

APPENDIX D

PERFORMANCE OF COMMONLY USED FLORIDA WALL AND ROOF ASSEMBLIES

This appendix presents the performance of commonly used Florida wall and roof assemblies in the large missile impact tests. Results presented are compiled from previous research reported in the literature, and from the present study.

Table D.1: Performance of Commonly Used Florida Wall Assemblies with Wood Framing Systems

Item No.	Assembly	Assembly Description	Source	Performance Level		
				Basic	Enhanced-A	Enhanced-B
1	Plywood	Stucco on 1 layer of 1/2 in. plywood	FAMU-FSU/UF	x	x	x
		2 layers of 3/4 in. plywood	TTU	√	x	x
		3 or 4 layers of 3/4 in. plywood	TTU	√	√	x
2	OSB	Stucco on 7/16 in. OSB	FAMU-FSU/UF	x	x	x
3	Gypsum Board	Stucco on 5/8 in. Gypsum Board	FAMU-FSU/UF	x	x	x
4	Dinsglass	Stucco on 1/2 in. Dinsglass	FAMU-FSU/UF	x	x	x
5	Hardiboard on plywood	5/16 in. Hardiboard horizontal siding on 1/2 in. plywood	FAMU-FSU/UF	x	x	x
		5/16 in. Hardiboard horizontal siding on 5/8 in. plywood	Miami-Dade	√	x	x
6	Hardiboard on OSB	5/16 in. Hardiboard horizontal siding on 7/16 in. OSB	FAMU-FSU/UF	√	x	x
7	Advantech	3/4 or 5/8 in. Advantech	FAMU-FSU/UF	x	x	x
8	Brick veneer on plywood	Brick veneer on 1/2 in. plywood	FAMU-FSU/UF	√	√	x
9	Brick veneer on OSB	Brick veneer on 7/16 in. OSB	FAMU-FSU/UF	√	√	x

- * Framing system: 2x4 or 2x6 in. SPF/STF studs spaced @ 16 in. o.c.
- * Cladding to be attached using 6d nails spaced at 6 in. o.c. for the panel edges and 12 in. o.c. on intermediate studs
- * 1/2 in. gypsum board as interior finish in all assemblies
- * Basic test criteria: 2x4 in. 9 lb missile impact @ 34 mph
- * Enhanced-A test criteria: 2x4 in. 15 lb missile impact @ 50 mph
- * Enhanced-B test criteria: 2x4 in. 15 lb missile impact @ 60 mph
- * √ : Test criteria satisfied
- * x : Test criteria not satisfied

Table D.2: Performance of Commonly Used Florida Wall Assemblies with Metal Framing Systems

Item No.	Assembly	Assembly Description	Source	Performance Level		
				Basic	Enhanced-A	Enhanced-B
10	Plywood	Stucco on 1 layer of 1/2 in. plywood	FAMU-FSU/UF	x	x	x
		2 layers of 3/4 in. plywood	TTU	√	x	x
		3 or 4 layers of 3/4 in. plywood	TTU	√	√	x
11	OSB	Stucco on 7/16 in. OSB	FAMU-FSU/UF	x	x	x
12	Gypsum Board	Stucco on 5/8 in. Gypsum Board	FAMU-FSU/UF	x	x	x
13	Dinsglass	Stucco on 1/2 in. Dinsglass	FAMU-FSU/UF	x	x	x
14	Hardiboard on plywood	5/16 in. Hardiboard on 1/2 in. plywood	FAMU-FSU/UF	x	x	x
		5/16 in. Hardiboard on 5/8 in. plywood	Miami-Dade	√	x	x
15	Hardiboard on OSB	5/16 in. Hardiboard with horizontal siding on 7/16 in. OSB	FAMU-FSU/UF	√	x	x
16	Advantech	3/4 or 5/8 in. Advantech	FAMU-FSU/UF	x	x	x
17	Brick veneer on plywood	Brick veneer on 1/2 in. plywood	FAMU-FSU/UF	√	√	x
18	Brick veneer on OSB	Brick veneer on 7/16 in. OSB	FAMU-FSU/UF	√	√	x
19	5V Galvalume on plywood	24 or 26 ga. 5V Galvalume on 1/2 in. plywood	FAMU-FSU/UF	√	x	x
20	Sem Loc on plywood	24 or 26 ga. Sem Loc on 1/2 in. plywood	FAMU-FSU/UF	√	x	x

- * Support: 4 to 8 in. channel (16 to 20 ga.) studs spaced @ 16 in. o.c. For items 19 and 20, this support may be replaced by 8 to 12 in. Z girts (16 to 18 ga.) spaced @ 2 to 6 ft. o.c.
- * Cladding attached to studs and bridging added between the studs using self-tapping screws. Panels fastened to the cladding using #14 x 7/8 in. screws, 24 in. o.c.
- * 1/2 in. gypsum board as interior finish in all assemblies
- * Basic test criteria: 2x4 in. 9 lb missile impact @ 34 mph
- * Enhanced-A test criteria: 2x4 in. 15 lb missile impact @ 50 mph
- * Enhanced-B test criteria: 2x4 in. 15 lb missile impact @ 60 mph
- * √ : Test criteria satisfied
- * x : Test criteria not satisfied

Table D.3: Performance of Commonly Used Florida Concrete Wall Panels

Item No.	Assembly	Assembly Description	Source	Performance Level		
				Basic	Enhanced-A	Enhanced-B
21	Concrete Masonry Unit (CMU)	8, 10 or 12 in. hollow cells CMU wall	FAMU-FSU/UF	√	x	x
22	Autoclaved Aerated Concrete (AAC) Blocks	8 in. x 8 in. x 24 in. AAC block.	FAMU-FSU/UF	√	x	x
23	Concrete walls using insulated concrete forms (ICF)	6 in. ICF wall with #6 bar @ 12 in. o.c. vertical and #3 bar @ 12 in. o.c. horizontal reinforcement. Concrete compressive strength: 7250 psi.	FAMU-FSU/UF	√	√	√
24	Tilt-up Wall	5 in. wall with #5 bar @ 12 in. o.c. vertical reinforcement and #3 bar @ 12 in. o.c. temperature and shrinkage reinforcement. Concrete compressive strength: 4120 psi.	FAMU-FSU/UF	√	√	√

- * *Basic test criteria: 2x4 in. 9 lb missile impact @ 34 mph*
- * *Enhanced-A test criteria: 2x4 in. 15 lb missile impact @ 50 mph*
- * *Enhanced-B test criteria: 2x4 in. 15 lb missile impact @ 60 mph*
- * *√ : Test criteria satisfied*
- * *x : Test criteria not satisfied*

Table D.4: Performance of Commonly Used Florida Roof Assemblies with Metal Framing Systems

Item No.	Assembly	Assembly Description	Details	Source	Performance Level		
					Basic	Enhanced-A	Enhanced-B
25	5V Galvalume on plywood	24 or 26 ga. 5V Galvalume on 1/2 in. plywood	Fifteen pound felt used over top of the plywood cladding. The 5V Galvalume fastened using #14 x 7/8 in. screws, 24 in. o.c.	FAMU-FSU/UF Miami-Dade	√	x	x
26	Standing Seam on plywood	24 or 26 ga. Standing Seam on 1/2 in. plywood	Fifteen pound felt used over top of the plywood cladding. The Standing Seam fastened using #14 x 7/8 in. screws, 24 in. o.c.	FAMU-FSU/UF UF Miami-Dade DOE	√	x	x
27	Structural deck with roofing	1-1/2 in. structural deck (20 to 22 ga.) with 26 ga. 5V Galvalume roofing	The 1-1/2 in. deck secured to the roof trusses using the self-tapping screws at 12 in. o.c. along the length of the specimen.	FAMU-FSU/UF UF DOE	√	√	√
28	Metal Deck	3 in. metal deck (22 ga.)	The deck requires 3/4 in. puddle welding to the beams and lap screws.	FAMU-FSU/UF	√	√	x
29	OSB/Plywood	Wood, clay or asphalt shingles on 7/16 in. OSB	---	FAMU-FSU/UF	x	x	x
		19/32 in. or greater plywood or wood plank	---	Miami-Dade	√	x	x

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* Support: Pre-Engineered roof truss system consists of 3-5/8 in. steel top truss chords at 48 in. o.c., and 16 ga. 1-1/2 in. hat channel purlins at 24 in. o.c. for items 25, 26, 27 and 29. Steel beams @ 12' o.c. support for item 28.

* Basic test criteria: 2x4 in. 9 lb missile impact @ 34 mph

* Enhanced-A test criteria: 2x4 in. 15 lb missile impact @ 50 mph

* Enhanced-B test criteria: 2x4 in. 15 lb missile impact @ 60 mph

* √ : Test criteria satisfied

* x : Test criteria not satisfied

Table D.5: Performance of Commonly Used Florida Concrete Roof Panels

Item No.	Assembly	Assembly Description	Source	Performance Level		
				Basic	Enhanced-A	Enhanced-B
30	Hollow Core Slab	6 in. hollow core slab	FAMU-FSU/UF	√	√	x
		8 in. hollow core slab	FAMU-FSU/UF	√	√	√

- * *Basic test criteria: 2x4 in. 9 lb missile impact @ 34 mph*
- * *Enhanced-A test criteria: 2x4 in. 15 lb missile impact @ 50 mph*
- * *Enhanced-B test criteria: 2x4 in. 15 lb missile impact @ 60 mph*
- * *√ : Test criteria satisfied*
- * *x : Test criteria not satisfied*