Scope of Work
Capital Improvement Project, Emergency Sheltering (004180A)

I. SCOPE OF WORK

The identified building(s) below have been designated by the County emergency management agency as a potential public hurricane evacuation shelter wind retrofit project. Eligible costs are limited to costs associated with the retrofit/modification of the existing structures, as specifically mentioned in this scope-of-work.

Upon completion of this scope-of-work, at a minimum, the building(s) shall be deemed to meet the prescribed minimum safety standards of the State Division of Emergency Management's Least Risk Decision Making (LRDM) matrix (Table 3) in the preferred or less preferred column.

At a minimum, all products prescribed shall meet the wind load design requirements of ASCE 7, Risk Category IV and Exposure Category "C" (unsheltered exposure). Also, all products prescribed shall have been tested and passed the large missile impact test procedures of ASTM E 1886 and ASTM E 1996, or Florida Building Code (High Velocity Hurricane Zone/Miami-Dade) Testing Protocols TAS 201, TAS 202 and TAS 203.

It is understood and agreed by the County and the School Board that the building may have vulnerabilities due to age, design and location which may result in damage to the building from high wind events even after the completion of the mitigation measures prescribed under this Agreement. It is further understood and agreed by the County and the School Board that the level of wind protection provided by the mitigation action, although meeting State codes and standards and enhancing the structural integrity of the building, does not ensure the safety or survival of building occupants.

Table 1

Site Name	Building – Room Number	Year Built	Description of Work	Estimated Cost	General Population Risk Capacity Gained / Maintained (@ 20 sq. ft.)	Special Needs Population Risk Capacity Gained / Maintained (@ 40 sq. ft.)
Joseph L. Carwise Middle School	5-100; 5-109; 5-112; 5-113; 5-200; 5-202; 5-207; 5-208; 5-209; 5-212; 5-214; 5-215; 6-100; 6-102; 6-107; 6-108; 6-109; 6-112; 6-113; 6-115; 6-117; 6-118; 6-119; 6-122; 6-124	1992	Furnish and install hurricane protection for 51 openings to harden 25 classrooms.	$339,195	1,041	n/a
East Lake High School	2-104; 2-109; 2-011; 2-017; 2-135; 2-141; 3-102; 3-103; 3-121; 3-122; 3-123; 9-108; 9-109; 9-110; 9-112; 9-113; 9-114; 9-116; 9-117; 9-119; 9-120; 9-136	1990	Furnish and install hurricane protection for 31 openings to harden 22 classrooms.	$305,473	708	n/a
Fairmount Elementary School	5-002; 5-004; 5-006; 5-009; 5-011; 5-012	2001	Furnish and install hurricane protection for 6 openings to harden 6 classrooms.	$78,359	280	n/a
Gibbs High School	2-204; 2-224	2003	Furnish and install hurricane protection to the first and second levels of the building 2 corner hubs.	$118,800	392 & access to 4 additional restrooms	n/a
			Labor and materials associated with the electrical requirements needed for this location.	$32,400		

John Hopkins Middle School	5-100; 6-108; 6-209	1997	Furnish and install hurricane protection for 11 openings to harden 3 classrooms.	$59,495	n/a	67
	2-all external; 3-all external; 4-all external		Furnish and install hurricane protection harden buildings 2, 3 and 4.	$122,270	n/a	624
			Labor and materials associated with the electrical requirements needed for this location.	$18,000	n/a	n/a
McMullen Booth Elementary School	5-006; 5-009; 5-012; 4-002; 4-005; 4-009; 4-012	1996	Furnish and install hurricane protection for 7 openings to harden 7 classrooms.	$89,567	288	n/a
Palm Harbor Middle School	1-125 (hallway)	1982	Furnish and install hurricane protection for the opening in the building 1 hallway.	$3,882	129	n/a
Palm Harbor University High School	5-101; 5-101a; 5-101b; 5-101d; 5-113; 11-101a; 11-103; 11-108; 11-109; 11-110; 11-112; 11-113; 11-115; 11-119; 11-203b	1995	Furnish and install hurricane protection for 43 openings to harden 15 classrooms.	$144,343	405 and safe pet space	n/a
	8-107 (gymnasium)	1995	Furnish and install hurricane protection for 16 openings to harden the gymnasium.	$33,000		

James B. Sanderlin K-8 School	4-001a; 4-009; 4-012; 4-013; 5-001; 5-002; 5-004; 5-006; 5-009; 5-011; 5-012; 5-014	2002	Furnish and install hurricane protection for 19 openings to harden 12 classrooms.	$146,119	550	n/a
John M. Sexton Elementary School	5-001; 5-002; 5-004; 5-006; 5-011; 5-012	1996	Furnish and install hurricane protection for 6 openings to harden 6 classrooms.	$77,470	233	n/a
			TOTALS	**$1,568,373**	**4,026**	**691**

II. DELIVERABLES

A. School Board shall prepare and submit a final timeline with key milestone activities/tasks, schedule, including start and estimated end dates for each activity. Table 2 *Initial Timeline* may be altered to meet this task product.

B. School Board shall provide the County with a copy of accepted vendor bid form(s) or other procurement procedure documentation to show compliance with procurement policies.

C. The School Board shall provide the County with copies of large missile impact envelope protective system or product test certifications, reports or Notices of Acceptance. Documentation shall demonstrate that the system(s) and product(s) meet the large missile impact performance requirements as defined in Table 3 of this scope-of-work.

D. If applicable, the School Board shall provide the County with copy of pertinent construction and regulatory permits, detailed construction schedule, observation/inspection reports (if any), certificate of completion (or written acceptance of completed work by building official), and photographs documenting pre-construction conditions and post-construction completed work.

E. The final closeout report shall provide a breakdown of actual funds used for each building, and include the total amount of funds the School Board received for this project under the Agreement, and the balance of unused funds, if any, that will not be used by the School Board for this project Agreement and may be de-obligated from this project Agreement by the County.

Table 2 Initial Timeline			
PROJECT PHASE/ ACTIVITY	**Start Date**	**End Date**	**Funding Source**
Board Contract Approval	11/01/2020	12/01/2020	Penny for Pinellas Funds
Environmental Review	12/01/2020	01/01/2021	Penny for Pinellas Funds
Engineering / Electrical & Building Design	01/01/2021	03/01/2021	Penny for Pinellas Funds
Competitive Contractor bids and contracts	03/01/2021	05/01/2021	Penny for Pinellas Funds
Construction Phase	06/01/2021	09/01/2021	Penny for Pinellas Funds
Post Construction auditing & reporting	11/01/2021	12/01/2021	Penny for Pinellas Funds

Table 3 - State of Florida Least-Risk Decision Making: Hurricane Evacuation Shelter Prescriptive Summary Guidance			
Criteria	**Revised Rankings**		
	Preferred	**Less Preferred / Marginal**	**Further Investigation / Mitigation Required**
1. Storm Surge Inundation For building's located in storm surge hazard evacuation zones, provide the building's finished floor elevation (FFE) as shown on construction documents, site survey or other reliable source. Provide the FFE of all floors if the building is multistory. Confirm reliability of the given FFE value(s) by comparison to the applicable site elevation shown on USGS or other authoritative topographic map products.	- Building is located outside a maximum hurricane storm surge inundation zone - Building is not subject to isolation due to a maximum hurricane storm surge inundation event - Shelter floor FFE is not subject to a maximum storm surge inundation; for comparison, reference the most recent Sea Lake Overland Surge from Hurricane (SLOSH) Maximum of Maximum (MOM) still-water inundation depth	- Building is located inside a near maximum hurricane storm surge inundation zone, and is subject to inundation by a maximum storm surge event - Shelter floor FFE is potentially subject to a storm surge inundation of up to one (1) foot; for comparison, reference the most recent SLOSH MOM still-water inundation depth - Building is subject to isolation due to a maximum storm surge inundation event	- Building is located inside a hurricane storm surge inundation zone, and subject to inundation from a maximum storm surge event - Shelter floor is potentially subject to a storm surge inundation in excess of one (1) foot; for comparison, reference the most recent SLOSH MOM still-water inundation depth - Avoid basements if there is any chance of flooding - Avoid buildings located on coastal barrier islands

2. Rainfall Flooding / Dam Safety For building's located in storm surge evacuation zones, provide the building's finished floor elevation (FFE) as shown on construction documents, site survey or other reliable source. Provide the FFE of all floors of multistory buildings. Confirm reliability of the given FFE value(s) by comparison to the applicable site elevation shown on USGS or other authoritative topographic map products. Documentation must include FEMA Flood Map # and revision date.	- Building is located outside of 500-year floodplain - Building is located in Flood Insurance Rate Map (FIRM) Zone C or X (unshaded) area - Building is not subject to isolation due to 100-year flood event (1% annual chance of being equaled or exceeded) - Building is not subject to flooding or isolation due to dam or reservoir containment failure	- Building is located within the 500-year floodplain - Shelter building is located in FIRM Zone B or X (shaded) area - Shelter floor FFE is less than two (2) feet above the Base Flood Elevation (BFE) of the most recent FIRM or Flood Insurance Study (FIS) - Building is subject to isolation due to 100-year flood event - Building is subject to isolation due to dam or reservoir containment failure	- Building is located within the 100-year floodplain - Shelter floor is below the BFE of the most recent FIRM - Shelter building is located in FIRM Zones V and AH - Avoid basements if there is any chance of flooding - Building is subject to velocity flooding and/or still-water inundation due to dam or reservoir containment failure

3. Hazmat and Nuclear Power Plant Considerations * Always coordinate level of risk from hazmat facility to shelter with Local Emergency Planning Council (LEPC) and local Emergency Management (EM). LEPC and Local EM can assist in determining the suitability of a potential hurricane evacuation shelter or determine precautionary zones (safe distances) for facilities near potential shelters that manufacture, use or store hazardous materials.	- Building that does not store certain reportable types or quantities of hazardous materials - Building that is not located within a precautionary zone for facilities that manufacture, use or store hazardous materials - Building is not located within the ten-mile emergency planning zone (EPZ) of a nuclear power plant	- Building that stores certain reportable types or quantities of hazardous materials, or Building is located within a precautionary zone for facilities that manufacture, use or store hazardous materials; and -the hazardous materials facility has been reviewed by LEPC & EM and precautions deemed adequate* - Building is located within the ten-mile EPZ of a nuclear power plant but mitigating procedures have been implemented per LEPC and local EM	- Building that stores certain reportable types or quantities of hazardous materials, or Building that is located within a precautionary zone for facilities that manufacture, use or store hazardous materials, and - The hazardous material facility has not been reviewed by LEPC & EM or such review finds precautions inadequate* - Building is located within the ten-mile EPZ of a nuclear power plant, but no mitigating procedures per LEPC and local EM
4. Lay-down Hazard Exposure	- Buildings not exposed to very large/heavy trees or structures	- Buildings exposed to very large/heavy trees or structures that	- Buildings exposed to very large/heavy trees or structures that could cause destructive collapse or

12 inch diameter or larger trees may be sufficient to cause lay-down damage to buildings.	that could cause destructive collapse or lay-down impact damage (i.e., envelope breach) - Buildings whose access routes are not tree-lined	could collapse or lay-down and cause minor impact damage, but not considered sufficient to cause significant envelope breach - Buildings whose access routes are tree-lined, and appropriate mitigating measures are available (e.g., isolation plan in-place, road debris clearance plan in-place, etc.)	lay-down impact damage, sufficient to cause significant envelope breach and/or crushing injuries to shelter occupants, and problem not mitigated - Buildings whose access routes are tree-lined, and **no** mitigating measures available.
5. Wind and Debris Exposure Note: If a source of heavy/massive windborne or falling debris is present, recommend roof and walls be constructed of top & bottom layered reinforced 9-inch or thicker cast-in-place concrete	- Buildings located in areas that are sheltered/protected from strong winds - Urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single family dwellings or larger	- Buildings located in areas subject to strong over-land non-coastal wind effects - Relatively flat open terrain with scattered obstructions having heights generally less than 30 feet above grade for a distance of at least a quarter mile (1,500 feet) - Building surroundings can be described as ASCE 7 Exposure C	- Buildings located in areas subject to strong coastal wind effects - Relatively flat, unobstructed areas exposed to wind flowing over hurricane coastal shoreline, and/or open water for a distance of at least one (1) mile - Building surroundings can be described as ASCE 7 Exposure D

	- Building surroundings can be described as ASCE 7 Exposures A and B - Buildings located more than one (1) mile from a hurricane coastline - No significant sources of small, large, very large/heavy lay-down, roll-over, and/or falling debris sources within 150 feet of shelter building's perimeter	- Buildings located within one (1) mile of hurricane coastline but with mitigating measure (e.g., modern wind design, such as ANSI A58.1-1982, ASCE 7-88 or more recent editions) - Significant sources of small and large debris are present within 150 feet, and/or very large/heavy lay-down, roll-over, or falling debris sources within 150 feet of shelter building's perimeter, but with mitigating factor(s)	- Buildings located within one (1) mile of hurricane coastline and with **no** mitigating measure - Significant sources of small and large debris within 150 feet, and/or very large/heavy lay-down, roll-over, or falling debris sources are present within 150 feet of shelter building's perimeter, and with **no** mitigating factor(s)
6. Wind Design Additional preference may be given to buildings designed and constructed to ASCE 7-98 (or more recent editions), and IBC and FBC equivalents,	- Certification by a licensed structural engineer to be capable of withstanding wind loads according to ANSI A58.1-1982, ASCE 7, IBC and FBC equivalents, Occupancy Category III or IV (I ≥ 1.10) or Risk Category III or IV - Documentation affirms building designed by a licensed	Documentation affirms building designed and constructed to ANSI A58.1-1982, ASCE 7, IBC and FBC, Occupancy (I=1.00) or Risk Category II - Documentation affirms building designed and constructed to SBC-1988 and MBMA (1986) or more recent editions, or similar wind load	- Non-engineered or partially engineered structures - Light or ordinary construction buildings designed to: - Pre-ANSI A58.1-1982 wind design standard; - Pre-SBC 1988 or other similar model code wind design; or - Pre-1986 MBMA wind design

Occupancy Category III or IV (I=1.15) or Risk Category III or IV; or higher wind design standard, code or guidance (e.g., ICC500 or FEMA P-361)	structural engineer and specifies wind design as ANSI A58.1-1982, ASCE 7, IBC and FBC equivalents, Occupancy Category III or IV (I ≥ 1.10) or Risk Category III or IV - Massive structures or other special facilities, such as nuclear fallout shelter bunkers; e.g., roof dead load ≥ 200 psf and exterior walls ≥ 16-inch reinforced concrete or earthen bermed.	codes or standards, Occupancy Category II (I=1.00) - Documentation affirms building designed by a licensed structural engineer and specifies wind design as SBC-1988, MBMA-1986 or more recent editions, or other similar wind design standards or model codes (e.g., SFBC); building must also meet other established hurricane shelter safety criteria prescribed in ARC 4496, Rev. January 2002 - Modern wind design by other than a licensed structural engineer, but approved and building permit issued by local AHJ - Engineered heavy concrete or steel construction facility with reinforced concrete roof (i.e., a self-weight of 35 psf or greater) and designed to ASA/ANSI A58.1-1955 wind standard, or 1961 or	

		more recent model codes and revisions; must also meet other established hurricane shelter safety criteria prescribed in ARC 4496, Rev. 2002	
7. Construction Type / Definable Continuous Loadpath Note: Unless otherwise indicated, assume masonry wall systems are 8 inch nominal thickness hollow concrete masonry units (CMU) with running bond, type M or S mortar, and continuous horizontal joint reinforcement spaced every 16 inches vertically; structural concrete grout fill required in every vertically reinforced cell; intermediate	- Heavy steel or reinforced concrete skeletal frame buildings - 4-inch or thicker precast tilt-up reinforced concrete wall bearing structures - 8-inch or thicker reinforced masonry (typical max. vert. rebar spaced @ 4-feet o.c. or less) or cast-in-place reinforced concrete (typical rebar spacing is 18-inches o.c. or less each way) wall-bearing buildings - ANSI A58.1-1982, ASCE 7 and IBC and FBC equivalents, Occupancy Category III or IV (I ≥ 1.10) and Risk Category III or IV certified or documented	- Light steel or glulam wood skeletal frame building - ANSI A58.1-1982, ASCE 7 and IBC and FBC equivalents, Occupancy or Risk Category III or IV certified or documented buildings that do exceed 60 feet in height above grade - ANSI A58.1-1982, ASCE 7 and IBC and FBC equivalents, Occupancy Category II (I=1.00) or Risk Category II certified or documented buildings regardless of height above grade - Post-1986 Pre-engineered Metal Buildings designed and constructed to ANSI A58.1-1982, ASCE 7 and IBC and FBC	- All partially engineered (a.k.a., marginally engineered) or non-engineered structures; example: light steel frame w/ unreinforced masonry infill walls - 8 to 12-inch load-bearing unreinforced masonry walls that exceeds reinforcement spacing described as Less Preferred/Marginal - Partially engineered or non-engineered light wood or metal-stud wall-bearing building - Pre-engineered (steel prefabricated) metal buildings built before the mid-1980s

bondbeam(s) recommended for walls that are 13.5 feet in height or greater; stack bond rebar spacings are half those of running bond (e.g., 2 feet o.c. rebar instead of 4 feet for preferred ranking) Additional preference may be given to buildings designed and constructed to ASCE 7-98 (or more recent editions), and IBC and FBC equivalents, Occupancy Category III or IV (I=1.15) or Risk Category III or IV; or higher wind design standard, code or guideline (e.g., ICC500 or FEMA 361)	buildings that do **not** exceed 60 feet in height above grade - Pre-engineered Metal Building hybrids with certified or documented wind design to ANSI A58.1-1982, ASCE 7 and IBC and FBC equivalents, and Occupancy or Risk Category III or IV - Massive structures or other special facilities, such as nuclear fallout shelter bunkers; e.g., roof dead load ≥ 200 psf and exterior walls ≥ 16-inch reinforced concrete or earthen bermed.	equivalents, Occupancy Category II (I=1.00) or Risk Category II, or model codes, such as MBMA or SBC; bracing present in both wall and roof planes - 8-inch partially reinforced masonry (typical maximum vertical rebar spaced ~~up to~~ @ 4.67 to 8-feet o.c.), or 12-inch partially reinforced masonry (typical max. vert. rebar spaced up to 11-feet o.c.) or precast reinforced concrete panel wall-bearing building - Masonry wall-bearing systems equivalent to partially reinforced masonry (for 8-inch CMU with typical tie-column/pilaster and tie-beam spacing no greater than 13.5-feet o.c, or 12-inch CMU with typical tie-column/pilaster and tie-beam spacing up to 16-feet o.c.) - Engineered light wood or metal-stud wall-bearing buildings	

8. Building Condition / Wind Damage History	- Building is in good condition with no observable or known structural or cladding deterioration - Building or interior shelter core area (if applicable) is approximately as sound as it was when new	- Building or interior shelter core area (if applicable) has minor structural and/or cladding deterioration; deterioration does not appear to significantly jeopardize wind-resistance	- Building or interior shelter core area (if applicable) has major deterioration of structural and/or cladding components and assemblies; deterioration appears to significantly affect wind-resistance
9. Exterior Wall Construction - Adequate protection means building exterior walls are capable of resisting wind loads and penetration by large windborne debris missile impacts. - Minimum preferred large missile impact criteria means	- 4-inches or thicker reinforced concrete wall panel (rebar spacing is 12-inches o.c. or less each way, or wire-welded mesh reinforcement) - 8-inch or thicker reinforced masonry (typical maximum vertical rebar spaced @ 4-feet o.c or less) with or without masonry or stucco veneer (anchored @ 24-inch o.c. maximum each way)	- 2 to 3.9-inches of reinforced concrete wall panel (rebar spacing is 18 inches o.c. or less, or wire-welded mesh reinforced) - 8-inch partially reinforced masonry with typical maximum vertical rebar spaced @ 4.67 to 8-feet o.c., or 12-inch partially reinforced masonry with typical maximum vertical rebar spaced @ 4.67 to 11-feet o.c.; with or without veneer (anchored @ 24-inches o.c. maximum each way)	- 1.9-inches or thinner reinforced concrete wall panel, or rebar spacing exceeds 18-inches o.c., or no wire-welded mesh reinforcement - 8 to 12-inch unreinforced masonry that exceeds reinforcement spacing described as Less Preferred/Marginal - 26 gauge ribbed or thinner metal wall panels ~~w/ no impact resistant veneer~~ no documentation affirming that assembly passed large missile impact test

performance consistent with FBC *Public Shelter Design Criteria* (EHPA) or ASTM E-1996 Level D: 9 lb 2x4 propelled at 34 mph or 50 ft/sec; additional preference may be given to wall assemblies that pass or exceed ASTM E-1996 Level E: 9 lb 2x4 propelled at 55 mph or 80 ft/sec - Bondbeams > 8-inches high are not recommended for masonry with vertical rebar spacing that exceeds six (6) feet o.c Note: Unless otherwise indicated, assume masonry wall systems are eight (8) inch nominal thickness	- 6-inch or thicker reinforced masonry with structural concrete grout fill in every cell; ; see definition of reinforced masonry above - 20 gauge or thicker ribbed metal wall panels with or without large missile impact test documentation ~~w/ masonry or stucco veneer (anchored @ 24" o.c. max. each way)~~ - 24 or 22 gauge ribbed metal wall panels with documentation affirming that assembly passed large missile impact test - Wall assemblies that are recognized by the Florida Dept. of Education, Miami-Dade Building Code Compliance Office or other testing or research authorities as having passed large missile impact tests	- 8-inch masonry wall systems equivalent to partially reinforced masonry: e.g., typical tie-column and tie-beam spacing no greater than 13.5-feet o.c., or 12-inch CMU tie-column and tie-beam spacing up to 16-feet o.c; with or without veneer. - 6-inch or thicker partially reinforced masonry with structural concrete grout fill in every cell; see definition of partially reinforced masonry above - 24 or 22 gauge ribbed metal wall panels with <u>no</u> documentation affirming that assembly passed large missile impact test - 5/8 or 19/32-inch or thicker CD Exposure 1 grade ~~plywood~~ structural wood panels w/ masonry or stucco veneer (anchored @ 24-inches o.c. maximum each way or less)	- EIFS wall system on substrate other than reinforced masonry or concrete, or 5/8 or 19/32-inch or thicker CD Exposure 1 grade ~~plywood~~ structural wood panels - Gypsum wall board sheathing over metal or wood studs, with or without brick or stucco veneer - Wall construction assemblies that <u>do not</u> meet “deemed to comply” FBC HVHZ-provisions (ref: s. 1626.4, FBC-Building) - 6 % or greater exterior wall area comprised of softspot, or direct exposure of softspot to shelter area(s)

hollow concrete masonry units (CMU) with running bond, type M or S mortar, and continuous horizontal joint reinforcement spaced every 16-inches vertically; structural concrete grout fill required in every vertically reinforced cell; intermediate bondbeam(s) recommended for walls that are 13.5-feet in height or greater; stack bond spacing ~~are~~ is half ~~those~~ that of running bond (e.g., for 8-inch masonry, 2-feet o.c. rebar instead of 4-feet for preferred ranking) - Additional preference may be given to buildings with exterior walls designed and	- Less than 1% of any exterior wall area comprised of softspot; no direct exposure to shelter area(s)	- Wall construction assemblies “deemed to comply” with FBC HVHZ-provisions (ref: s. 1626.4, FBC-Building) - 1 to 5% of any exterior wall area comprised of softspot; no direct exposure to shelter area(s)	

constructed to ASCE 7-98 (or more recent editions), and IBC and FBC equivalents, Occupancy Category III or IV (I=1.15) or Risk Category III or IV; or higher wind design standard, code or guideline (e.g., ICC500 or FEMA 361)			
10. Fenestrations / Window Protection - Adequate protection means building windows, doors, louvers and other fenestrations are capable of resisting wind loads and penetration by large windborne debris missile impacts. - Minimum preferred large missile impact criteria means	- Building and/or shelter area fenestrations (e.g., windows, doors, louvers, etc) must pass one or more of the following: SBCCI SSTD 12; ASTM E 1886 & ASTM E 1996; SFBC 201, 202 & 203, and/or FBC HVHZ TAS 201, 202 and 203 - Less than 1% of any exterior wall area comprised of unprotected glass; no direct exposure to shelter area(s)	- Protected window and door assemblies that cannot be certified or documented to meet high wind missile testing protocols, but adequate barrier to envelope breach effects - 5/8 or 19/32-inch or thicker CD Exposure 1 grade wood structural panel (shutters) with adequate sub-framing and anchorage - 1 to 5% of any exterior wall area comprised of unprotected glass; no direct exposure to shelter area(s)	- Unprotected window and door assemblies, or “protective” assemblies that cannot be certified or documented to meet high wind missile testing protocols and ~~will~~ not ~~provide~~ an adequate barrier to envelope breach effects - 6 % or greater exterior wall area comprised of unprotected glass, or unprotected glass with direct exposure to shelter area(s)

performance consistent with FBC *Public Shelter Design Criteria* (EHPA) or ASTM E-1996 Level D: 9 lb 2x4 propelled at 34 mph (50 ft/sec). Additional preference may be given to assemblies that pass or exceed ASTM E-1996 Level E: 9 lb 2x4 propelled at 55 mph (80 ft/sec)			
11. Roof Construction / Roof Slope ** - Per ASCE 7-98, section 6.2, the area of potential roof openings must not exceed 1% of the shortest length wall face's area. This only applies to the story	- Building with a heavy concrete roof system (i.e., a self-weight of 50 psf or greater) - 4-inch or thicker reinforced concrete (rebar spacing is 12-inches o.c. or less each way or wire-welded mesh reinforced on 26 gauge or thicker ribbed metal deck)	- 3 inches (+/-) of ordinary reinforced concrete (rebar spacing is 18 inches o.c. or less, or wire-welded mesh reinforced on 22 gauge or thicker metal deck) - Building designed to a pre-2000 model code with light or moderate weight roof deck and a flat or moderate roof slope less than 30° (2/12 to 7/12 pitch)	- Roof systems with ~~unverifiable~~ unobservable or ~~inadequate~~ discontinuous loadpath connections - Unbraced gable-end roof geometry - Non-metal or non-wood deck assemblies***

immediately below the roof. *** - Fiber-based formboard, insulation or cementitious panels; typically installed on bulb-tee sub-framing. Note: If a source of heavy/massive windborne or falling debris is present, FEMA 361 recommends roof and walls be constructed of two layers (one each top & bottom) of bi-directionally reinforced 9-inch or thicker cast-in-place concrete Additional preference may be given to	- Building designed to a pre-2000 model code with light or moderate weight roof deck with a steep roof slope greater than 30° (7/12 pitch) and hipped geometry if applicable - Building designed to a pre-2000 model code with roof eaves or overhangs that do not extend more than 2-feet from exterior envelope cladding - Building roof design is documented as capable of resisting wind loads according to ANSI A58.1-1982 and ASCE 7 wind design standards, Occupancy Category III or IV (I ≥ 1.10) or Risk Category III or IV, and IBC and FBC equivalents with roof eave or overhangs that extend more than 2-feet from exterior envelope cladding	- Building designed to a pre-2000 model code with braced gable-end roof or hipped roof geometry - Roof assemblies “deemed to comply” with FBC (ref: s. 1626.4); e.g., 2 to 3.75-inches of reinforced concrete, 5/8-inch CD plywood or 19/32-inch or thicker CD Exposure 1 structural wood panels - 19/32-inch or thicker CD Exposure 1 wood structural panel sheathing w/impact resistant covering - Building roof design is documented as capable of resisting wind loads according to ANSI A58.1-1982 or ASCE 7, Occupancy Category II (I=1.00) or Risk Category II, and IBC and FBC equivalents with roof eaves or overhangs that extend more than	- Uncertified or documented roof eave or overhangs that extend more than 2 feet from exterior envelope cladding - Structural 26 gauge or thinner metal deck w/o structural concrete fill - Heavyweight Unanchored roof appendages - Roof construction assemblies that <u>do not</u> meet “deemed to comply” FBC HVHZ-provisions (ref: s. 1626.4, FBC-Building) - Significant breach potential (6+ %**)

buildings designed and constructed to ASCE 7-98 (or more recent editions), and IBC and FBC equivalents, Occupancy Category III or IV (I=1.15) or Risk Category III or IV; or higher wind design standard, code or guideline (e.g., ICC500 or FEMA 361)	- Structural 24 gauge or thicker ribbed metal roof deck with documentation affirming that assembly passed large missile impact test - No unanchored roof appendages - Negligible breach potential, less than 1%**	2-feet from exterior envelope cladding - Structural 22-24 gauge or thicker metal deck, or structural 26 gauge or thicker metal deck w/ concrete structural fill - Lightweight unanchored roof appendages present - Moderate breach potential, 1-5%**	
12. Roof Open Span Additional preference may be given to buildings designed and constructed to ASCE 7-98 (or more recent editions), and IBC and FBC equivalents,	- Building with long open roof span(s) < 40-feet and design is documented as capable of resisting wind loads according to ANSI A58.1-1982, ASCE 7, IBC or FBC Occupancy Category II (I=1.00) or Risk Category II - Building with long open roof span(s) ≥ 40-feet and design is	- Building with long open roof span(s) < 40-feet and design cannot be documented as capable of resisting wind loads according to ANSI A58.1-1982, ASCE 7, IBC nor FBC - Building with long open roof span(s) ≥ 40-feet and design is documented as capable of	- Building with long open roof span ≥ 40 feet and design cannot be documented as capable of resisting wind loads according to ANSI A58.1-1982, ASCE 7, IBC nor FBC

Occupancy Category III or IV (I=1.15) or Risk Category III or IV; or higher wind design standard, code or guideline (e.g., ICC500 or FEMA 361)	documented as capable of resisting wind loads according to ANSI A58.1-1982, ASCE 7, IBC or FBC Occupancy Category III or IV (I=1.10 or greater) or Risk Category III or IV	resisting wind loads according to ANSI A58.1-1982, ASCE 7, IBC or FBC Occupancy Category II (I=1.00) or Risk Category II	
13. Roof Drainage / Ponding Note: 100-year, 1-hour rainfall rate per Figure 1106.1, FBC Plumbing indicates approx. 4.4 to 5.0-inch per hour for Florida	- See ASCE 7-98, section 8.2 & FBC, s. 1503.4; 100-year, 1-hour rainfall rate - Building with no roof drainage confining parapet walls or curbs - No evidence of ponding that exceeds 2 inches in accumulation	- Building with roof drainage confining parapet walls or curbs; flow capacity of overflow scuppers is not less than primary drains, and/or mitigating factor(s) present - No evidence of ponding that exceeds 5 inches in accumulation	- Building with roof drainage confining parapet walls or curbs; unknown flow capacity, or flow capacity of overflow scuppers is less than primary drains - Evidence of ponding that exceeds 5 inches in accumulation
14. Interior Safe Space Note: An interior safe space/core	- At a minimum, all "preferred" criteria described in 1 – 13 above apply to the interior safe space envelope - Example: 8-inch or thicker reinforced masonry or 4-inch or	- At a minimum, all criteria ranked as "marginal" described in 1 – 13 above apply to the interior safe space envelope - Example: 8-inch or thicker partially reinforced masonry (vert.	**In the case where the surrounding building does not meet ARC 4496, and the interior shelter space (e.g., corridor) does not meet ARC 4496, describe why it does not.** - Interior spaces that cannot independently meet ARC 4496 guidelines

area is not required if the proposed hurricane shelter building, as a whole or in part, meets ARC 4496 guidelines/standards - If applicable, interior shelter space must independently meet ARC 4496 guidelines Additional preference may be given to buildings designed and constructed to ASCE 7-98 (or more recent editions), and IBC and FBC equivalents, Occupancy Category III or IV (I=1.15) or Risk Category III or IV; or higher wind design standard, code or	thicker inch reinforced concrete perimeter wall panels with cast-in-place 4-inch or thicker reinforced concrete roof/ceiling slab; windows and doors meet high wind debris impact resistance requirements - Structural separation from surrounding building(s) is required (i.e., expansion, control or slip-joints) - Massive structures or other special facilities, such as nuclear fallout shelter bunkers -In the case where the surrounding building meets ARC 4496 **this criteria is not applicable.**	rebar @ 8-feet o.c., or tie-column & beam @ 13.5-feet o.c.) or 2-inch or thicker reinforced concrete panel perimeter walls with cast-in-place 2-inch or thicker reinforced concrete roof/ceiling slab or min. 24 gauge metal deck (or concrete & metal decks combined); no windows or doors w/ glass with direct exposure to shelter space - Roof of shelter framed separately from surrounding building, but complete structural separation not required -In the case where the surrounding building meets ARC 4496 **this criteria is not applicable.**	- Unreinforced masonry walls - Gypsum wall board on metal or wood stud walls - Windows or doors present w/ glass (larger than a small view window) with direct exposure to shelter space(s) - Significant very large/heavy or falling debris, lay-down, and/or structural collapse hazards - Roof/ceiling of interior space is not framed separately from surrounding building (i.e., roof support members are continuous through or over interior space partitions)

guideline (e.g., ICC500 or FEMA 361)			
15. Life Safety / Emergency Power	- Building must be in compliance with all local building and fire codes - Building and/or hurricane shelter space(s) must be supported by a standby back-up generator capable of supporting critical fire and life-safety systems, ventilation systems, adequate shelter lighting and if applicable, special needs requirements - Generator must be independent of off-site utilities/infrastructure (e.g., water, fuel, etc.) with a minimum of 24-hour on-site fuel supply (72 hours or greater recommended) - Generator and ancillary equipment must be adequately	- Building must be in compliance with all local building and fire codes - No provision for standby or emergency back-up electrical system; or - Standby or emergency back-up electrical system or generator present but dependent upon one or more off-site utilities/ infrastructure (e.g., water, fuel, etc.), and/or less than a 24-hour on-site fuel supply; or - generator and ancillary equipment are not adequately protected from major hurricane effects	**- Building that is not in compliance with local building and fire codes; a local authority having jurisdiction must make this determination.**

	protected from major hurricane effects		
Notes:			