

EF3



EF4



EF5



EF4-EF5

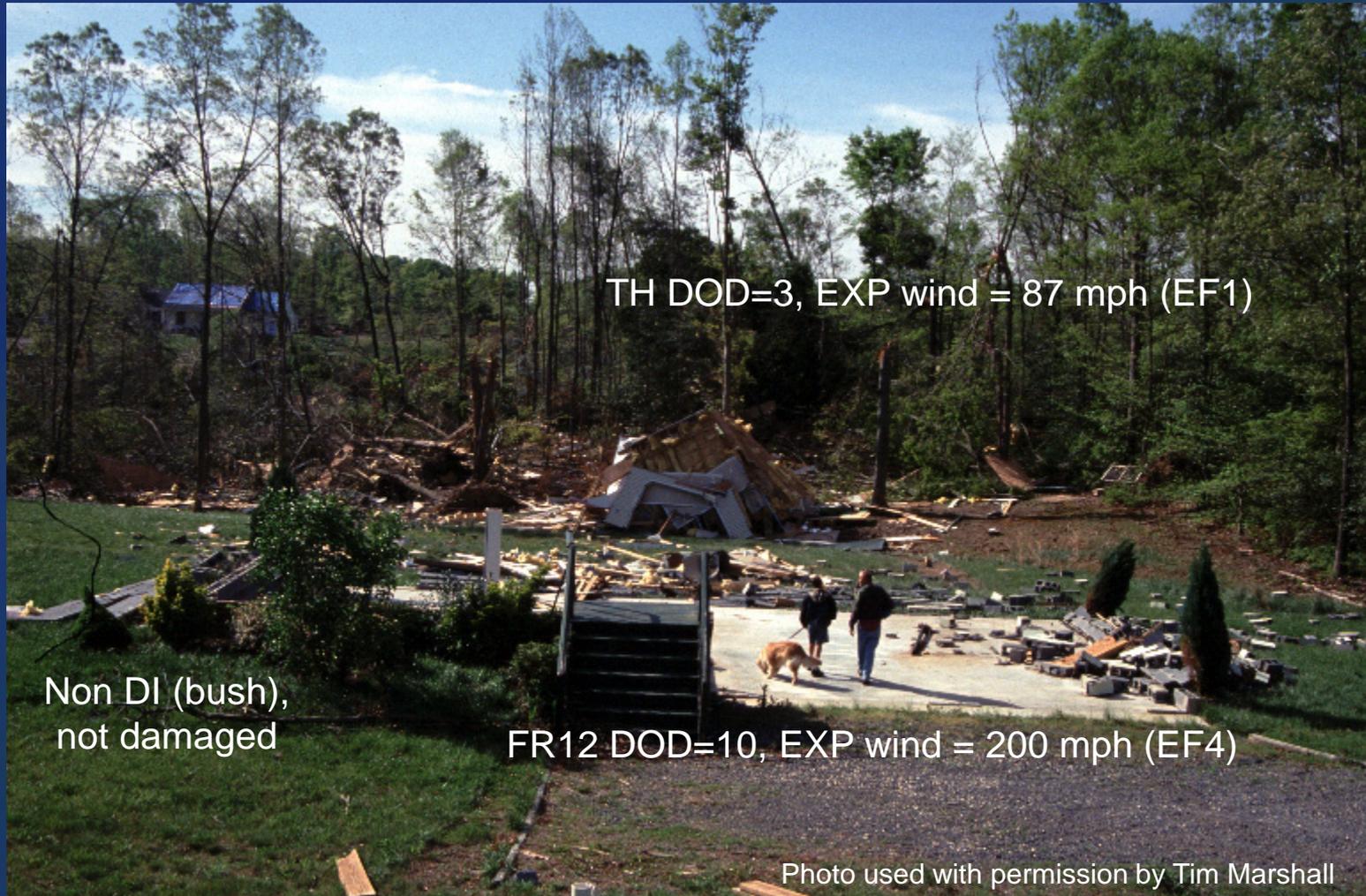


Rating a Tornado (EF Scale)

- Rate the tornado based on the **highest** EF-Scale rating for any Damage Indicator (DI)
- Try to confirm with other damage indicators
- Check surrounding non-indicators for consistency
 - *Does it make sense?*
- Be careful about getting too specific
 - *Do we really know?*

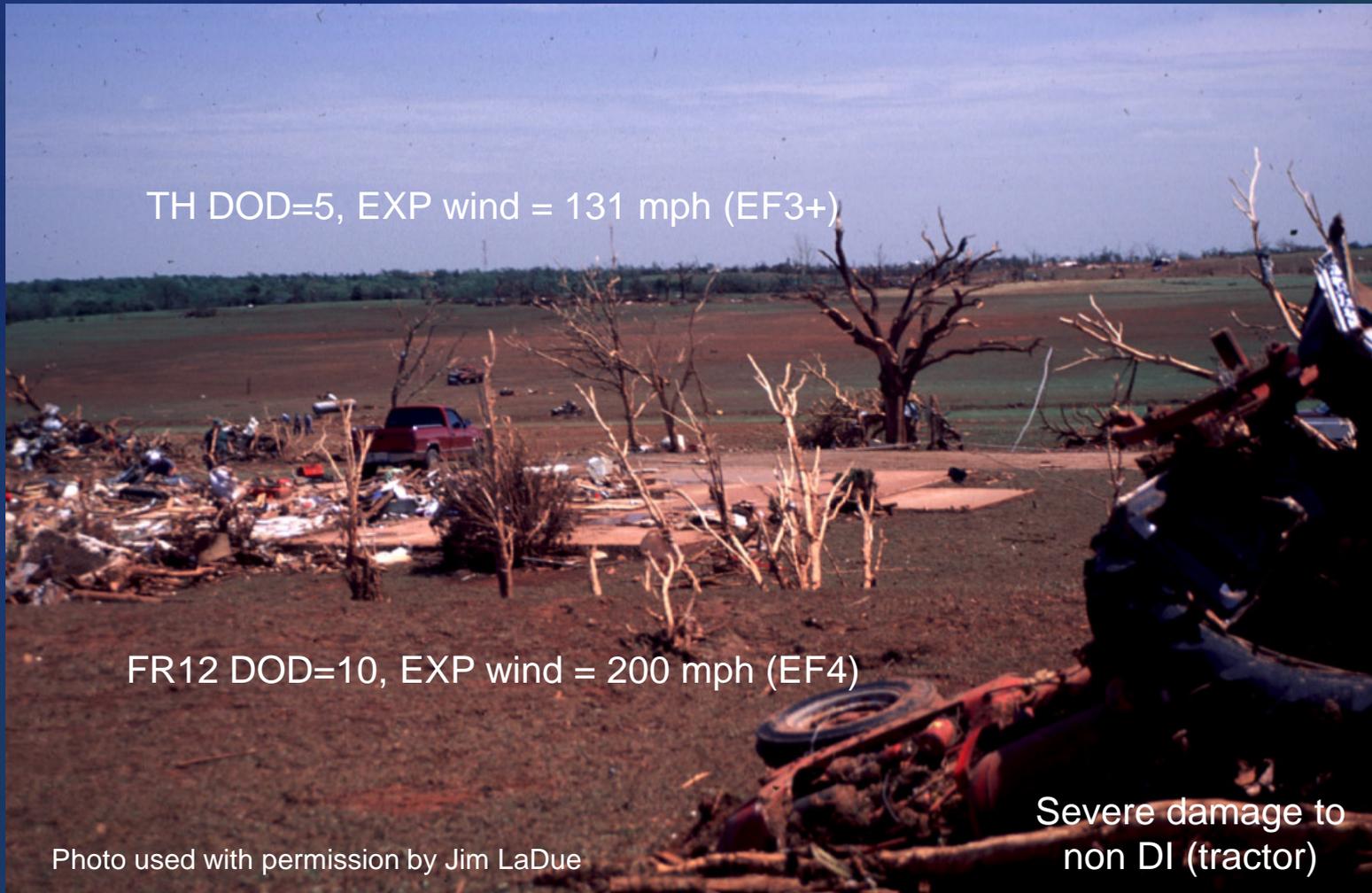


Rating a Tornado (EF Scale)



No confirmation here. Do not use this to rate.

Rating a Tornado (EF Scale)



Confirmation present – Good example to use

The Big Picture



You Make the Call!



Mobile Home, Single Wide





August 19, 2011 Wausaukee, WI

MANUFACTURED HOMES – SINGLE WIDE

Typical Construction

- Steel undercarriage supported on concrete block piers
- Metal straps and ground anchors (Frame and/or over-the-top strap anchors)
- Asphalt shingles or one-piece metal roof covering
- Wood roof joists
- Metal, vinyl or wood siding
- Wood stud walls and partitions
- Better construction in post 1974 models in coastal areas

Scale	Wind speed (estimated)	
	mph	km/h
EF0	65–85	105–137
EF1	86–110	138–178
EF2	111–135	179–218
EF3	136–165	219–266
EF4	166–200	267–322
EF5	>200	>322

DOD*	Damage description	EXP	LB	UB
1	Threshold of visible damage	61	51	76
2	Loss of shingles or partial uplift of one-piece metal roof covering	74	61	92
3	Unit slides off block piers but remains upright	87	72	103
4	Complete uplift of roof; most walls remain standing	89	73	112
5	Unit rolls on its side or upside down; remains essentially intact	98	84	114
6	Destruction of roof and walls leaving floor and undercarriage in place	105	87	123
7	Unit rolls or vaults; roof and walls separate from floor and undercarriage	109	96	128
8	Undercarriage separates from unit; rolls, tumbles and is badly bent	118	101	136
9	Complete destruction of unit; debris blown away	127	110	148

DOD is degree of damage

House-like Structures, Pine Trees



Phil Kurimski
NWS Green Bay



28. TREES (SOFTWOOD)

Typical Construction

- Softwood: Pine, Spruce, Fir, Hemlock, Cedar, Redwood, Cypress

DOD	Damage description	EXP	LB	UB
1	Small limbs broken (up to 1" diameter)	60	48	72
2	Large branches broken (1" – 3" diameter)	75	62	88
3	Trees uprooted	87	73	113
4	Trunks snapped	104	88	128
5	Trees debarked with only stubs of largest branches remaining	131	112	153

* DOD is degree of damage



2. ONE-AND TWO-FAMILY RESIDENCES (FR12) (1000 – 5000 sq. ft.)

Typical Construction

- Asphalt shingles, tile, slate or metal roof covering
- Flat, gable, hip, mansard or mono-sloped roof or combinations thereof
- Plywood/OSB or wood plank roof deck
- Prefabricated wood trusses or wood joist and rafter construction
- Brick veneer, wood panels, stucco, EIFS, vinyl or metal siding
- Wood or metal stud walls, concrete blocks or insulating-concrete panels
- Attached single or double garage

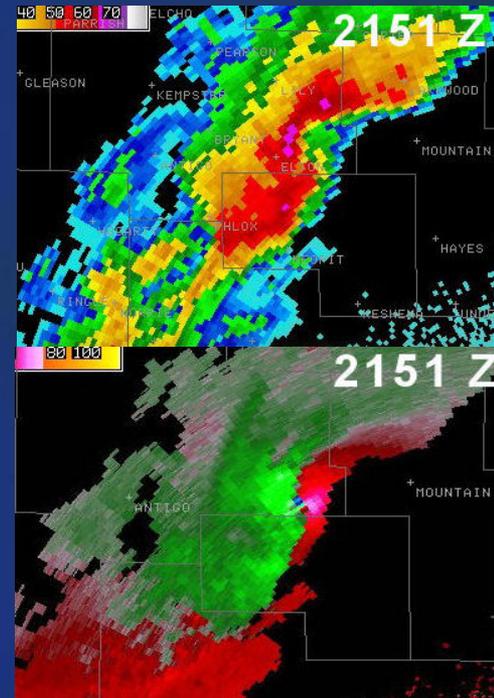
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DOD*	Damage description	EXP	LB	UB
1	Threshold of visible damage	65	53	80
2	Loss of roof covering material (<20%), gutters and/or awning; loss of vinyl or metal siding	79	63	97
3	Broken glass in doors and windows	96	79	114
4	Uplift of roof deck and loss of significant roof covering material (>20%); collapse of chimney; garage doors collapse inward; failure of porch or carport	97	81	116
5	Entire house shifts off foundation	121	103	141
6	Large sections of roof structure removed; most walls remain standing	122	104	142
7	Exterior walls collapsed	132	113	153
8	Most walls collapsed, except small interior rooms	152	127	178
9	All walls	170	142	198
10	Destruction of engineered and/or well constructed residence; slab swept clean	200	165	220

* DOD is degree of damage



Ben Christianson
Oconto Co.



June 7, 2007
Near White Lake, WI

1-2 Family Residence





2. ONE-AND TWO-FAMILY RESIDENCES (FR12) (1000 – 5000 sq. ft.)

Typical Construction

- Asphalt shingles, tile, slate or metal roof covering
- Flat, gable, hip, mansard or mono-sloped roof or combinations thereof
- Plywood/OSB or wood plank roof deck
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* DOD is degree of damage

Mobile Home (single), Hardwood trees





27. TREES: HARDWOOD

Typical Construction

- Hardwood: Oak, Maple, Birch, Ash

DOD*	Damage description	EXP	LB	UB
1	Small limbs broken (up to 1" diameter)	60	48	72
2	Large branches broken (1"-3" diameter)	74	61	88
3	Trees uprooted	91	76	118
4	Trunks snapped	110	93	134
5	Trees debarked with only stubs of largest branches remaining	143	123	167

* Degree of Damage



MANUFACTURED HOMES – SINGLE WIDE

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DOD is degree of damage

1-2 Family Residence





2. ONE-AND TWO-FAMILY RESIDENCES (FR12) (1000 – 5000 sq. ft.)

Typical Construction

- Asphalt shingles, tile, slate or metal roof covering
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Junior / Senior High School



Junior / Senior High School



16. JUNIOR OR SENIOR HIGH SCHOOL (JHSH)

General Description

- Generally large one or two-story buildings with flat roofs
- May contain gymnasiums, cafeteria, and auditorium with large structural spans; may have a basement
- Classroom wings have interior hallways with bearing or non-bearing interior walls
- BUR or single-ply membrane roof covering with or without gravel
- Structural system may consist of an all steel structure or an all reinforced concrete structure or a combination of both
- Roof structure may be light steel construction with open web joists supported on steel beams; corrugated metal roof deck with rigid insulation or poured gypsum deck
- Exterior walls constructed of concrete or clay blocks with brick veneer, stucco, or EIFS; metal and glass curtain walls; walls may have more than 30% windows



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DOD*	Damage description	EXP	LB	UB
1	Threshold of visible damage	68	55	83
2	Loss of roof covering (<20%)	79	66	99
3	Broken windows	87	71	106
4	Exterior door failures	101	83	121
5	Uplift of metal roof decking; significant loss of roofing material (>20%); loss of rooftop HVAC	101	85	119
6	Damage to or loss of wall cladding	108	92	127
7	Collapse of tall masonry walls at gym, cafeteria or auditorium	114	94	136
8	Uplift or collapse of light steel roof structure	125	108	148
9	Collapse of exterior walls in top floor	139	121	153
10	Most interior walls of top floor collapsed	158	133	186
11	Total destruction of a large section of building envelope	192	163	224
12	Significant damage to steel or concrete structural system			

* Degree of Damage

Any Questions ???



What If: Moving the EF5 Joplin Tornado Through Madison

