Association, Inc.
Mr Client
Midnight Pass Road
Sarasota, FL 34242
boardofdirectors@gmail.com

May 4, 2024

Attention: [redacted]

Regarding: Roof Moisture Survey
4.24-XXXX

Mr. Client:

Dynamic Engineering Design & Inspection (Dynamic) recently performed a Infrared Roof Moisture Survey at Condo at your request for [redacted] This report includes the results of our survey.

1. Purpose & Scope

The purpose of this survey was to identify thermal anomalies generally consistent with wet insulation, to the extent reasonably possible within the scope of the survey.

The scope included an aerial-based moisture survey with an infrared camera, a limited roof-based visual survey, and a limited roof-based moisture survey with a Tramex RWS to corroborate the results of the aerial survey. Roof cores were not performed by Dynamic.

2. Summary & Background

Dynamic performed the survey on the five (5) residential buildings. Based on information provided, the roofs were replaced in 2005 (approx.) and consist of a modified bitumen roof system over a mechanically attached base sheet, over lightweight insulating concrete, over a structural concrete roof deck. The roof on The Clubhouse was replaced in 2008 (approx.) and consists of a

modified bitumen roof system over rigid insulation over a structural concrete roof deck. The method of attachment of the roof on the Dolphin is unknown by Dynamic at this time.

3. Equipment

Dynamic used the following equipment to perform the survey:

Standard	ASTM C1153, Standard Practice for Location of Wet Insulation in Roofing Systems Using Infrared Imaging
Aerial Equipment:	DJI Mavic 3T Resolution: 640×512
Impedance Scanner:	Tramex RWS

4. Date, Time & Environmental Conditions

Date:	04/24/24
Sunset:	DJI Mavic 3T, Resolution: [redacted]
Time:	Tramex RWS
Ambient Air Temp.:	77°F
Wind Speed:	<10 MPH
Surface Condition:	Dry

5. Discussion of IR Technology and Impedance Technology

An infrared camera measures the surface temperature by detecting infrared energy and converts these readings into a visual image. Areas on the roof that have different temperatures than adjacent areas are identified as thermal anomalies and are represented by a change in color on the thermograph. Most thermal anomalies associated with wet insulation observed in the evening will be warmer than the adjacent dry insulation. Thermal anomalies associated with wet insulation are differentiated from other types of anomalies, such as variations in the type, thickness, density or continuity of roof insulation, previous repairs, damage, moisture or debris on the roof surface, or infrared radiation from nearby sources such as mechanical equipment or walls above roof level.

Thermal anomalies associated with wet insulation fall into one of three categories: board-stock, picture framed, or amorphous. Board-stock anomalies are comprised of solid rectangular patterns generally associated with board-by-board wetting of perlite, cork, wood fiber, and glass fiber or cellular plastic insulation. Picture-framed anomalies are comprised of rectangular outlined patterns generally associated with slow-wetting insulation boards such as cellular plastic and cellular glass. Amorphous anomalies are irregular in shape. They are generally associated with monolithic insulations such as lightweight concrete, gypsum, or foamed-in-place polyurethane.

Thermal anomalies identified on The Albacore, The Dolphin, The Marlin, The Sailfish, and The Tarpon should be amorphous. Thermal anomalies identified on The Dolphin should be picture-framed anomalies, or board-stock anomalies.

Impedance scanners project a low-frequency, non-destructive, electrical signal through the surface of the roof into the roof assembly. The current flowing through the field is inversely proportional to the impedance of the material; areas of low impedance will have a higher value on the analog dial, indicating high levels of moisture in the assembly, and areas of high impedance will have a lower value on the analog dial, indicating low levels moisture in the roof assembly, , as shown on the table below.

Impedance	Comparative Reading	Moisture Content
Low	100	High
High	0	Low

Prior to beginning the survey, the scanner was calibrated by placing the scanner over a dry area and zeroing out the scanner, and then placing the scanner over a wet area to confirm an elevated reading (100).

6. Survey Description and Results

Dynamic performed an aerial survey at a height approximately 75 feet above the roof surface. Thermal anomalies were detected during the survey and were regularly corroborated with a Tramex RWS impedance scanner. Thermal anomalies that did not have elevated readings with the Tramex RWS were not included.

Anomalies suspected to be from wet insulation were discovered on the roof during the moisture survey, are summarized below, and are documented in the Thermograms attached to this report.

Building	Anomaly	Approx. Area (sf)
A	1	86
A	2	1,560
A	3	86
B	1	1,205
B	1	326
B	2	278
B	3	280
C	1	377
D	1	130

All anomalies must be verified by a roof core.

7. Recommendations

Dynamic Engineering Design & Inspection (Dynamic) understands that your insurance company requires the roof to be replaced, and the work must be classified as a *Roof Replacement* on the building permit.

All new roof systems must be capable of resisting the design pressures determined in accordance with ASCE 7-22.

The 2023 Florida Building Code defines roof replacement as “the process of removing the existing roof covering, repairing any damaged substrate and installing a new roof covering”[1].

Unless otherwise required by the Building Official, removal of the existing lightweight insulating concrete (LWIC) is not required to obtain a permit. Any damaged LWIC must be replaced, and any wet LWIC must be remediated.

7.1. Buildings A, B, and C

The following scope will meet the requirements of the Florida Building Code to qualify as a roof replacement, and should satisfy the requirements of your insurance provider:

1. remove the existing roof covering entirely, or only at areas with wet LWIC
2. replace all damaged LWIC
3. remediate (dry or replace) all wet LWIC
4. Install a new roof covering with an applicable Florida Product Approval, complete with flashings.

Uplift testing is required to verify suitability of a roof system, prior to installation.

7.2. Building D

Additional investigation and testing is required before a system can be selected. Uplift testing is required to verify suitability of a roof system, prior to installation.

8. Closing

We appreciate the opportunity to provide our services, and trust this letter is acceptable. Dynamic appreciates any opportunity to assist further with the roof replacement project. Specifically, Dynamic can:

1. Provide design wind pressures
2. Select an appropriate roof system, with Florida Product Approval
3. Perform uplift testing as required by the Product Approval
4. Provide attachment density calculations
5. Provide drawings and specifications, signed and sealed by a Professional Engineer
6. Procure and tabulate bids from qualified roofing contractors

[1] https://up.codes/viewer/florida/fl-building-code-2023/chapter/2/definitions#202

7. Provide Contract Administration and Quality Assurance services during the construction phase of the project.

Please contact us if you have any questions, or if we can assist further.

Matthew Mullins, PE
RRC, RRO, CCS, CCCA
President
941-212-0398
mtmullins@dyneng.online
05/04/24

Exhibit A – Definitions
Exhibit B – Thermograms and Visual Light Images

Limitations

The standard of care and skill for the services provided is consistent with the care and skill ordinarily used by members of the subject profession practicing under similar circumstances at the same time and in the same locality.

Observations and information in this report were obtained during a site visit. The opinions are based on visual observations of the as-built conditions and information (written and/or verbal) supplied by others. This report is limited to the areas, components and systems that were viewed at the time of the site visit. Engineer offers no opinion on components, systems or assemblies or areas not included. Any areas of the facility that are concealed, inaccessible or not readily visible are not included. Unless specifically stated otherwise, extrapolations should not be made from observations or opinions provided.

Structural analysis, investigation (destructive or otherwise), and testing were not performed and are beyond this scope of service.

The opinions, discussions, conclusions, and recommendations described in this report are based on the information available, visual observations, and data collected during the site visits to develop this report. Dynamic reserves the right to revise and supplement this report should new information be made available.

The information included in this report is not meant to be a guarantee or warranty of any kind. We have prepared this report exclusively for the Client. Any use of this report by any other individual(s) without our expressed written consent is prohibited. Should another individual rely on this report without our consent, they shall indemnify Dynamic from any damages, losses or expenses they may incur because of its use.

While reasonable attempts have been made to verify that the thermal anomalies shown in this report are consistent with wet insulation, the anomalies identified in this report are not a guarantee of wet insulation. Thermograms are dependent on the conditions present at the time and place at which they are taken. Dynamic makes no guarantees that all anomalies shown in this report are of wet insulation, or that other areas of wet insulation do not exist.

EXHIBIT A - DEFINITIONS

ASTM C1153

Core—a small sample taken by cutting through the roof membrane and insulation and removing the insulation to determine its composition, condition, and moisture content.

Detection—the condition at which there is a consistent indication that a thermal difference is present on the surface of the roof. Detection of thermal anomalies can be accomplished when they are large enough and close enough to be within the spatial resolution capabilities of the imaging system; that is, when their width is at least two times the product of the instantaneous field of view (IFOV)of the system and the distance from the system to the surface of the roof divided by 1000.

Expansion joint—a structural separation or flexible connection between two building elements that allows free movement between the elements without damage to the roofing or waterproofing system.

Feld-of-View, (FOV)—the total angular dimensions, expressed in radians, within which objects are imaged, displayed and recorded by a stationary imaging device.
Infrared Imaging System—an apparatus that converts the spatial variations in infrared radiance from a surface into a two-dimensional image, in which variations in radiance are displayed as a range of colors or tones.

Membrane—a flexible or semiflexible roof covering or waterproofing whose primary function is the exclusion of water. (See Terminology D1079.)

Moisture Meter Probe—an invasive (electrical resistance or galvanometric type) test that entails the insertion of a meter probe(s) through the roof membrane to indicate the presence of moisture within the roofing system.

Possible—able to happen or exist

Probable—likely to happen or be true but not certain

Roof Section, Roof Area—a portion of a roof that is separated from adjacent portions by walls or expansion joints and in which there are no major changes in the components.

Roofing System—an assembly of interacting com-ponents designed to weatherproof, and normally to insulate, a building's top surface. (See Terminology D1079.)

Survey Window—the time period during which roof moisture surveys are successfully conducted according to the requirements of Section 10.

Thermal Anomaly—a thermal pattern of a surface that varies from a uniform color or tone when viewed with an infrared imaging system. Wet insulation is capable of causing thermal anomalies.

Thermogram—a recorded visual image that maps the apparent temperature pattern of an object or scene into a corresponding contrast or color pattern.

Definitions - Florida Building Code

PERMIT. An official document or certificate issued by the building official that authorizes performance of a specified activity.

REROOFING. The process of recovering or replacing an existing roof covering. See "Roof recover" and "Roof replacement."

ROOF COVERING. The covering applied to the roof deck for weather resistance, fire classification or appearance.

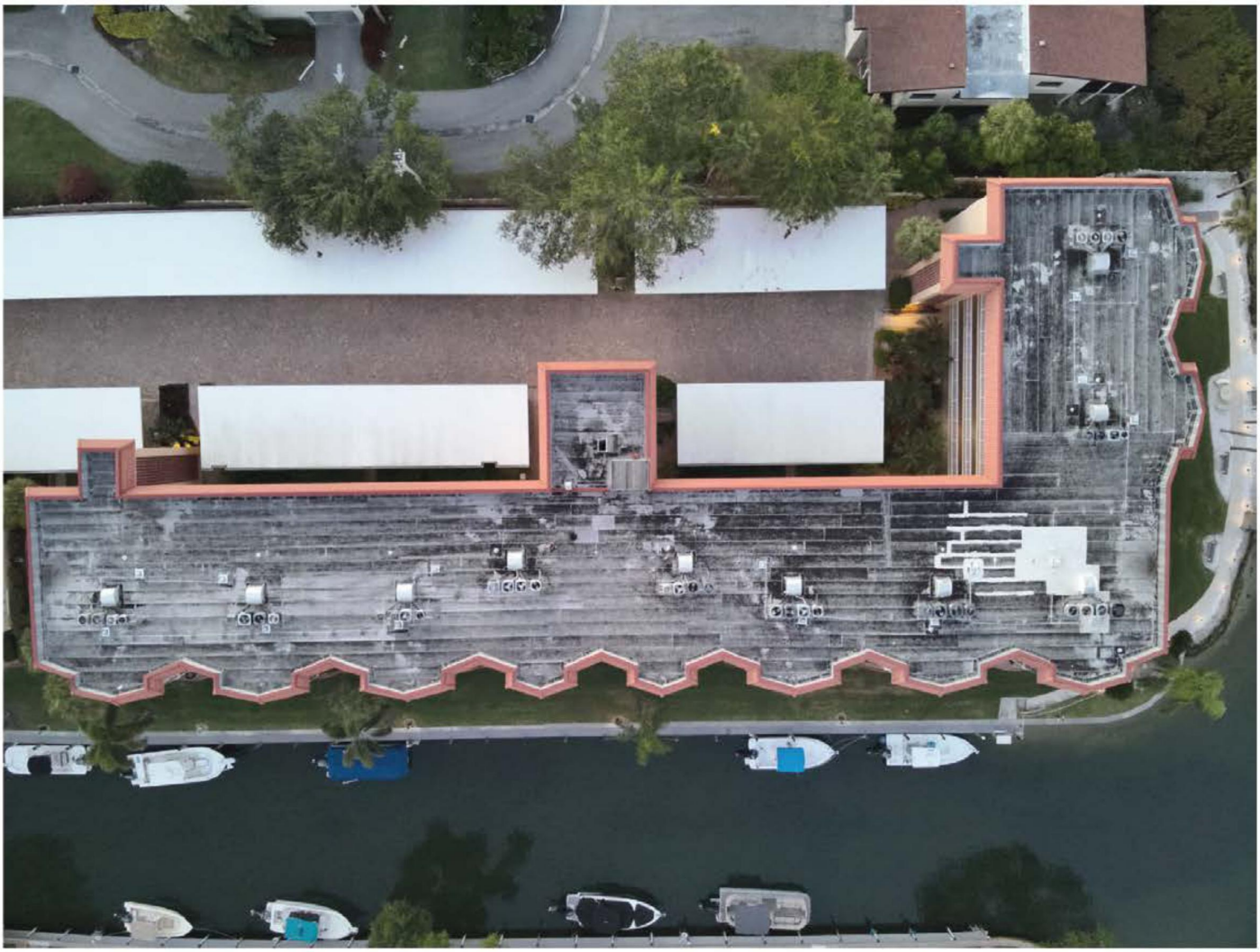
ROOF RECOVER. The process of installing an additional roof covering over a prepared existing roof covering without removing the existing roof covering.

ROOF REPAIR. Reconstruction or renewal of any part of an existing roof for the purposes of its maintenance.

ROOF REPLACEMENT. The process of removing the existing roof covering, repairing any damaged substrate and installing a new roof covering.

ROOF SECTION. A separation or division of a roof area by existing joints, parapet walls, flashing (excluding valleys), difference of elevation (excluding hips and ridges), roof type or legal description; not including the roof area required for a proper tie-off with an existing system.

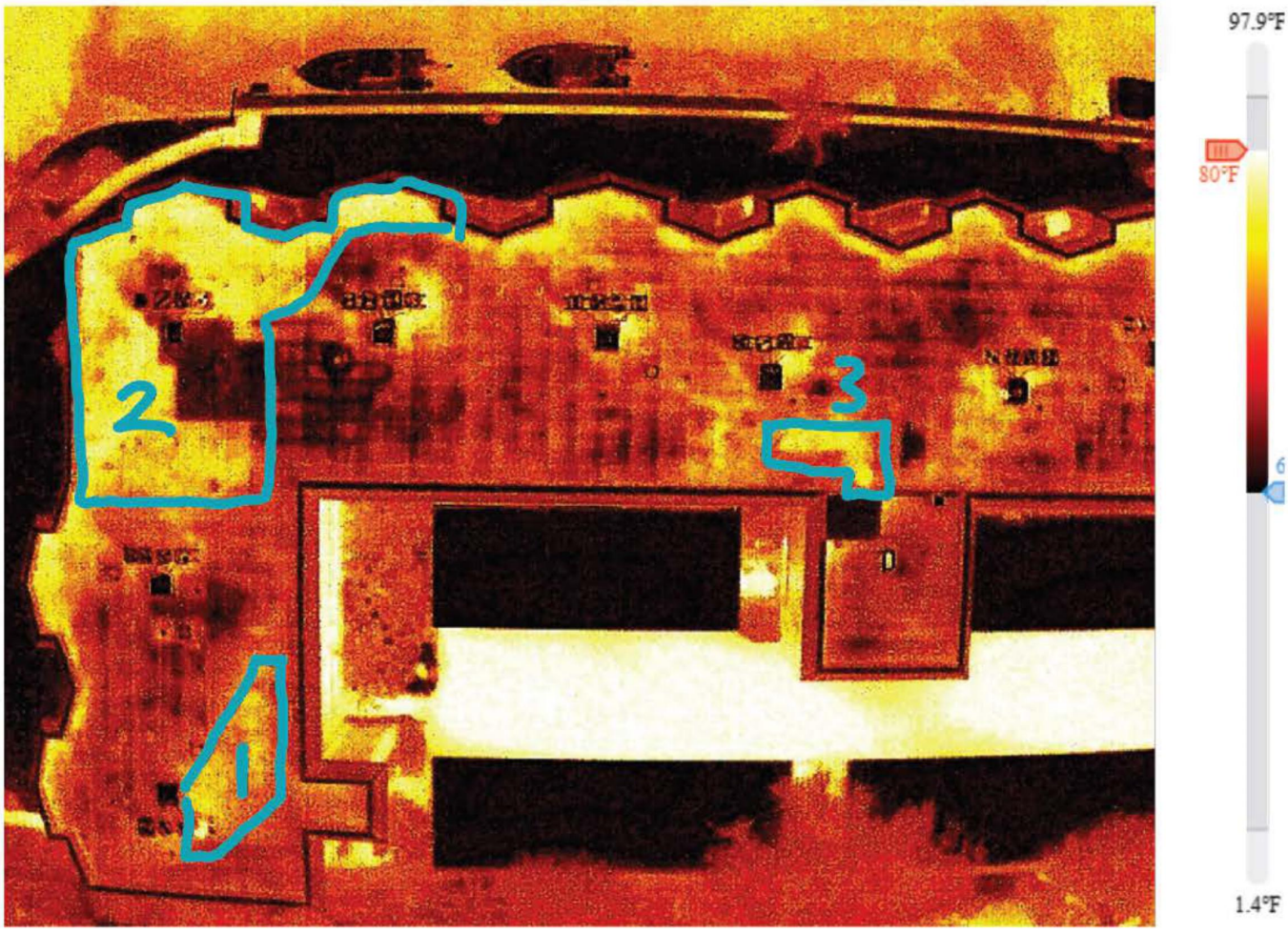
ROOF SYSTEM. A roof system consists of a roof covering and other interacting roofing components and may include a vapor retarder, thermal barrier, insulation or other similar substrate. The system does not include the roof deck unless it is part of a single component serving as the roof covering and the roof deck.



Picture 2: Visible light overview of [redacted]

Lat: 27.25707	Long: -82.53455	Bearing:	Date Taken: 04/24/2024
Weather:			Taken By: Matthew Mullins
Tags:			

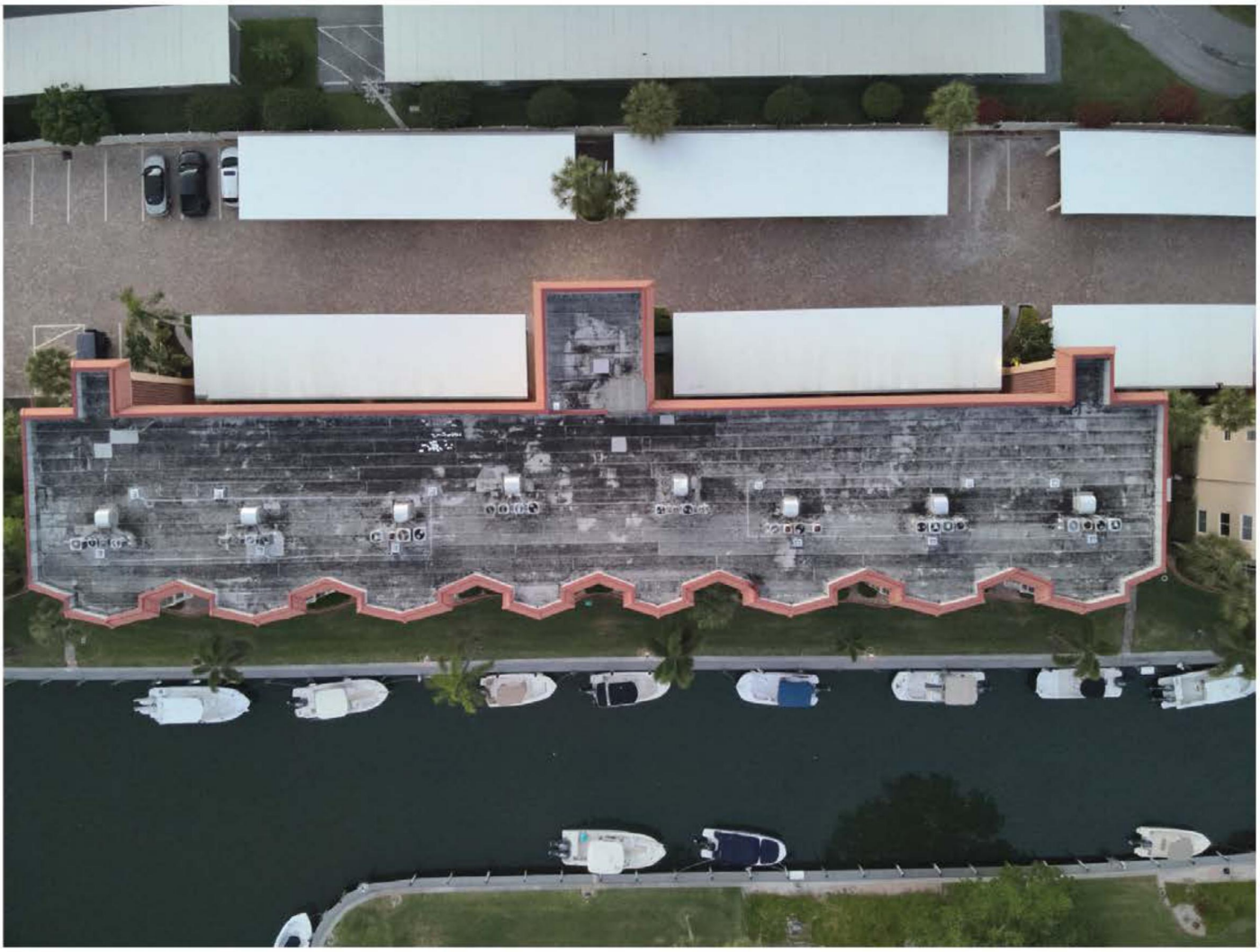
Project Name: [redacted] Roof Moisture Scan	
Project Location: [redacted] Pass Rd, Sarasota, FL 34242, USA	
Client: [redacted]	Project Code: [redacted]
Preparer: MTM	Reviewer: MTM
Report Date: 2024-05-03	Page Number: 2 of 21



Picture 3: Thermogram of [redacted] Thermal anomalies consistent with wet insulation outlined in blue.
1: Approximately 86 sf.
2: Approximately 1,560 sf.
3: Approximately 86 sf.

Lat: 27.25574	Long: -82.53640	Bearing:	Date Taken: 05/03/2024
Weather: Sunny			Taken By: Matthew Mullins
Tags:			

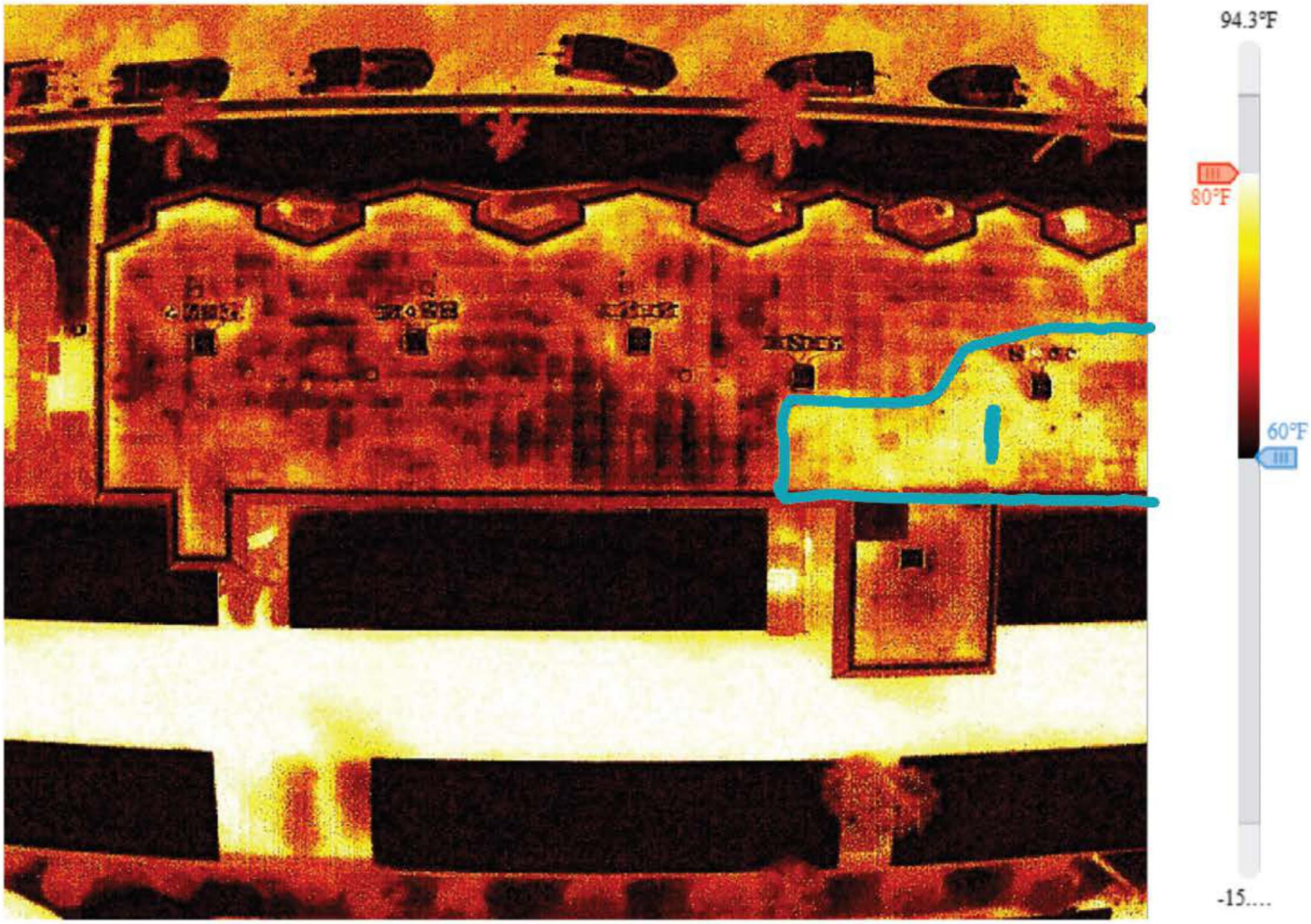
Project Name: [redacted] Roof Moisture Scan	
Project Location: [redacted] Pass Rd, Sarasota, FL 34242, USA	
Client: [redacted]	Project Code: 4.24[redacted]
Preparer: MTM	Reviewer: MTM
Report Date: 2024-05-03	Page Number: 3 of 21



Picture 5: Visible light overview of the [redacted]

Lat: 27.25658	Long: -82.53520	Bearing:	Date Taken: 04/24/2024
Weather:			Taken By: Matthew Mullins
Tags:			

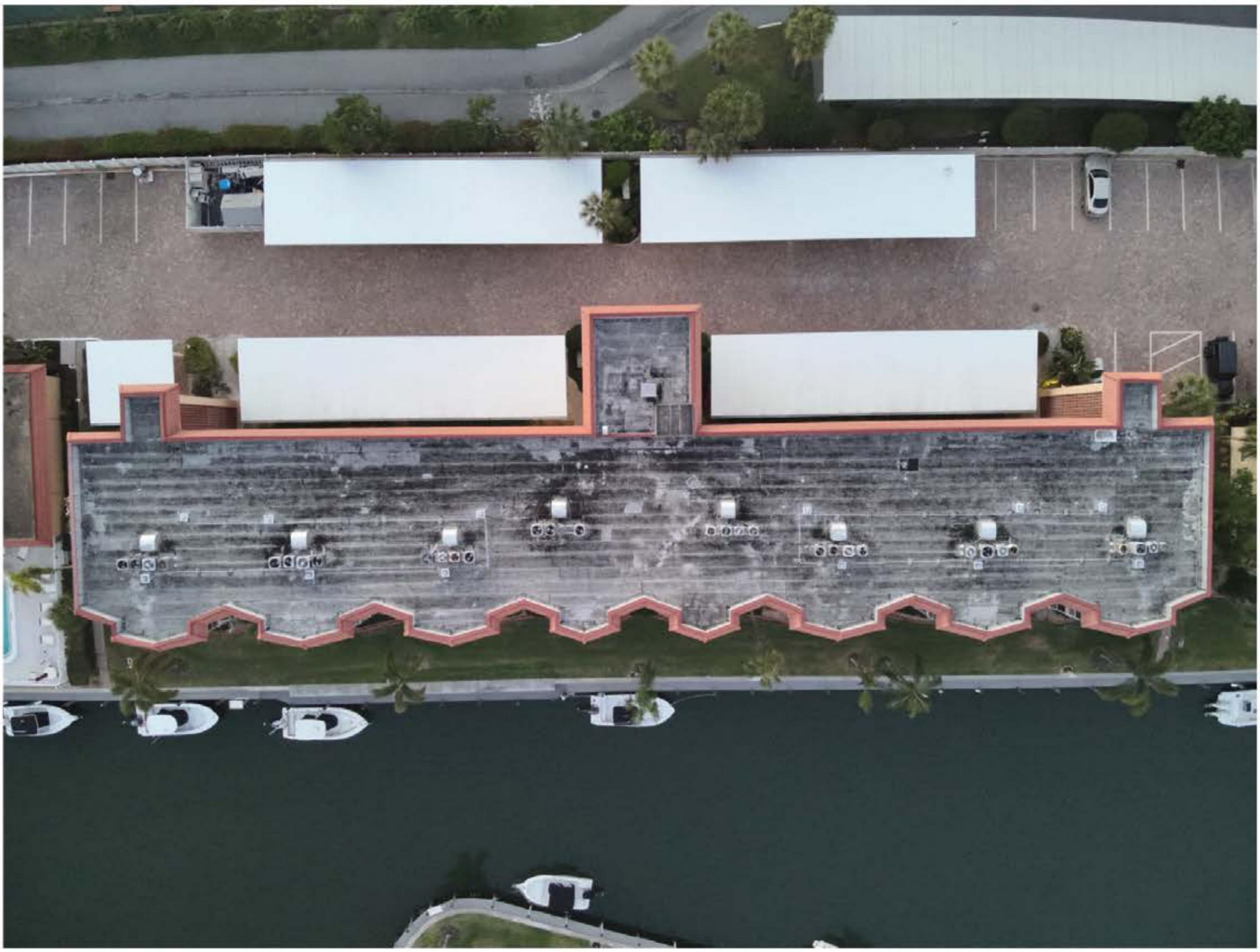
Project Name: [redacted] Roof Moisture Scan	
Project Location: [redacted] Pass Rd, Sarasota, FL 34242, USA	
Client: [redacted]	Project Code: 4.2[redacted]
Preparer: MTM	Reviewer: MTM
Report Date: 2024-05-03	Page Number: 5 of 21



Picture 6: Thermogram of The [redacted] Thermal anomalies consistent with wet insulation outlined in blue.
1: Approximately 1,205 sf.

Lat: 27.25574	Long: -82.53640	Bearing:	Date Taken: 05/03/2024
Weather: Sunny			Taken By: Matthew Mullins
Tags:			

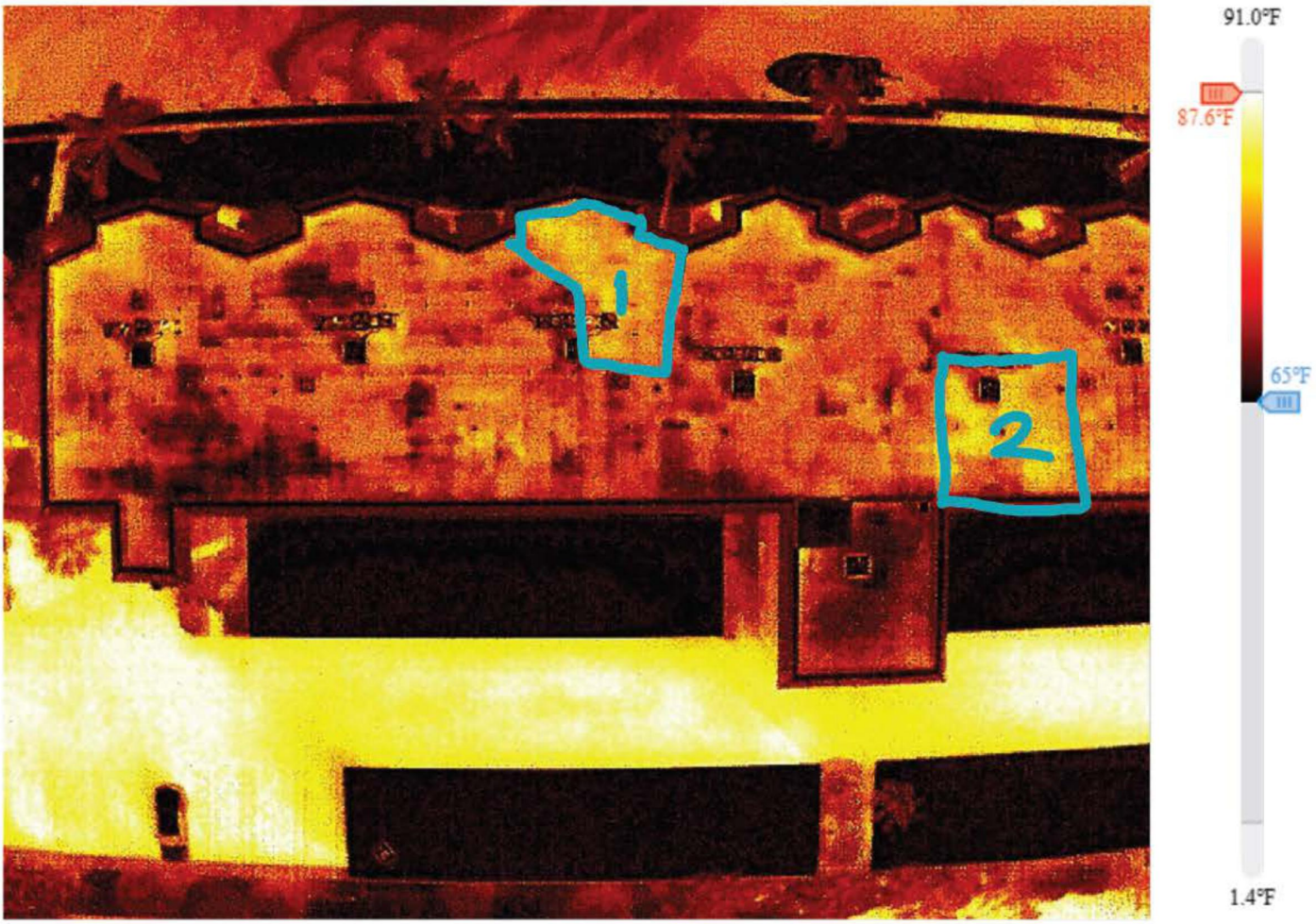
	Project Name: [redacted] Roof Moisture Scan	
	Project Location: [redacted] Pass Rd, Sarasota, FL 34242, USA	
	Client: [redacted]	Project Code: 4.24-[redacted]
	Preparer: MTM	Reviewer: MTM
	Report Date: 2024-05-03	Page Number: 6 of 21



Picture 8: Visible light overview of [redacted]

Lat: 27.25612	Long: -82.53592	Bearing:	Date Taken: 04/24/2024
Weather:			Taken By: Matthew Mullins
Tags:			

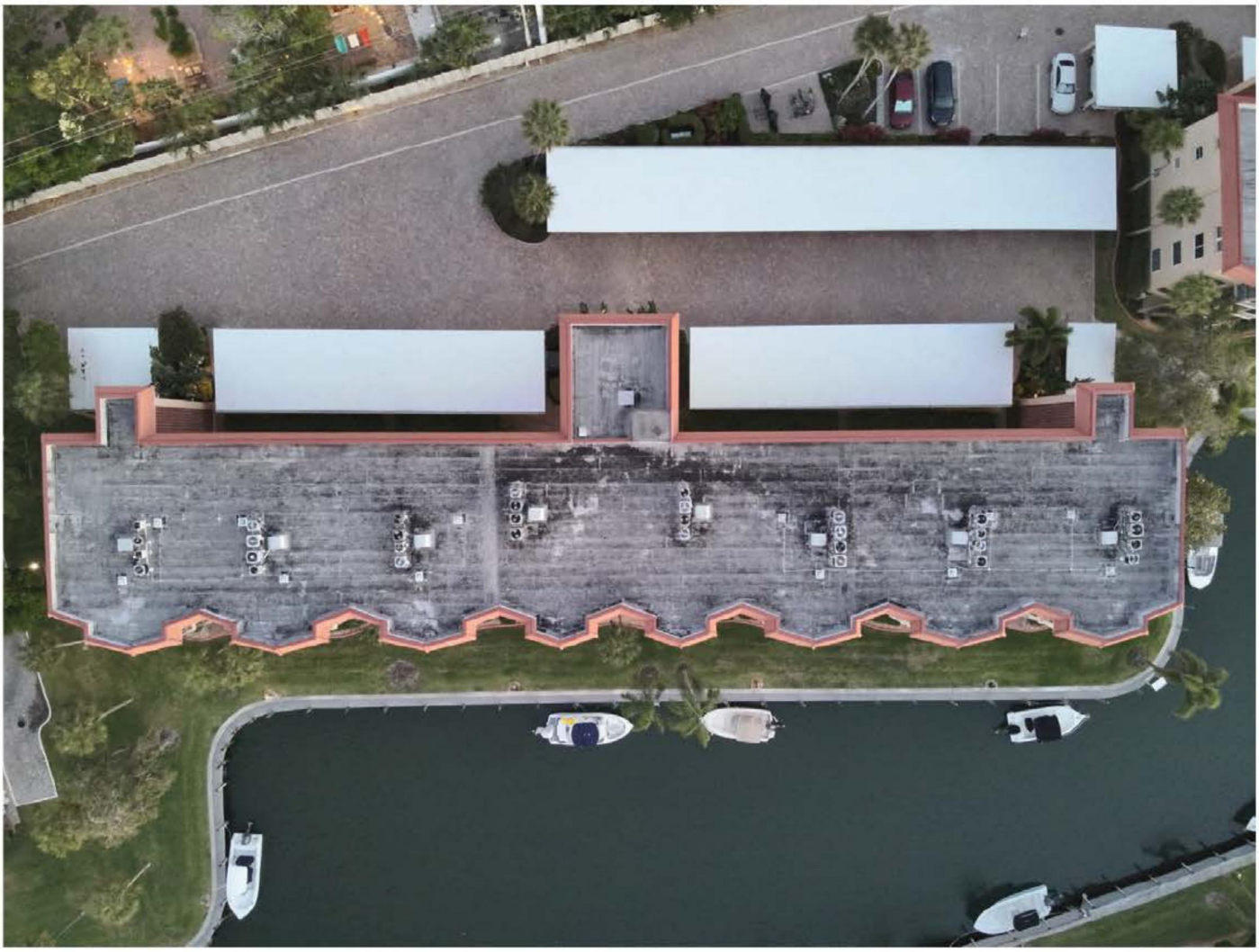
Project Name: [redacted] Roof Moisture Scan	
Project Location: [redacted] Pass Rd, Sarasota, FL 34242, USA	
Client: [redacted]	Project Code: 4.24[redacted]
Preparer: MTM	Reviewer: MTM
Report Date: 2024-05-03	Page Number: 8 of 21



Picture 9: Thermogram of [redacted] Thermal anomalies consistent with wet insulation outlined in blue.
1: Approximately 326 sf.
2: Approximately 278 sf.

Lat: 27.25574	Long: -82.53640	Bearing:	Date Taken: 05/03/2024
Weather: Sunny			Taken By: Matthew Mullins
Tags:			

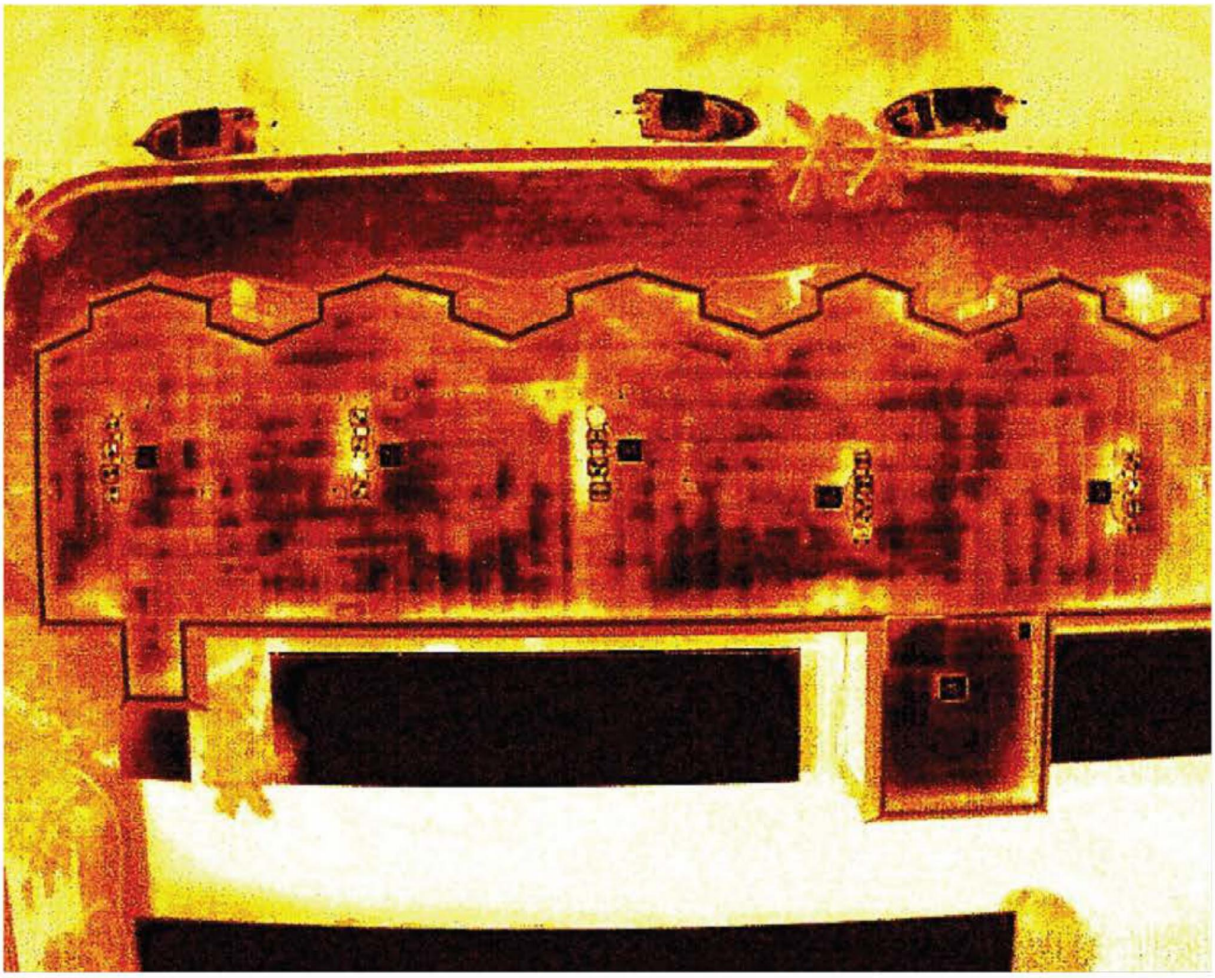
Project Name: [redacted] Roof Moisture Scan	
Project Location: [redacted] Pass Rd, Sarasota, FL 34242, USA	
Client: [redacted]	Project Code: 4.24-[redacted]
Preparer: MTM	Reviewer: MTM
Report Date: 2024-05-03	Page Number: 9 of 21



Picture 14: Visible light overview of the [redacted].

Lat: 27.25573	Long: -82.53533	Bearing:	Date Taken: 04/24/2024
Weather:			Taken By: Matthew Mullins
Tags:			

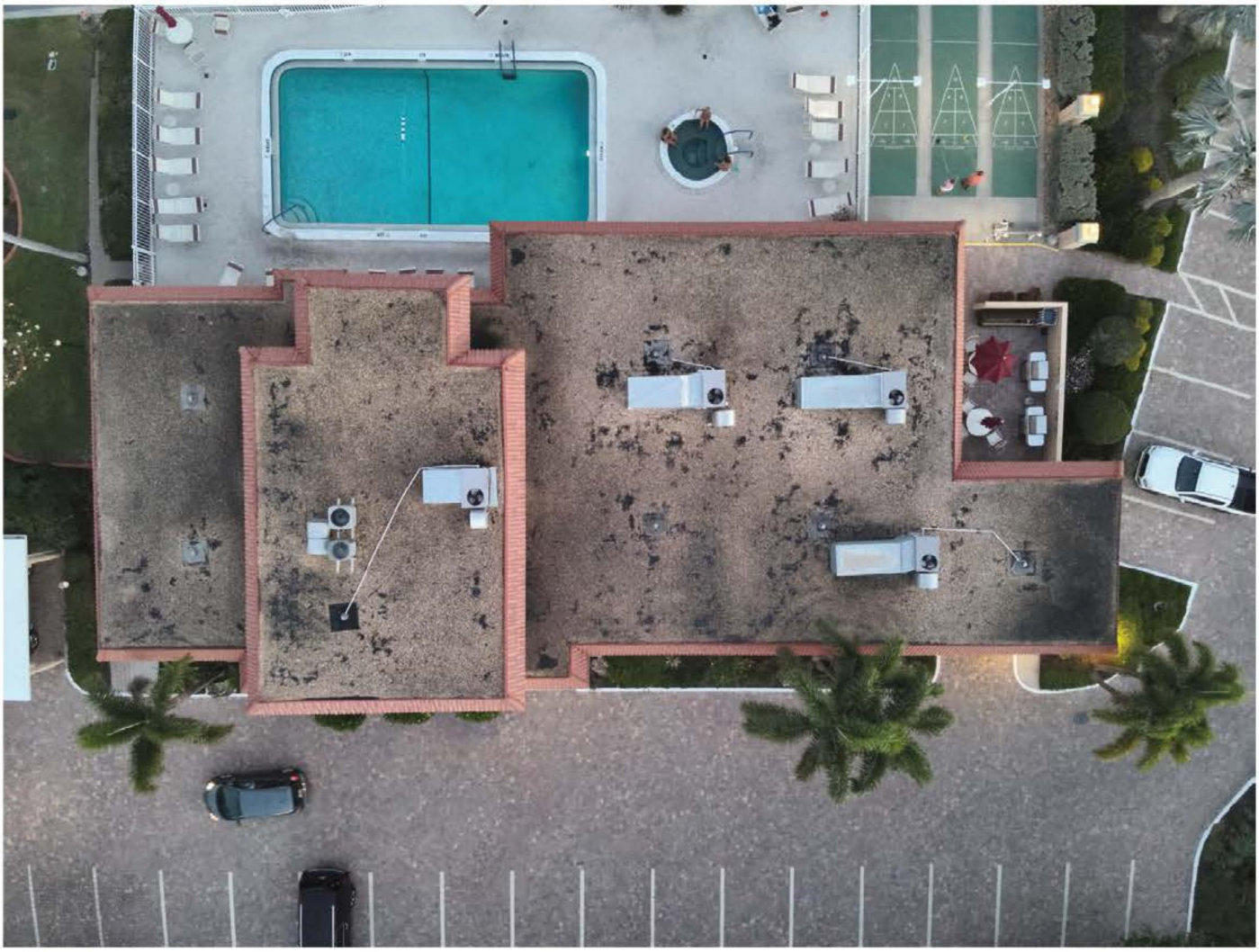
Project Name: [redacted] Moisture Scan	
Project Location: [redacted] Pass Rd, Sarasota, FL 34242, USA	
Client: [redacted]	Project Code: 4.24[redacted]
Preparer: MTM	Reviewer: MTM
Report Date: 2024-05-03	Page Number: 14 of 21



Picture 15: Thermogram of The [redacted]

Lat: 27.25574	Long: -82.53640	Bearing:	Date Taken: 05/03/2024
Weather: Sunny			Taken By: Matthew Mullins
Tags:			

Project Name: [redacted] Moisture Scan	
Project Location: [redacted] Pass Rd, Sarasota, FL 34242, USA	
Client: [redacted]	Project Code: 4.2[redacted]
Preparer: MTM	Reviewer: MTM
Report Date: 2024-05-03	Page Number: 15 of 21



Picture 17: Visible light overview of clubhouse.

Lat: 27.25575	Long: -82.53641	Bearing:	Date Taken: 04/24/2024
Weather:			Taken By: Matthew Mullins
Tags:			

Project Name: [redacted] Roof Moisture Scan	
Project Location: 6289 Midnight Pass Rd, Sarasota, FL 34242, USA	
Client: [redacted]	Project Code: 4.24[redacted]
Preparer: MTM	Reviewer: MTM
Report Date: 2024-05-03	Page Number: 17 of 21

Picture 19: Dry insulation corroboration on The [redacted]

Lat: 27.25711	Long: -82.53435	Bearing: SE	Date Taken: 05/03/2024
Weather: Sunny			Taken By: Matthew Mullins
Tags:			

Project Name: [redacted] Roof Moisture Scan	
Project Location: [redacted] Pass Rd, Sarasota, FL 34242, USA	
Client: [redacted]	Project Code: 4.24[redacted]
Preparer: MTM	Reviewer: MTM
Report Date: 2024-05-03	Page Number: 19 of 21

Picture 20: Wet insulation corroboration on The [redacted]

Lat: 27.25715	Long: -82.53424	Bearing: E	Date Taken: 05/03/2024
Weather: Sunny			Taken By: Matthew Mullins
Tags:			

Project Name: [redacted] Roof Moisture Scan	
Project Location: [redacted] Pass Rd, Sarasota, FL 34242, USA	
Client: [redacted]	Project Code: 4.24-[redacted]
Preparer: MTM	Reviewer: MTM
Report Date: 2024-05-03	Page Number: 20 of 21