be permitted when supporting a light-frame bearing wall and roof only. Floor cantilevers supporting an exterior balcony are permitted to be constructed in accordance with Table R502.2.3.3(2).

**TABLE R502.2.3.3(1)**  
**CANTILEVER SPANS FOR FLOOR JOISTS SUPPORTING**  
**LIGHT-FRAME EXTERIOR BEARING WALL AND ROOF ONLY<sup>a,b,c,f,g,h</sup>**  
**(Floor Live Load ≤ 40 psf, Roof Live Load ≤ 20 psf)**

(No changes to existing tables or figures except for renumbering)

**TABLE R502.2.3.3(2)**  
**CANTILEVER SPANS FOR FLOOR JOISTS SUPPORTING EXTERIOR BALCONY<sup>a,b,e,f</sup>**

(No changes to existing tables or figures except for renumbering)

**R502.2.4 Joists under bearing partitions.** Joists under parallel bearing partitions shall be of adequate size to support the load. Double joists, sized to adequately support the load, that are separated to permit the installation of piping or vents shall be full depth solid blocked with lumber not less than 2 inches (51 mm) in nominal thickness spaced not more than 4 feet (1219 mm) on center. Bearing partitions perpendicular to joists shall not be offset from supporting girders, walls or partitions more than the joist depth unless such joists are of sufficient size to carry the additional load.

**R502.2.5 Allowable girder spans.** The allowable spans of girders fabricated of dimension lumber shall not exceed the values set forth in Tables R502.2.5(1) and R502.2.5(2).

**TABLE R502.2.5(1)**  
**GIRDER SPANS AND HEADER SPANS<sub>a</sub> FOR**  
**EXTERIOR BEARING WALLS**  
**(Maximum spans for Douglas fir-larch, hem-fir, southern pine and**  
**Spruce-pine fir<sub>b</sub> and required number of jack studs)**

(No changes to existing tables or figures except for renumbering)

**TABLE R502.2.5(2)**  
**GIRDER SPANS AND HEADER SPANS<sub>a</sub> FOR INTERIOR BEARING WALLS**  
**(Maximum spans for Douglas fir-larch, hem-fir, southern pine**  
**And spruce-pine-fir<sub>b</sub> and required number of jack studs)**

(No changes to existing tables or figures except for renumbering)

**R502.2.6 Bearing.** The ends of each joist, beam or girder shall have not less than 1.5 inches (38 mm) of bearing on wood or metal and not less than 3 inches (76 mm) on masonry or concrete except where supported on a 1-inch-by-4-inch (25.4 mm by 102 mm) ribbon strip and nailed to the adjacent stud or by the use of approved joist hangers.

**R502.2.6.1 Floor systems.** Joists framing from opposite sides over a bearing support shall lap a minimum of 3 inches (76 mm) and shall be nailed together with a minimum three 10d face nails. A wood or metal splice with strength equal to or greater than that provided by the nailed lap is permitted.

**R502.2.6.2 Joist framing.** Joists framing into the side of a wood girder shall be supported by approved framing anchors or on ledger strips not less than nominal 2 inches by 2 inches (51 mm by 51 mm).

**R502.2.7 Lateral restraint at supports.** Joists shall be supported laterally at the ends by full-depth solid blocking not less than 2 inches (51 mm) nominal in thickness; or by attachment to a full-depth header, band, or rim joist, or to an adjoining stud; or shall be otherwise provided with lateral support to prevent rotation.

**Exception:** In Seismic Design Categories  $D_0$ ,  $D_1$  and  $D_2$ , lateral restraint shall also be provided at each intermediate support.

**R502.2.7.1 Bridging.** Joists exceeding a nominal 2 inches by 12 inches (51 mm by 305 mm) shall be supported laterally by solid blocking, diagonal bridging (wood or metal), or a continuous 1-inch-by-3-inch (25.4 mm by 76 mm) strip nailed across the bottom of joists perpendicular to joists at intervals not exceeding 8 feet (2438 mm).

**R502.2.8 Drilling and notching.** Structural floor members shall not be cut, bored or notched in excess of the limitations specified in this section. See Figure R502.2.8.

**FIGURE R502.2.8**  
**CUTTING, NOTCHING AND DRILLING**

(No changes to existing tables or figures except for renumbering)

**R502.2.8.1 Sawn lumber.** Notches in solid lumber joists, rafters and beams shall not exceed one-sixth of the depth of the member, shall not be longer than one-third of the depth of the member and shall not be located in the middle one-third of the span. Notches at the ends of the member shall not exceed one-fourth the depth of the member. The tension side of members 4 inches (102 mm) or greater in nominal thickness shall not be notched except at the ends of the members. The diameter of holes bored or cut into members shall not exceed one-third the depth of the member. Holes shall not be closer than 2 inches (51 mm) to the top or bottom of the member, or to any other hole located in the member. Where the member is also notched, the hole shall not be closer than 2 inches (51 mm) to the notch.

**R502.2.8.2 Engineered wood products.** Cuts, notches and holes bored in trusses, structural composite lumber, structural glue-laminated members or I-joists are prohibited except where permitted by the manufacturer's recommendations or where the effects of such alterations are specifically considered in the design of the member by a registered design professional.

**R502.2.9 Fastening.** Floor framing shall be nailed in accordance with Table R602.3(1). Where posts and beam or girder construction is used to support floor framing, positive connections shall be provided to ensure against uplift and lateral displacement.

**R502.2.10 Framing of openings.** Openings in floor framing shall be framed with a header and trimmer joists. When the header joist span does not exceed 4 feet (1219 mm), the header joist may be a single member the same size as

the floor joist. Single trimmer joists may be used to carry a single header joist that is located within 3 feet (914 mm) of the trimmer joist bearing. When the header joist span exceeds 4 feet (1219 mm), the trimmer joists and the header joist shall be doubled and of sufficient cross section to support the floor joists framing into the header. Approved hangers shall be used for the header joist to trimmer joist connections when the header joist span exceeds 6 feet (1829 mm). Tail joists over 12 feet (3658mm) long shall be supported at the header by framing anchors or on ledger strips not less than 2 inches by 2 inches (51 mm by 51 mm).

**R502.3 Design and construction where basic wind speed equal or exceed 100 mph (160.9 km/h) in hurricane-prone regions or 110 miles per hour (177.1 km/h) elsewhere.** Floor framing of light-frame wood construction shall be designed and constructed in accordance with the provisions of Section R301.2.1.1 and Section R502.1.

**Reason:** This modification reorganizes the provisions for wood-frame construction of floors by separating general provisions applicable to all wood construction from that of prescriptive wood-frame construction from that of engineered wood construction. This change adds new Section R502.1 General Requirements, revising Section R502.2 to clarify where the prescriptive construction applies and adding new Section R502.3 to clarify where an engineered construction is required.

**Cost Impact:** The code change proposal will not increase the cost of construction. This change merely reorganizes the provisions for wood-frame construction of floors by separating general provisions applicable to all wood construction from that of prescriptive, wood-frame construction from that of engineered wood construction.

Public Hearing: Committee: AS AM D  
 Assembly: ASF AMF DF

## RB159-06/07

### R502.2.2.1 (New), Table R502.2.2.1 (New), R502.2.2.1.1 (New)

**Proponent:** Richard E. Bartell, Hanover County, VA, representing the Virginia Plumbing and Mechanical Inspectors Association/Virginia Building and Code Officials Association

**Add new text and table as follows:**

**R502.2.2.1 Deck ledger connection to band joist.** For residential applications and a total design load of 50 psf, the connection between a pressure preservative treated southern pine, incised PPT hem-fir, (or approved decay-resistant species) deck ledger and a 2-inch nominal band joist bearing on a sill plate or wall plate shall be constructed with ½-inch lag screws or bolts with washers per Table R502.2.2.1.

**TABLE R502.2.2.1  
 FASTENER SPACING FOR A RESIDENTIAL PPT SOUTHERN PINE OR HEM-FIR DECK LEDGER  
 AND A 2-INCH NOMINAL SOLID-SAWN SPRUCE-PINE-FIR BAND JOIST (50 PSF TOTAL LOAD)<sup>3,6</sup>**

<u>Joist Span (ft)</u>	<u>6' and less</u>	<u>6'-1 to 8'</u>	<u>8'-1" to 10'</u>	<u>10'-1" to 12'</u>	<u>12'-1" to 14'</u>	<u>14'-1" to 16'</u>	<u>16'-1" to 18"</u>
	<u>On-Center Spacing of Fasteners<sup>4,5</sup></u>						
<u>½" diameter Lag Screw with 15/32" sheathing<sup>1</sup></u>	<u>30</u>	<u>23</u>	<u>18</u>	<u>15</u>	<u>13</u>	<u>11</u>	<u>10</u>
<u>½" diameter bolt with 15/32" sheathing</u>	<u>36</u>	<u>36</u>	<u>34</u>	<u>29</u>	<u>24</u>	<u>21</u>	<u>19</u>
<u>½" diameter bolt with 15/32" sheathing and ½" stacked washers<sup>2</sup></u>	<u>36</u>	<u>36</u>	<u>29</u>	<u>24</u>	<u>21</u>	<u>18</u>	<u>16</u>

<sup>1</sup> The tip of the lag screw shall fully extend beyond the inside face of the band joist.

<sup>2</sup> The maximum gap between the face of the ledger board and face of the house band joist shall be ½".

<sup>3</sup> Ledgers shall be flashed to prevent water from contacting the house band joist.

<sup>4</sup> Lag screws and bolts shall be staggered per R502.2.1.1.

<sup>5</sup> Deck ledger shall be 2x8 PPT No.2 grade (minimum) or other approved method and material as established by standard engineering practice.

<sup>6</sup> When solid-sawn PPT deck ledgers are attached to engineered lumber products (composite rimboard or LVL), the ledger attachment requirements in the product manufacturer's engineering report shall be followed.

**R502.2.2.1.1 Placement of lag screws or bolts in residential deck ledgers.** The lag screws or bolts shall be placed two inches in from the bottom or top of the deck ledgers and two inches in from the ends. The lag screws or bolts shall be staggered from the top to the bottom along the horizontal run of the deck ledger.

**Reason:** Researchers at Virginia Tech University and Washington University have tested simulated deck-ledger to house-band-joint connections in their respective laboratories. A practical range of pressure-preservative-treated (PPT) deck ledger lumber (incised Hem-fir and Southern Pine) was attached to a simulated Spruce-Pine-Fir band joist by ½-inch lag screws or bolts with washers. The deck ledger was separated from the house band joist by placing a piece of 15/32" wall sheathing in the connection, and in another test case for bolts only, a ½-inch stack of washers was inserted into the connection to produce a drainage plane. The specimens were tested to failure and the average test results were divided by a factor of 3.0, intended to provide an adequate in-service safety factor, and further divided by 1.6 to convert from a "test duration" to a "normal duration" of ten years recognized by the NDS and IBC as the proper duration for occupancy live load.

The proposed on-center spacing is the closest spacing for the two cases of deck ledger lumber studied. Due to the limited investigation into the performance of composite type house rimboards (only DFL was evaluated) and the possibility of rimboards entering the market being a lower quality than what was tested at Washington State University, engineered rimboards are not included in the scope of the proposed fastener spacing table. Instead, footnote 6 is proposed to refer the contractor and official to the manufacturer of the rimboard product. The two papers cited in the Bibliography gives the testing procedure and results for the cases included in the caption to the proposed table.

**Bibliography:**

1. Carradine, D. M., D. A. Bender, J. R. Loferski, and F. E. Woeste. 2005. Wood Bits: Residential deck ledger design. Building Safety Journal (6): 4-7. [www.iccsafe.org/news/bsj/1205\\_Woodbits.pdf](http://www.iccsafe.org/news/bsj/1205_Woodbits.pdf)
2. Loferski, J., F. Woeste, R. Caudill, T. Platt, and Q. Smith. 2004. Load-tested deck ledger connections. Journal of Light Construction 22(6): 71-78

**Cost Impact:** The code change proposal will increase the cost of construction.

Public Hearing: Committee:	AS	AM	D
Assembly:	ASF	AMF	DF

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## RB160–06/07

**R502.11.1, R502.11.2, R502.11.3, R502.11.4, R502.11.4.1 (New), R502.11.4.2 (New), R502.11.4.3 (New), R502.11.5 (New), R502.11.6 (New), R502.11.7 (New)**

**Proponent:** Kirk Grundahl, P.E., WTCA, representing the Structural Building Components Industry

**Add new text, revise, reorder and add sections as follows:**

### **R502.11 Wood trusses.**

**R502.11.1 Truss design drawing.** A type of construction document that includes the written, graphic and pictorial depiction of each individual truss.

**R502.11.2 Truss submittal package.** Shall consist of each individual Truss Design Drawing, the Truss Member Permanent Bracing per R502.11.3 and, as applicable, the cover sheet/truss index sheet.

**R502.11.3 Truss placement diagram.** Optional manufacturer's installation instructions, which identifies the proposed location for each individually designated truss and references the corresponding Truss Design Drawing. The Truss Placement Diagram shall not be required to bear the seal or signature of the Truss Designer.

**R502.11.4 Design.** Wood trusses shall be designed in accordance with the provisions of this code and approved engineering practice. ~~The design and manufacture of metal plate connected wood trusses shall comply with ANSI/TPI-1. The truss design drawings shall be prepared by a registered professional where required by the statutes of the jurisdiction in which the project is to be constructed in accordance with Section R406.1.~~ Members are permitted to be joined by nails, glue, bolts, timber connectors, metal connector plates or other approved framing devices.

**R502.11.4.1 Truss design drawings.** The written, graphic and pictorial depiction of each individual truss shall be provided to the building official for approval prior to installation. ~~Truss design drawings, prepared in compliance with Section R502.11.1, shall be submitted to the building official and approved prior to installation.~~ Truss design drawings shall also be provided with the shipment of trusses delivered to the job site. Truss design drawings shall include, at a minimum, the information specified below:

1. Slope or depth, span and spacing.

2. Location of all joints.
3. Required bearing widths.
4. Design loads as applicable:
  - 4.1. Top chord live load;
  - 4.2. Top chord dead load;
  - 4.3. Bottom chord live load;
  - 4.4. Bottom chord dead load;
  - 4.5. Concentrated loads and their points of application; ~~and~~.
  - 4.6. Controlling wind and earthquake loads.
5. Adjustments to wood member ~~lumber~~ and metal connector plate ~~joint~~ connector design values for conditions of use.
6. Each reaction force and direction.
7. ~~Joint~~ Metal connector plate type and description, e.g., size, and thickness or gauge, and the dimensioned location of each metal connector plate ~~joint~~ connector except where symmetrically located relative to the joint interface.
8. ~~Lumber~~-size, species and grade for each wood member.
9. Connection requirements for:
  - 9.1. Truss-to-girder-truss;
  - 9.2. Truss ply-to-ply; ~~and~~.
  - 9.3. Field splices.
10. Calculated deflection ratio ~~and/or~~ maximum vertical and horizontal deflection ~~description~~ for live and total load, as applicable.
11. Maximum axial tension and compression forces in the truss members to enable the building designer to design the size, connections and anchorage of the permanent continuous lateral bracing. Forces shall be shown on the truss drawing or on supplemental documents.
12. Required ~~permanent~~ individual truss member permanent bracing location and method per Section R502.11.4.2, unless a specific truss member permanent bracing plan for the roof or floor structural system is provided by a registered design professional.

**R502.11.24.2 Bracing.** Trusses shall be braced to prevent rotation and provide lateral stability in accordance with the requirements specified in the construction documents for the building and shall be braced where permanent bracing of individual truss members is indicated on the individual truss design drawings. Where permanent bracing of individual truss members is required on the truss design drawings, it shall be accomplished by one of the following methods:

1. The trusses shall be designed so that the buckling of any individual truss member can be resisted internally by the structure (e.g. buckling member T-bracing, L-bracing, etc) of the individual truss. The individual truss member buckling reinforcement shall be installed as shown on the Truss Design Drawing or on supplemental truss member buckling reinforcement diagrams provided by the Truss Designer.
2. Permanent bracing shall be installed using standard industry bracing details that conform with generally accepted engineering practice.

In the absence of specific bracing requirements, trusses shall be braced in accordance with the Building Component Safety Information (BCSI 1-03) Guide to Good Practice for Handling, Installing & Bracing of Metal Plate Connected Wood Trusses.

**R502.11.4.3 Truss designer:** The individual or organization responsible for the design of trusses.

**R502.11.4.3.1 Name and signature on truss design drawing.** Where required by a registered design professional, or a building official; or the statutes of the jurisdiction in which the project is to be constructed, each individual truss design drawing shall bear the seal and signature of the truss designer:



**Exceptions:**

1. When a cover sheet and truss index sheet are combined into a single cover sheet and attached to the set of truss design drawings, the single sheet/truss index sheet is the only document required to be signed and sealed within the truss submittal package.
2. When a cover sheet and a truss index sheet are separately provided and attached to the set of truss design drawings, both the cover sheet and the truss index sheet are the only documents that need to be signed and sealed within the truss submittal package.

**R502.11.5 Anchorage.** All transfer of loads and anchorage of each truss to the supporting structure is the responsibility of the individual submitting the construction documents for the structure for approval.

**R502.11.3 Alterations to trusses.** Truss members and components shall not be cut, notched, spliced or otherwise altered in anyway without the approval of a registered design professional. Alterations resulting in the addition of load (e.g., HVAC equipment, water heater, etc.), that exceed the design load for the truss, shall not be permitted without verification that the truss is capable of supporting the additional loading.

**R502.11.7 Metal-plate-connected trusses.** In addition to Sections R502.11.1 through R502.11.6, the design, manufacture and quality assurance of metal-plate-connected wood trusses shall be in accordance with TPI 1. Manufactured trusses shall comply with R109, as applicable.

**Reason:** This harmonizes this section with the language in the IBC section 2303.4. The wood truss sections included in Chapter 5 and 8 contain the same requirements with the exception of the direct reference to Section R301.6 regarding the controlling roof load in 4.1 of proposed Section R802.10.4.1 and the applicability limitations imposed upon roof trusses for snow loading in proposed Section R802.10.4.2.

The order of the sections in Chapter 5 and 8 has also been harmonized.

R502.11.7 & R802.10.7 - Revises the reference to the truss design standard in conformity with language used elsewhere in the IRC; see R505.1.3 for Cold-Formed Steel Floor Trusses.

R502.11.4.3 & R802.10.4.4 – This section has been added to clearly define a term unique to this revised code section, Truss Designer. It also refines the requirements for signing and sealing each Truss Design Drawing as well as allowing for a cover or index sheet to be used in lieu of signing and sealing each individual truss design drawing. This is a method that is often used in engineering practice.

R502.11.1 & R802.10.1 This proposal includes the definition of a Truss Design Drawing that explicitly defines it as a Construction Document.

R502.11.2 & R802.10.2 This proposal adds a definition for a truss submittal package which provides much greater clarity and easier understanding surrounding what needs to be included in a truss submittal package.

R502.11.3 & R802.10.3 This proposal adds a definition of the term 'truss placement diagram' to minimize the confusion that exists in the construction industry between a variety of terms that can mean the same thing, such as "installation documents," "construction documents," "shop drawings," etc. The term "truss placement diagram" has been used by the truss industry and is very specific. This change is intended to provide much greater clarity, easier understanding and better communication

R502.11.4.1 & R802.10.4.1 a few clarifying words have been added at items #10, 11 and 12.

R502.11.4.2 & R802.10.4.3 expands on the requirements of item #12 and is intended to help focus everyone involved in the construction process on the need for permanent truss bracing to be installed. Two options are provided to define the requirements for permanent truss member bracing:

1. The trusses can be designed so that the buckling of any individual truss member is resisted internally by the structure of the individual truss.
2. Permanent bracing shall be installed in compliance with the Truss Industry's permanent bracing standard details that follow sound engineering practice. Conceptual details are provided by:
  - a. component manufacturers to the building design professional as the projects are being designed
  - b. component manufacturers to the jobs that they supply through their job site packages that are shipped with each job.
  - c. WTCA on its website at [www.sbcindustry.com](http://www.sbcindustry.com) or by calling WTCA staff at 608-274-4849.
  - d. the *Building Component Safety Information (BCSI 1) Guide to Good Practice for the Handling, Installing & Bracing of Metal Plate Connected Wood Trusses*.

R502.11.5 & R802.10.5 this section has been added to ensure that it is clear that the transfer of all design loads through the building and the connections of the trusses to the supporting structure to resist those loads remain the responsibility of the individual taking out the building permit.

**(see corresponding change proposal for R802.10)**

The overall goal of this proposed code change is to more clearly define the current design process as it pertains to metal plate connected wood trusses. Our experience is that there are a variety of expectations and there can be a great deal of confusion regarding trusses. By developing clearer code language, we believe this change will markedly improve the construction process as it relates to trusses.

**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing: Committee:	AS	AM	D
Assembly:	ASF	AMF	DF

**RB161-06/07**  
**Table R503.2.1.1(1)**

**Proponent:** Edward L. Keith, representing APA-The Engineered Wood Association

**Revise table as follows:**

**TABLE R503.2.1.1(1)**  
**ALLOWABLE SPANS AND LOADS FOR WOOD STRUCTURAL PANELS FOR ROOF**  
**AND SUBFLOOR SHEATHING AND COMBINATION SUBFLOOR UNDERLAYMENTa, b, c**

(No change to table entries)

- a. (No change to current text)
- b. Panels continuous over two or more spans with ~~long dimensions~~ strength axis perpendicular to supports. Spans shall be limited to values shown because of possible effect of concentrated loads.
- c. through I. (No change to current text)

**Reason:** The purpose of the change is to clarify the intent of the code. The proposed language change would help ensure that panel segments less than full size will be installed correctly. While in a traditional full panel the long dimension is the same as the strength axis, once a panel is cut into smaller pieces it is the strength axis that determines how a panel is to be placed and not the longest dimension. As an example, how would a 4' x 4' panel be placed?

This code change makes the language the same in this table as it is in the similar table in the IBC - Table 2304.7(3).

**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing: Committee:	AS	AM	D
Assembly:	ASF	AMF	DF

## RB162-06/07

### R506.2.5 (New)

**Proponent:** Alan Seymour, Oregon Department of Energy

**Add new text as follows:**

**R506.2.5 Concrete slab on grade waterproofing.** The exterior-most vertical perimeter of concrete slabs on grade shall be waterproofed by applying any one of the materials listed in Section R406.2 to the exterior of the slab, underneath any required exterior applied insulation.

#### **Exceptions:**

1. Waterproofing is not required when the foundation is installed on well-drained ground or sand-gravel mixture soils, Group I Soils, as detailed in Table R405.1.
2. Organic solvent based products such as hydrocarbons, chlorinated hydrocarbons, ketones and esters shall not be used for ICF walls with expanded polystyrene form material. Plastic roofing cements, acrylic coatings, latex coatings, mortars and pargings are permitted to be used to seal ICF walls. Cold setting asphalt or hot asphalt shall conform to type C of ASTM D 449. Hot asphalt shall be applied at a temperature of less than 200°F (93°C).

**Reason:** Where required, this would specify waterproofing of exterior slab edges whenever installed. This language references the same material allowed by Section R406.2. Exception 2 is also from R406.2. This was Dr George Tsongas', Ph.D., P.E., proposal for an Oregon code change. It is to prevent moisture migration from wet soil into the concrete (by capillary wicking) and direct exposure to rain water. This often causes mold growth in ground floor walls and flooring. Dr Tsongas is a building scientist that is renowned for his building forensics research. He has provided many presentations on this topic to ASHRAE.

The potential for moisture-related problems exist in buildings. Lack of measures necessary to prevent moisture into a structure is lacking in code. A major vehicle for water intrusion into buildings is through the exterior slab edge, which in many cases is the actual foundation wall (floating slabs) for specific soil types and climatic conditions. As stated in Reasons above, this is problematic in more types of construction than covered in current code. In addition, as specified in Cost Impact below, these measures are very expensive, if not nearly impossible to install after a building has been constructed.

**Cost Impact:** This proposal is related to reducing moisture-related problems within a building. Increased levels of moisture in homes contribute to mold, which can become health issues and lead to dry rot damage in wood components of the building. Insurance for a contractor, architect, or homeowner does not cover damages due to moisture related issues.

While most molds are benign, some can cause devastating health problems and lead to dry rot in wood building components. Requiring replacement of wood components due to dry rot after a building is constructed is much more expensive to mitigate and repair than during construction of a new building.

Public Hearing: Committee:	AS	AM	D
Assembly:	ASF	AMF	DF