Roof Survey
and
Condition Assessment
Report

Prepared For:
JOE FALLCARA

Location:
15690 BARKERS LANDING RD
HOUSTON, TX 77079

GUARDIAN FILE: **RRP-JF-714**

-Performed By-

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Date:	May 12, 2020,
To:	Mr. Joe Fallacara
Site Location:	Residential Property 15690 Barkers Landing Rd Houston, TX 77079
Document	Summary Roof Survey and Condition Assessment Report
Date of Inspection:	May 7, 2020

Introduction:

As requested, Guardian has inspected the roof system and assembly associated with the structure site location referenced above and submit the following report. At the request of Joe Fallacara, Guardian was asked to provide a condition assessment of the roofing systems on his residential property. It is our understanding that a new TPO roof was installed in January of 2020 and leaking has persisted to occur since this install was completed. The inspection was completed by Michael Atkinson, the author of this report. I currently hold installation credentials as a certified installer for several TPO manufacturers including Mule Hide. Pictures were taken during my inspection and will be provided for documentation of our findings.

Findings and Observations:

1. Roofing system and installation:
    a. The existing roof surface is a .60 Mil TPO single ply membrane over a substrate board and both are mechanically attached.
    b. No core sample was taken so we cannot definitively say what is under the TPO roof system or if any components installed under the roof membrane are installed correctly. Our findings are solely based on areas that were visible during our inspection.
        i. Homeowner advised that the new roof was installed over an existing modified bitumen roof system with a ½" fanfold cover board being was used to separate the modified from the new TPO membrane.
2. TPO roof system was not installed following the manufactures specifications and many areas were found left in a manner which would allow moisture to penetrate the new roof system.

3. Install defects were found in a variety of areas and will require major repairs to bring the roof system to a watertight condition. Some installation errors do not cause concern of leaking but may cause roof failure, due to improper termination and securement, during a major weather event. These conditions contain the following issues listed below. Reference numbers have been listed to show pictures of these conditions on our inspection report.

    a. Mule Hide cut edge sealant was not used on membrane seams that do not have a factory edge. This is required to ensure proper sealing of the seams. (Page 4)
        i. Some areas were cut in a manner that they may need to be completely covered with new TPO membrane.
    b. Cuts were found in TPO membrane at edge termination that were improperly sealed with caulking and termination bar. (Page 5)
    c. Base attachment of TPO membrane is done improperly. TPO was run with one piece of membrane in field and up parapet walls. Fasteners were then installed over the TPO and covered with TPO T-patches. Spacing on the fasteners installed was found to be between 4' – 6' spacing which is insufficient for pullout strength of roof membrane and may cause the roof system to pull off during a high wind event. (Pages 6-7)
    d. Inconsistent installation of membrane termination was found at vertical applications. Some areas were found with improper installation and securement of termination bar. Fasteners were installed randomly along termination bar skipping factory made holes designed for termination bar securement. No back sealing of termination bar was found which is required to be installed by all TPO manufacturers and acts as a final block of defense if moisture can get behind the termination bar or membrane. Other areas were found to be only sealed with caulking or exposed fasteners. We found TPO to be installed over coping metal in some areas and under the coping in other areas. Areas where the membrane was tucked under the coping metal were not run up and over the parapet wall and have no securement to hold membrane in place. On the parapet wall located on the West side of the property, termination bar was run under the coping metal for half of the wall and transitions to over the coping for the remainder of the wall. Inadequate securement of TPO membrane was found at this transition leaving a wide-open area for water intrusion. (Pages 8-12)
    e. Inconsistent installation of membrane termination was also found along the edge termination of the roof system. TPO is required to be run a minimum of ½ inch past the termination bar. Some areas had excessive materials left under the termination bar, up to 3-4 inches, while other areas the TPO was cut short and does not pass all the way under the termination bar. Large sections of termination bar were left unfastened allowing the membrane to be pulled up with little or no resistance. Termination bar did not run the full length covering all TPO membrane and leaving end sections completely unsecured. Termination bar was bent around inside and outside corners whereas manufacturers require cutting the termination bar to a specific size to reach the full run of that section. This is done so that the membrane is compressed against the substrate leaving no voids for water intrusion. (Pages 13-15)
    f. During my inspection I probed welded seams throughout the roof marking any areas where the membrane was not properly welded. These areas are referred to as cold welds and are areas where voids in the seal are located. It is also a leading cause for leaks with this type of roof system. A TPO roof system is dependent on the seals being fully welded or it will not be a watertight system. I observed over 60 cold welds without probing every welded seam on the roof. More areas can be expected to be

found once every welded seam is checked with a probe. These were found to be in the field of the roof, up vertical walls, around roof penetrations, and at edge and flashing detail locations. Based on the number of cold welds found on this roof system, it is consistent with the membrane being hand welded versus using a welding robot. (Pages 16-30)

g. We found three pipe penetrations installed in the field of this roof. One HVAC pipe and two PVC plumbing vent pipes. None of the pipe flashings were installed properly and all areas are currently susceptible to leaking. While cold welds were found along the flange of the pipe boots, the larger concern would be the PVC pipe extensions installed over the plumbing pipes. Due to the type of pipe flashing used over these pipes, a PVC extension needed to be added to the existing plumbing pipes. Normal practice would require that the pipe extension be glued or securely attached to the existing pipes. However, we found that the new PVC pipe was not secured to the existing pipes and has allowed the two to come disconnected. This is allowing any water that falls through the new PVC pipe to drain under the new TPO roof system. Once under the new TPO membrane, this water can travel anywhere on the roof and will flow until it finds an entry point to enter the building. Along with this issue, none of the pipes were back sealed between the pipe and pipe flashing. Manufacturers require all pipes to be back sealed using water cutoff mastic before installing the new pipe flashing. They also require a metal clamping ring be installed around the top of the pipe flashing so that the flashing is tight against the pipe, and then caulking is to be installed over this clamping ring. This detail was not done on any of the three pipes. (Pages 31-32)

h. No perimeter or corner fastening enhancements have been done in accordance with manufacturer specifications. TPO roof systems have been designed to use these enhancements to secure membrane in susceptible areas to wind uplift pressures. Failure to follow these guidelines can result in roof failure during high wind events. The perimeter of this roof either has a flat eave line or low parapet wall under 18 inches in height and would require enhanced fastening to keep the roof from blowing off or coming unsecured during a wind event. It is also required to increase these enhancements in areas where large openings existing under the roof line. The north edge of this roof section has a garage door which is cause for the increased enhancement over this area. (Pages 33-34)

i. Due to the style of design for this building, the existing roof must tie into the roof system on neighboring properties on both sides of the rear area of the roof. The existing TPO looks to have been installed directly over the modified bitumen installed on the two neighboring properties and is secured down with termination bar and caulking. Since TPO and modified bitumen are two different types of roof systems, there is a specific installation guideline on how to tie these two systems together to ensure that leaks do not occur. These specifications were not followed and both areas are susceptible to water intrusion.

Conclusions / Recommendations:

- All items listed in our findings and observations were based solely on what was visible at the time of our inspection. I could not verify any elements of the roof system below the TPO membrane without deconstructing the roof. These findings would include the “fanfold” cover board type and its attachment, as well as what the original roof system consisted of. When doing a layover installation, there are certain requirements that need to be done to the existing roof system, prior to a new roof being installed. Without further investigation, we cannot guarantee that these requirements were met. No moisture scan was done during our inspection, but I can confidently

say many leak points were found due to poor workmanship.

Based on the issues found on the TPO portion of the roof, I do not feel confident that the installer who worked on this roof had a clear understanding of how the roof system was supposed to be installed and/or what the manufacturer specifications were when installing this product. In order to bring this roof system up to a watertight condition, several days of repairs will be needed as well as addition materials.

After working up a cost analysis of repairs being made to the existing roof versus a full replacement of the roof system, the cost would be nominal. Making all necessary repairs would remove any chances of leaking in its current state but would not guarantee that additional issues did not emerge in the future. Nor would this guarantee how the roof would perform during a weather or high wind event.

Furthermore, without deconstructing the roof, we cannot guarantee what kind of moisture may be trapped under the roof surface or under the original roof membrane. Due to these unknown factors and all issues found during our inspection, it is my recommendation that the entire roof would need to be removed and replaced. A cost for the roof replacement will be provided based upon a layover installation as was previously done by the contractor who installed the new TPO roof. Tear off of the original roof may also be required if moisture is found to be trapped inside the existing roof system and would be in addition to the cost listed on our replacement quote. On request, a core sample can be performed showing us what all roof components are installed above the roof decking, and a new quote can be provided based upon these findings.

Pease contact me with any questions.

Sincerely,

Michael Atkinson
President
Guardian Roof Systems