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FRSA SERVICES CORP.

December 7, 2022

Growth Management Services
Chairman James R. Schock
4040 Lewis Speedway
St. Augustine, FL 32084

Dear Chairman Schock:

Best wishes to you and your family during the holidays.

As we approach the December 13-14 Commission meeting in Daytona Beach Shores, I am providing the enclosed documents that I believe provide important information. They pertain to FRSA code modification requests R10093 and R10175 dealing with roofing underlayment.

1. The December 2022 issue of *Florida Roofing* features an article on page 14 by Mike Silvers, CPRC (who represents FRSA at FBC TAC and Commission meetings) on post-storm research following Hurricane Ian. Page 18 provides a summary of roof system performance before discussing the merits in such storms of self-adhered underlayment applied directly to the deck.

2. A timeline of events connected to the development of FRSA's tile underlayment positions and related code modification requests and our interaction with Miami-Dade officials throughout the process.

3. A recent article by Greg Keeler, *Technical Services Leader at Owens Corning Science and Technology*, about the advantages and disadvantages in south Florida of self-adhered underlayment installed directly to the deck.

4. Page 2 of Florida's *Uniform Mitigation Verification Inspection Form* highlighting the use of self-adhered underlayment applied directly to the deck as the only underlayment option that provides secondary water resistance (SWR).

Thank you in advance for taking the time to review these documents before the meeting.

Sincerely,

Lisa Pate, CEM
FRSA Executive Director

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Digging Deeper into Ian's Destruction

Mike Silvers, CPRC, Silvers Systems Inc. and FRSA Director of Technical Services

As I finished last month's column (www.floridaroof.com/frm11-22p12), I had just returned from hurricane damage reconnaissance in areas north of where Hurricane Ian made landfall. I reported on some of my early observations made just days after the hurricane and addressed issues with limited access to some hard-hit areas, noting how important it is to gather information prior to tarping and other repairs taking place. I also discussed how much information could be obtained from many types of media directly after these events. Sometimes, those two types of information gathering can converge, and with a little research and applied reasoning, there is much that can be learned.

Shortly after Hurricane Ian hit southwest Florida, I was looking at the damage on NOAA satellite imagery, slowly making my way up the coast trying to pinpoint different types of roof damage, noting the locations of buildings. I was looking for missing or damaged roof coverings, displaced air conditioning units, etc. Some damage is easy to spot, others require a closer look to find.

The roofs on a pair of condominium buildings located in Ft. Myers Beach, directly on the Gulf of Mexico, looked odd. In particular, I had trouble making out what I initially thought was a piece of strangely shaped mechanical equipment and then realized that what I was looking at was actually a couch. As I looked closer, it became clear that I wasn't looking at a roof at all but instead at the inside of every apartment on the top floor of both buildings – kitchens, bathrooms and all. These were two good-sized buildings that had suffered a catastrophic failure of the overall roof assembly. The image made an impression. A few days later while looking at hurricane damage in the Tampa Bay Times, I was struck by a picture of these same buildings taken from a helicopter just a few days after Ian's landfall. It was much clearer and more detailed than the NOAA imagery. You can see how compelling the above picture is. As I examined the shot closer, my attention was drawn to the houses across Estero Boulevard, behind the condos. It seemed that they weren't as severely impacted by the storm surge as many others in this area but, even though they were protected from the wind by the much larger condo buildings, they still had significant damage. When looking closer at the shape and size of the debris near the houses it didn't correlate with the damage to the structures. Then it occurred to me that the debris could be the roof assemblies from the condo buildings, which would indicate that the roofs may have been relatively intact when making impact with the houses. As I looked closer at a two-story house behind the others and across a canal there was similar debris. Could the roof structure have blown that far away? I couldn't help but be curious and I hoped for some additional information.

A few days later, an opportunity to do some additional storm damage assessment presented itself. The Roofing Industry Committee on Weather Issues (RICOWI) was going to send wind investigative teams to observe damage caused by Ian and they were looking for volunteers to participate. RICOWI is a great organization funded by the Department of Energy, that is dedicated to conducting surveys to study the performance of roofing materials in extreme weather events and report their findings to the industry to help improve products and their application. RICOWI's David Roodvoets, Jordan Loudon, members and

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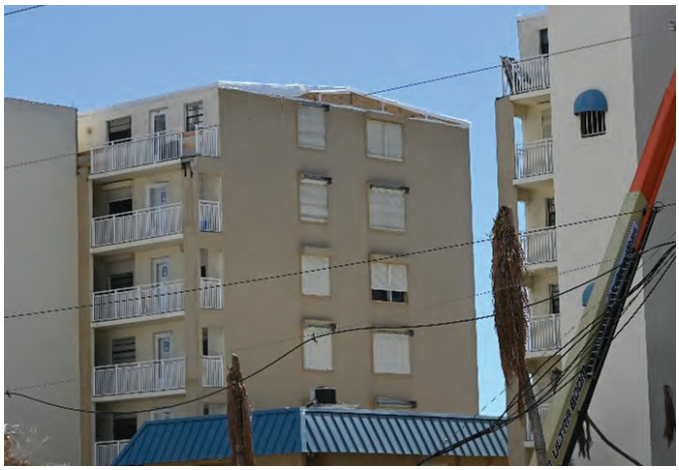
volunteers provide an invaluable service to the industry. I gladly agreed to spend a few days with them, as did a few FRSA members. It was another opportunity to observe and learn.

Our team was assigned investigation of steep slope roofing. We visited many sites, gathering information on all types of roof systems including shingles, tile, metal and wood shakes and shingles. We looked at damage that occurred in areas north, south and east of where Ian made landfall. These RICOWI trips confirmed many of the same successes and failures that I had observed during previous visits. Roof coverings of all types that were installed in accordance with recent editions of the Florida Building Code (FBC), which have incorporated ASCE 7-10 and 7-16, overall did very well. I'll get back to those observations after a little more on the damage sustained on the condos I mentioned above.

With RICOWI, we gained access to Ft. Myers Beach and those condo buildings were still in the back of my mind. We worked our way south along the beach and after many stops to access all kinds of roof damage, I saw the two condo buildings I'd been looking for. Repair work was already well underway. A new truss system had been installed and roofing had begun. Debris cleanup was in progress and a lot of the debris had been hauled away while some had been pushed aside to open up streets to traffic or moved to parking lots for staging. One house across the street had already been demolished and hauled away. However, some of what appeared to be the condo building's roof assembly was still laying on several of the houses.

The roof section that remained was unusual for several reasons. For one, there were two layers of plywood sheathing with an asphalt-based roof covering in between and a mechanically attached single-ply roof covering on top. I expected to see wood joists but instead was seeing trusses. I thought from seeing the walls that remained that it would probably be joists construction and that the roof-to-wall connection might have been an issue. After reviewing some Google Earth pre-hurricane pictures, it became obvious that the buildings did actually have trusses that incorporated mansards and soffits around the perimeter. All of this was now gone or at least not where it was supposed to be.

Several questions came to mind. Did the addition of a second layer of plywood that was used as an unusual type of roof recover preclude renailing of the original plywood deck? Would renailing have helped? Would the recent expansion of roof-to-wall inspections in the FBC for this type of building and the optional mitigation that it now includes, have helped in lessening the failure? How much did the presence of the mansards



and soffits as well as how they were constructed and roofed, contribute to the failure? What effect would the new condominium inspection requirements that were recently adopted by the state as a response to the Surfside collapse have on the type of conditions that led to this catastrophic failure? I hope that some additional information will become available to help clarify what the failure mode was and what construction methods will be employed in making repairs.

While trying to obtain a better image of the newspaper shot that originally helped me clarify what I was seeing, I reached out to Dr. Robert Young with Western Carolina University and the credited photographer. He not only shared the image but provided a link to aerial shots all along the impacted coastline. The viewpoint and clarity of the pictures contained are perfect for initial roof damage assessment and have added a great deal of information to our research. Looking for this kind of information often opens doors to new, unexpected resources. The degree of collaboration among those with an interest in improving the resilience of buildings is to be commended. Many thanks to Dr. Young.

I want to get back to some of my general observations. One needs to keep in mind that hard data about specific damage experienced on particular roof types






and the cause of that damage are extremely hard to come by. So, for the time being, we try to reach some early preliminary conclusions using not only our own personal observations but also by discussing our observations with other professionals.

As I said earlier, roofs that have been installed since the wind resistance requirements of the FBC have been increased did very well overall regardless of roof type. With that said, many older roofs also did well, but they were outliers when looking at roofs that were approximately 20 years or older. We observed many severely damaged shingle, tile and metal roof coverings from that period. The damage to older roofs was often more catastrophic with wood exposed. Exposed wood is much less common with newer roof coverings, even when missing portions of the field of the roofs. This is possibly attributable to improved underlayments – or secondary water barrier – resistance. Several roofs were observed with very little of the primary roof covering still left in place but where a self-adhered underlayment applied direct-to-deck was present and was still providing protection from major water intrusion.

One trend was very clear from my observations. Many of those who suffered major roof damage are opting to have a self-adhered underlayment installed direct-to-deck when replacing their roofs regardless of the type of roof covering chosen. Even the historic Boca Grande Pass Lighthouse is getting the added protection that such a system provides. It seems that

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those who have been through a recent hurricane can see the value of having this type of underlayment as an option.

Unfortunately, this is an option that those in the High Velocity Hurricane Zone (HVHZ Miami-Dade and Broward Counties) don't have. On December 13, the Florida Building Commission will decide if this inequity will remain when the new 2023 8th Edition of the Florida Building Code is adopted or if they will follow the guidance of the Commision's Roofing Technical Advisory Committee and the roofing industry coalition and vote to standardize underlayment options throughout Florida. Self-adhered underlayment applied directly to the deck is the only underlayment option that qualifies for a secondary water resistance mitigation credit from Florida's property insurers. It will also help reduce claim damages that affect insurance rates for all Floridians. One of FRSA's past Presidents recently asked "Why is it only the people with no experience with this installation method are the ones pushing back against its adoption?" Great question!

FRM

Mike Silvers, CPRC is owner of Silvers Systems Inc., and is consulting with FRSA as Director of Technical Services. Mike is an FRSA Past President, Life Member and Campanella Award recipient and brings over 40 years of industry knowledge and experience to FRSA's team.

Timeline for the Development of FRSA's Tile Underlayment Positions and Modifications

2/15/2018 - FRSA/TRI Manual 6th Edition Review Committee decides to limit the prescriptive two-ply tile underlayment described in the manual to hot mop with enhanced fastening (up to four times greater fastener density than Miami/Dade (M/D)- RAS). Otherwise, only those with product approvals meeting uplift resistance pressures of ASCE 7 are included in the manual.

5/31/2018 - FRSA/TRI Manual Review Committee adopts a new flow chart based on above decision and voices concerns that the RAS option in the code would allow the continued use of the M/D prescriptive two-ply system with a #30 anchor sheet (with fastening 6" o.c. in laps and 12" staggered in the field) and a self-adhered underlayment (SAU) that has low uplift resistance values in manufacturers' product approvals. The committee asks that additional information on M/D prescriptive methods be gathered and, if shown to be insufficient, remedies be proposed.

12/31/2020 – The new FRSA/TRI Manual 6th edition is adopted as an updated reference standard and becomes effective. It includes the modified flow chart and new two-ply requirements.

1/4/2021 – FRSA Educational and Research Foundation approves funds to perform uplift resistance testing of the M/D prescriptive two-ply system in two stages. First, by 1. Testing four M/D-approved #30 anchor sheets for pull through (TAS 117B) and adhesion (ASTM D1876) and 2. Four M/D-approved SAU for adhesion. Then selecting the two best performing products from each to be tested as a system using the UL 1897-12 bell chamber method.

4/06/2021 – four test decks are assembled and materials installed. The decks are then left to weather.

5/10/2021 – Materials previously installed on the test decks are tested using a 12' X 12' bell chamber test with the M/D RAS prescriptive method, achieving an ultimate uplift resistance of -45 psf. This yields -22.5 psf after the safety factor of 2 was applied. This result was achieved using the best performing compliant products. After the testing is completed, M/D is verbally informed about the low resistance encountered. A meeting with M/D is requested.

9/1/2021 – FRSA representatives meet with M/D representatives in Miami to share our test results and to discuss the additional results from the industry used to achieve product approvals. The meeting is held prior to FRSA membership being informed of the results. The need for updated underlayment uplift resistance and methods of standard testing statewide is discussed as well as the need for an SAU applied direct to deck to meet the new higher pressures of ASCE 7-16 and for a code-required SWR. M/D states they will review the information and respond. (No formal response is received.)

2/15.2022 – FRSA submits code modifications intended to standardize test methods and underlayment systems statewide with a few special provisions in the HVHZ. Test results from the above testing are included.

4/8/2022 – FRSA/TRI Manual 7th Edition Review Committee adopts new Flow Chart modified to remove Table A1 (enhanced fastening) as an option for prescriptive two-ply system, thereby requiring all tile underlayment described for use in the manual to be tested for uplift resistance using either FM 4474 or UL 1897-12.

Timeline for the Development of FRSA's Tile Underlayment Positions and Modifications (continued)

6/20 & 21/2022 – Roofing TAC (primary) approves FRSA Modification R10175 that covers the recommended test methods and denies M/D Modification R10093 that introduces a new test standard and precludes the use of SAU applied direct to deck. Structural TAC (secondary) denies FRSA R10175 and M/D R10093. FBC Staff asks stakeholders to meet in an attempt to find compromise.

8/15/2022 – M/D, FRSA, ARMA, Owens Corning and IBHS meet at IBHS headquarters in Tampa. A discussion takes place concerning the pros and cons of a SAU installed direct to deck with most sighting many more pros than cons. The need for manufacturers not to retest to a new standard – as would be required if M/D code modification requests are approved – is also discussed. A resolution is not met during the meeting.

10/11 & 12/2022 - Roofing TACs (primary) meets and reaches the same conclusions reached during the June meetings. The Structural TAC (secondary) denies R10175 and approves original R10093 with alternative language A1.

12/13/2022 – Commission will meet to review modifications R10093 and R10175 and adopt or disapprove modifications accordingly.

INSTALLING SELF-ADHERING UNDERLAYMENTS DIRECT TO DECK: PROS AND CONS

If you're a roofing contractor in South Florida, you're certainly aware of the quandary that is posed when confronted with the decision regarding underlayment options. This is especially true when it comes to use of a self-adhering underlayment.

The recent landfall of Hurricane Ian in Southwest Florida was a stark reminder of the perils that face homeowners in South Florida. We've all witnessed scenes of widespread damage to roof coverings of all types – tile, metal panels, asphalt shingles, etc. Thus, the topic of how to protect the roof deck and the building below it when the roof covering is damaged or blown off becomes critical. One of the best ways to provide protection from water intrusion into the structure is to install a self-adhering underlayment directly to the roof sheathing. After all, these products are designed and tested to be adhered directly to wood sheathing, not to #30 felt or synthetic underlayments.

Let's jump into the advantages and disadvantages of adhering the underlayment directly to the deck. The following list was developed through a cooperative effort between multiple industry stakeholders, including a Florida code enforcement agency. I'm sure we didn't capture everything, but it's a fairly comprehensive list.

ADVANTAGES	DISADVANTAGES
Best option for sealed roof deck	Potential for moisture problems (when installed over an unvented attic)
High uplift resistance	Reroofing concerns (difficult or impossible to remove)
Cost effective	Can't inspect deck nailing
Less labor intensive	Requires clean and dry deck when installed
No exposed fastener penetrations	
Direct load path into sheathing	
Lower installation variability	
Easiest code-compliant installation	
Seals around roof covering fasteners	

As the table indicates, the advantages far outweigh the disadvantages. In fact, a couple of the suggested "disadvantages" essentially conflict with each other: if the products being installed on a deck that isn't 100% clean and dry was really an issue (and how often is "dry" even possible in South Florida?), they wouldn't also be difficult or impossible to remove when reroofing.

There has been a lot of testing done in the past few years to determine if a prescriptive #30 felt mechanically fastened base sheet with a self-adhering underlayment installed over it can provide any meaningful uplift resistance. What we found is that such a system, even when installed with the greatest attention to details, provides far less uplift resistance than that which would be required by the FBC and the *FRSA/TRI Florida High Wind Concrete and Clay Tile Installation Manual*.

Let's take a quick look at one hypothetical scenario.

Project Description:

- Single Family Home
- 160 mph wind zone
- 20' Mean Roof Height
- Exposure Category C
- Adhered Concrete Tile
- Self-Adhering Underlayment Approved For Use Under Tile

If this home is in the High Velocity Hurricane Zone, the underlayment requirements are prescriptive and would require that the underlayment meet the requirements of TAS 103. Section 7 of this test protocol stipulates that (4) 8 foot by 8 foot test decks are constructed and underlayment is applied directly to the plywood (which doesn't reflect permissible conditions in the HVHZ). Then a 5 foot by 5 foot chamber is placed over the underlayment and negative pressure (suction) is applied to the deck, starting at 15psf. The 15psf pressure is maintained for one minute, then it is increased by 15psf and held for one minute. This process is repeated until the pressure reaches 90psf. If the underlayment is still adhered after one minute at 90psf, the test deck passes. If all four decks pass this test, the product is considered as compliant with the uplift testing requirements.

Now contrast the TAS 103 uplift requirements with the requirements from the *FRSA/TRI Florida High Wind Concrete and Clay Tile Installation Manual.* According to Table 1A of the Tile Manual, for a roof in even the lowest wind speed area of the HVHZ with the same characteristics, the underlayment would be required to attain an uplift resistance of 102.8psf. This uplift resistance rating would be achieved by testing to failure using one of two testing protocols: FM 4474 or UL 1897. These protocols utilize the same procedure of starting with a negative pressure of 15psf and holding for one minute, then increasing by 15psf and holding for every minute until the product fails. A 2:1 safety factor is then applied to the last pressure at which the product passed. Thus, a product that meets the 102.8psf uplift requirements would need to pass at a minimum 205.6psf pressure. That is more than double the pressure that is required by Section 7 of TAS 103.

One of the primary arguments I hear regarding adhering underlayment directly to the deck is related to reroofing. As was mentioned above, once these products are adhered to the deck, they are virtually impossible to remove without damaging the sheathing. In that situation, one option is to install a mechanically fastened slip/anchor sheet over the existing underlayment, then install (if desired) a new layer of self-adhered underlayment over it. In this scenario, in the event the new slip/anchor sheet blows off the roof, the roof deck is still protected by the layer of self-adhering underlayment that couldn't be removed.

I know I've thrown a lot of numbers and technical information at you, but I urge you to answer this fundamental question: If a hurricane is bearing down on your home, would you feel more comfortable with a self-adhered underlayment adhered directly to your roof sheathing or a self-adhered underlayment adhered to #30 felt that is nailed to your roof sheathing? I know for me the choice is clear.

or greater resistance than 8d common nails spaced a maximum of 6 inches in the field or has a mean uplift resistance of at least 182 psf.

- ☐ D. Reinforced Concrete Roof Deck.
- ☐ E. Other: _____
- ☐ F. Unknown or unidentified.
- ☐ G. No attic access.

4. **Roof to Wall Attachment:** What is the **WEAKEST** roof to wall connection? (Do not include attachment of hip/valley jacks within 5 feet of the inside or outside corner of the roof in determination of WEAKEST type)
   - ☐ A. Toe Nails
     - ☐ Truss/rafter anchored to top plate of wall using nails driven at an angle through the truss/rafter and attached to the top plate of the wall, or
     - ☐ Metal connectors that do not meet the minimal conditions or requirements of B, C, or D

   Minimal conditions to qualify for categories B, C, or D. All visible metal connectors are:
     - ☐ Secured to truss/rafter with a minimum of three (3) nails, **and**
     - ☐ Attached to the wall top plate of the wall framing, or embedded in the bond beam, with less than a ½" gap from the blocking or truss/rafter **and** blocked no more than 1.5" of the truss/rafter, **and** free of visible severe corrosion.
   - ☐ B. Clips
     - ☐ Metal connectors that do not wrap over the top of the truss/rafter, **or**
     - ☐ Metal connectors with a minimum of 1 strap that wraps over the top of the truss/rafter and does not meet the nail position requirements of C or D, but is secured with a minimum of 3 nails.
   - ☐ C. Single Wraps
     Metal connectors consisting of a single strap that wraps over the top of the truss/rafter and is secured with a minimum of 2 nails on the front side and a minimum of 1 nail on the opposing side.
   - ☐ D. Double Wraps
     - ☐ Metal Connectors consisting of 2 separate straps that are attached to the wall frame, or embedded in the bond beam, on either side of the truss/rafter where each strap wraps over the top of the truss/rafter and is secured with a minimum of 2 nails on the front side, and a minimum of 1 nail on the opposing side, **or**
     - ☐ Metal connectors consisting of a single strap that wraps over the top of the truss/rafter, is secured to the wall on both sides, and is secured to the top plate with a minimum of three nails on each side.
   - ☐ E. Structural Anchor bolts structurally connected or reinforced concrete roof.
   - ☐ F. Other: _____
   - ☐ G. Unknown or unidentified
   - ☐ H. No attic access

5. **Roof Geometry:** What is the roof shape? (Do not consider roofs of porches or carports that are attached only to the fascia or wall of the host structure over unenclosed space in the determination of roof perimeter or roof area for roof geometry classification).
   - ☐ A. Hip Roof Hip roof with no other roof shapes greater than 10% of the total roof system perimeter.
     Total length of non-hip features: _____ feet; Total roof system perimeter: _____ feet
   - ☐ B. Flat Roof Roof on a building with 5 or more units where at least 90% of the main roof area has a roof slope of less than 2:12. Roof area with slope less than 2:12 _____ sq ft; Total roof area _____sq ft
   - ☐ C. Other Roof Any roof that does not qualify as either (A) or (B) above.

6. **Secondary Water Resistance (SWR):** (standard underlayments or hot-mopped felts do not qualify as an SWR)
   - ☐ A. SWR (also called Sealed Roof Deck) Self-adhering polymer modified-bitumen roofing underlayment applied directly to the sheathing or foam adhesive SWR barrier (not foamed-on insulation) applied as a supplemental means to protect the dwelling from water intrusion in the event of roof covering loss.
   - ☐ B. No SWR.
   - ☐ C. Unknown or undetermined.

Inspectors Initials _____ Property Address_____

***This verification form is valid for up to five (5) years provided no material changes have been made to the structure or inaccuracies found on the form.**