

PA HURRICANE MITIGATION CHECKLIST

Category of Damage	Type of Facility	Mitigation Measures	√	Ref #	HMH Pg. #	FMH Pg. #
I. Surge Damage	Roads & Bridges			1		
A. Inundation	Roads/Roadside Equipment	Elevate/floodproof traffic signal control boxes		A.1.a	3	
		Replace gravel roads with asphalt or concrete		A.1.b	4	
		Increase roadway elevation		A.1.c		15
	Bridges	Relocate bridge		A.2.a	5	
		Construct bridge wingwalls		A.2.b		49
		Elevate the bridge deck		A.2.c		54
		Replace a steel truss bridge w/ an open deck bridge		A.2.d		55
		Replace multi-spans with a single span bridge		A.2.e		56
Increase bridge opening size		A.2.f		57		
B. Erosion & Scour	Roadway Ditches	Increase ditch capacity		B.1.a		4
		Install ditch lining		B.1.b		5
	Roadway Surfaces & Shoulders	Relocate road		B.2.a	8	
		Soil stabilization/geotextiles		B.2.b	9	
		Replace gravel roads with asphalt or concrete		B.2.c	4	
		Increase roadway elevation		B.2.d		15
		Construct shoulder protection		B.2.e		16
	Culverts & Embankments	Relocate culvert		B.3.a	10	
		Bio-engineered embankment slope		B.3.b		9
		Change geometry of roadway section		B.3.c		11
		Place riprap along eroded slope		B.3.d		13
		Shape culvert entrance		B.3.e		35
		Install appropriate culvert end sections		B.3.f		37
	Bridges	Construct an energy dissipater		B.3.g		38
		Protect approaches & abutments using rip-rap		B.4.a		11
		Relocate bridge		B.4.b		6

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		Construct bridge wingwalls		B.4.c		49
		Replace multi-spans with a single span bridge		B.4.d		56
C. Debris	Bridges	Relocate bridge		C.1	5	
		Install debris deflectors on both sides of bridge piers		C.2		65
		Construct bridge wingwalls		C.3		49
		Replace multi-spans with a single span bridge		C.4		56
II. Wind Damage	Roads & Bridges				13	
	A. Light & Traffic Poles	Replace strain poles with mast arm poles		A.1	15	
		Replace strain poles with higher strength poles		A.2	16	
	B. Overhead & Roadside Signs	Strengthen overhead and roadside signs		B.1	18	
		Replace strain poles with mast arm poles		B.2	15	
Replace strain poles with higher strength poles			B.3	16		
III. Surge Damage	Water Control				19	
A. Inundation	Increase flow capacity	Increase ditch capacity		A.1		4
		Replace with larger pipe culvert		A.2		21
		Add multiple pipe culverts		A.3		24
B. Erosion & Scour	Protect drainage/irrigation ditches Protect shoreline protective structures	Install lining in the ditch		B.1.a		5
		Improve shoreline protective structures		B.2.a		22
C. Debris	Protect drainage structures	Install entrance debris barriers		C.1		30
		Install a relief culvert		C.2		32

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III. Surge Damage	Buildings & Contents				24	
A. Inundation	Protect building structural & non-structural elements	Elevate building on piles		A.1.a	26	
		Install breakaway walls		A.1.b	27	
		Improve pile foundations		A.1.c	28	
		Install openings in foundation walls & crawlspaces		A.1.d	29	
		Improve wall-to-foundation connections		A.1.e	30	
		Use flood-resistant building materials		A.1.f	31	
		Relocate building		A.1.g		72
		Wet floodproof building		A.1.h		74
		Dry floodproof building		A.1.i		75
		Install backflow prevention devices		A.1.j		76
	Protect building utilities & equipment	Install Ground Fault Interrupter (GFI) circuits		A.2.a		32
		Elevate HVAC equipment		A.2.b		33
		Elevate pool filter & pump equipment		A.2.c		34
		Elevate elevators or elevator control equipment		A.2.d		35
		Construct flood-resistant equipment enclosures		A.2.e		36
		Secure fuel & other storage tanks		A.2.f		37
		Use flexible utility connections at building service entrance (see Earthquake Mitigation Handbook, p. 57)		A.2.g		
	B. Erosion & Scour	Protect buildings	Restore & maintain coastal dunes		B.1	39
Elevate buildings on piles				B.2	26	
Install breakaway walls				B.3	27	
Improve pile foundations				B.4	28	
VI. Wind Damage	Buildings & Contents				45	
	A. Structural Frame	Use hip roofs		A.1	47	

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		Improve gable end roofs		A.2	48	
		Install hurricane clips or straps		A.3	49	
		Install framing connectors		A.4	50	
		Eliminate ancillary structures by integrating functions		A.5	51	
		Anchor ancillary structures		A.6	52	
		Improve wall-to-foundation connections (see inundation A.1.e)		A.7	30	
	B. Building Envelope	Secure roof sheathing		B.1	54	
		Improve shingle roofs		B.2	55	
		Improve metal roof systems		B.3	56	
		Upgrade concrete/clay tile roofs		B.4	57	
		Improve membrane roofs		B.5	58	
		Eliminate or improve roof ballast		B.6	59	
		Improve roof flashing, coping, and gutters		B.7	60	
		Anchor or reduce roof overhangs		B.8	61	
		Improve soffits		B.9	62	
		Strengthen siding		B.10	63	
		Improve exterior doors		B.11	64	
		Brace garage doors		B.12	65	
		Install window shutters		B.13	66	
		Strengthen window glass		B.14	67	
	C. Building Utility Equipment	Anchor rooftop equipment		C.1	69	
		Reposition rooftop equipment		C.2	70	
		Eliminate ancillary structures by integrating functions into main building		C.3	51	

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VI. Wind-Driven Rain Damage	Buildings & Contents				71	
	A. Building Upgrades	Enhance secondary moisture protection		A.1	73	
		Increase weather-stripping around windows & entry doors		A.2	74	
		Use flood-resistant building materials		A.3	31	
		Improve soffits		A.4	62	
		Install window shutters		A.5	66	
	B. Building Utility Equipment	Install rain-resistant venting		B.1	76	
		Install Ground Fault Interrupter (GFI) circuits		B.2	32	
		Eliminate ancillary structures by integrating functions into main building		B.3	51	
VII. Surge Damage	Facilities-Utilities				78	
A. Inundation	Utility Equipment	Relocate utility		A.1.a		82
		Elevate utility		A.1.b		83
		Anchor & tie-down buoyant facilities		A.1.c		95
	Utility Transmission & Distribution Lines	Encase utility lines		A.2.a		84
		Line damaged pipes		A.2.b		86
		Bury utility lines		A.2.c		87
B. Erosion & Scour	Utility Equipment & Transmission / Distribution Lines	Relocate utility equipment		B.1		82
		Encase utility lines		B.2		84
		Line damaged pipes		B.3		86
		Bury utility lines		B.4		87

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VII. Wind Damage	Utilities				80	
	A. Utility Equipment	Anchor electrical equipment		A.1	82	
		Improve anchorage of tank structures		A.2	83	
		Eliminate ancillary structures by integrating functions into main building		A.3	51	
	B. Transmission & Distribution Lines	Install additional pole supports		B.1	85	
		Replace strain poles with mast arm poles		B.2	15	
		Replace strain poles with higher strength poles		B.3	16	
		Bury the utility		B.4		87
IX. Surge Damage	Parks, Recreational, & Other				86	
A. Inundation	Protect docks & piers	Strengthen deck systems		A.1	88	
		Construct coastal defenses		A.2	89	
B. Erosion & Scour	Public beaches & dunes	Dune maintenance		B.1	91	
		Beach nourishment		B.2	92	
		Restore & maintain coastal dunes		B.3	39	
		Construct coastal defenses		B.4	89	
X. Wind Damage	Parks, Recreational, & Other				93	
	A. Public Beaches & Dunes	Dune maintenance		A.1	94	
	B. Docks & Piers	Anchor or eliminate dock/pier structures & signs		B.1	95	
		Strengthen deck systems		B.2	88	