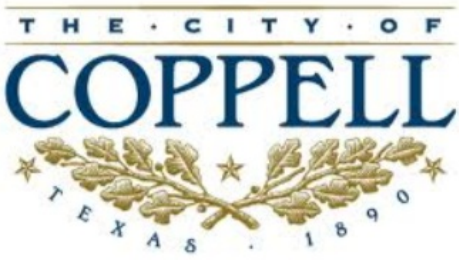

CORE Roof Conditions & Solutions Report

Prepared By
Russell Roberts

Prepared For
Andrew Moore

April 06, 2021

Table of Contents

Aquatic & Recreation Center- CORE / Facility Summary.....3
Aquatic & Recreation Center- CORE / Flat Roof- Built Up Roof / Roof Section Photo.....7
Aquatic & Recreation Center- CORE / Flat Roof- Built Up Roof / Construction Details.....8
Aquatic & Recreation Center- CORE / Flat Roof- Built Up Roof / Inspection: Apr 25, 2019.....11
Aquatic & Recreation Center- CORE / Flat Roof- Built Up Roof / Solution: May 19, 2019.....19

Facility Summary

Client: The City of Coppell

Facility: Aquatic & Recreation Center- CORE

Facility Data

Address 1	234 E Parkway Boulevard
City	Coppell
State	Texas
ZIP	75019
Type of Facility	Municipal
Square Footage	58,467
Contact Person	Steve Shore

Notes

Case #0234-01

As requested by , an inspection of the roofing system at the referenced address above was performed on August 27, 2020.

GHLA, Stephen Bingham, Manufacturer representative Russell Roberts arrived on site at Aquatic and Recreation Center to complete post-storm roof inspection of metal roof assembly and exterior metal panels on vertical wall assemblies owned by City of Coppell (referred to as “Client” hereafter).

Introduction:

This report contains current roof conditions and ASTM, City codes applicable to the roof system installed at Aquatic and Recreation Center located at address listed above. Please note that if new or additional information becomes available after the date listed on this report relative to these roof systems, GHLA, Architecture Firm (referred to as "Architect or Designer" herein) reserves the right to revise report for case #0234-01 based on new information provided after the date of August 27, 2020.

Project Description:

This investigation is limited to the performance of roofing materials and assembly of roof components at the subject property. The subject project consisted of a flat roof section and metal roof sections, all part of one building located at 234 Parkway Blvd, Coppell, TX 75019.

Scope of Work:

Architect/Designer scope of work for this project is to determine IF the integrity of roofing materials applications is in compliance with the ASTM requirements, local building codes and investigate existing weather related damage that occurred on all metal roof surfaces and all other assemblies adjoining roof system.

This Investigation(s) was organized to determine:

- *To document the cause of reported roof leaks.*
- *If the metal roofing assembly performance was impacted by weather-related events.*
- *If the roofing assembly water tight capabilities were compromised by weather related events.*
- *If the fasteners have been compromised by high wind events occurring at location.*
- *If the stucco wall assembly was impacted by recent weather-related events.*
- *Determine complete roof assembly from structural deck to roof surface.*

Active Participants:

Client, Architect, Manufacturer

Site Visit:

August 27, 2020 Initial trip to observe and document all roofing assemblies and accessories general conditions (Client, Architect, Manufacturer)

Property Description and Site Conditions:

Community Location – Coppell, TX

Financial Facility

Elevation – 1 Story >38' mean roof height

Framing – Masonry/Stone

Foundation – Slab on grade

Exterior – Masonry (Brick/Metal) Wall

Directional Setting – West

Roof Slope/Pitch – low slope roof (4": 12" or lower), Steep Pitch (4":12" or greater)

Roof Design – < > low slope / steep slope

Exposure – B

Codes and Installation Instruction:

City of Coppell is a city in the U.S. state of Texas , Most of the city is in Dallas County.

City of Coppell building department adopted the 2018 International Building Code (IBC).

City of Coppell building department adopted the 2018 International Energy Code Council (IECC) design requirements.

IBC 2018: Section 1403.2 Flashings shall be installed in such a manner so as to prevent moisture from entering the wall or to redirect it to the exterior. Flashing shall be installed at the perimeters of exterior. Flashings shall be installed at the perimeter of exterior door and window assemblies, penetrations and terminations of exterior wall assemblies, exterior wall intersections with roofs, chimney, porches, decks, balconies and similar projections and at built-in gutters and similar locations where moisture could enter the wall. Flashing with projecting flanges shall be installed on both sides and the ends of copings, under sills and continuously above projecting trim.

IBC 1503.3.1 requires roof covering shall be applied and installed in accordance with this code and the manufacturer's instructions such that the roof covering shall serve to protect the building or structure.

Wall Coping Metal (Parapet):

For parapet walls, positive slope to the roof side should be provided at the top of the wall. A continuous tapered shim installed over the wood blocking is a common method of sloping the top of the wall to the roof side. When weather-tight seams are not installed, copings should have a continuous sheet membrane liner under the coping that should be capable of providing a secondary water barrier. If installed, a sheet membrane liner may also act as an isolation sheet for incompatible materials or act as a slip sheet for materials with differential movement.

During this visual observation of water shedding surfaces, consistent visible evidence has the cause of mineral displacement on mineral cap surface along with disengaged metal roof panel and weather related impacts metal roof panel surfaces. Visible signs and/or reports have been brought to our attention related to damage caused by the weather event that occurred at the address listed above.

Roofing Product Identification:

Manufacturer's specifications and design requires roof surface to provide positive discharge of moisture from roof assembly, Ultra-Violent ray protection and sustain life cycle of design according to ASTM requirements.

- *Manufacturer observed impacts on metal roof panel surface from hail impacts.*

- *Manufacturer observed impacts on hip and ridge cap roof surface from hail impacts.*
- *Manufacturer observed impacts in "W" Valley metal roof surface from hail impacts*
- *Manufacturer observed moisture in roof assembly at fractures on metal roof panel.*
- *Manufacturer observed hail impacts on parapet wall flashing membrane.*
- *Manufacturer observed hail impacts on metal exhaust caps.*

Reference for Hail Assessment Protocol:

1. Protocol For Uniformly Assessing Hail Damage to Roofs
2. Protocol For Assessment of Hail Damage Roofing (HAAG, Timothy Marshall, Richard Herzog)
3. Hail: Sizing it Up (Vicki Crenshaw, Jim Koontz)
4. The Day After (Karl Schaack, RRC, PE)
5. HAAG, Metal Roof Assessment, Carlos Lopez

Asset Information

Name	Date Installed	Square Footage	Roof Access
Flat Roof- Built Up Roof	N/A	10,500	Internal Roof Hatch
Standing Seam Metal: Low Slope	1998	11,390	Internal Roof Hatch
Standing Seam Metal: Steep Slope	N/A	34,360	Ladder Needed

Construction Details

Client: The City of Coppell

Facility: Aquatic & Recreation Center- CORE

Roof Section: Flat Roof- Built Up Roof

Information

Year Installed	N/A	**Square Footage**	10,500
Slope Dimension	1/4"	**Eave Height**	30
Roof Access	Internal Roof Hatch	**System Type**	Built Up Roof (BUR)
		Contractor	City of Coppell Andrew Moore 469-418-0090 (Mobile) AMoore@CoppellTX.Gov

Assembly

Roof #	Layer Type	Description	Attachment	R-Value	Thickness
1	Surfacing	3/8" gravel	Flood Coat	-	-
1	Membrane	BUR - 3 ply	Hot Mopped	-	-
1	Cover Board	Perlite	Hot Mopped	1.39	.50
1	Insulation	Polyisocyanurate	Hot Mopped	11.9	2.2
1	Deck	Metal Deck	Adhesive	-	-

Details

Perimeter Detail	Parapet Wall
Flashing Material	Modified Membrane
Drain System	Internal Roof Drains
Coping Cap	Metal

Inventory

Inventory Type	Quantity
Drain	4
Gas Pipe Penetration	4
HVAC	4
Roof Hatch	1

Notes

General Summary of Observations and ASTM D 2829-07 Test Results:

The core received is a three-ply built up roof with a flood and gravel surfacing and inter-ply glass mat applied in hot asphalt. The surface of the roof is very weathered and shows signs of alligatoring. The flood and gravel surfacing acts as an important UV protectant for the asphalt; this loss of minerals and surface cracking will potentially lead water penetration though to the roof deck below.

The roof core is well intact, with no signs of air gaps or loss of adhesion. The plies were not readily able to be pulled a part. The key mechanism of any built-up roof system consists of all plies being adhered together as a system with an adhesive; by keeping the system intact, the total system strength remains strong and waterproof to avoid any cracks or reduction in mechanical properties.

The average softening point of the inter-ply asphalt was 281.5°F with a pen of 7. Standard Type III asphalt has a softening point of 185-205°F and a pen of 15-35. This asphalt sample tested above the ASTM D 312-00 specifications listed above. This could be due to the asphaltic oils baking out over time from weathering and heat cycling, leading to an increased softening point and more brittle asphalt. The loss of oil leads to overall brittleness, cracking and crazing of the roof system, especially in climates with temperature variation between seasons.

In accordance with the Recommended Performance Criteria for Modified Bitumen Roof Membrane Systems, bitumen roof systems should have a minimum of 2.5% elongation, and 200 lbf/in tensile strength to ensure adequate field performance. This roof core had a tensile strength of 189.5 lbf/in and an elongation of 1.3%. Both the tensile strength and elongation are not within the recommended criteria. This can be related to the degraded roof system not being solidly adhered to reach the full tensile strength and the brittle asphalt reducing its overall elasticity.

Based on the analysis of the core provided and from our observations, the overall construction of the core has sufficient integrity and adhesion qualities; the aged asphalt has negatively affected the total system strength. The softening point of the asphalt for both cores was very high, indicating degradation of the asphalt. As a result, the physical properties of this roof core exhibit that the roof is toward the end of its life cycle and will continue to deteriorate with time.

Recommendations:

Based on ASTM D 2523, ASTM D 2829 test results, physical roof discoveries and moisture migrating through existing failing roof system our recommendation is to remove roof surfacing, prepare existing roof membrane and apply new roof system over existing roof system. This proposed solution will ensure interior conditions of gym are not compromised and will avoid raising all roof top units to install new applicable IECC/ASHRAE requiring R-25 continues insulation on roof deck.

See Solution listed below in this report with scope of work and manufacturers responsibility.

Inspection Report

Client: The City of Coppell

Facility: Aquatic & Recreation Center- CORE

Report Date: 04/25/2019

Roof Section: Flat Roof- Built Up Roof

Inspection Information

Inspection Date	04/25/2019	**Core Data**	Yes
Inspection Type	Core Analysis	**Leakage**	Yes
Deck Conditions	Good		

Flashing Conditions

Perimeter	Fair	**Wall**	Fair
Projections	Failed	**Counterflashing**	Fair

Miscellaneous Details

Reglets	Good	**Debris**	Yes
Control Expansion Joints	Fair	**Ponding Water**	Minor
Parapet Wall	Fair	**Coping Joints**	Poor

Photo 1

Photograph shows location of roof where destructive test was completed.

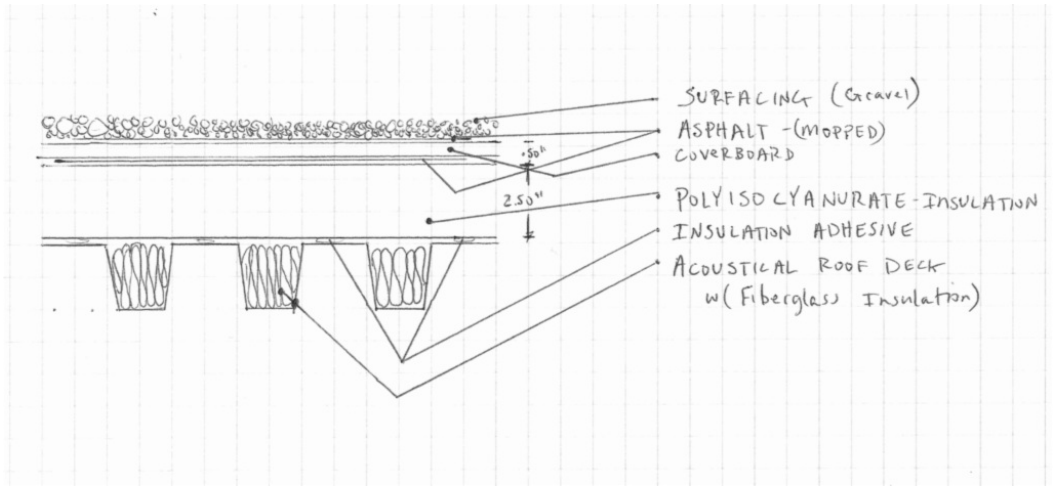

Photo 2

On-site shop drawing showing roof system currently installed over gym area only.

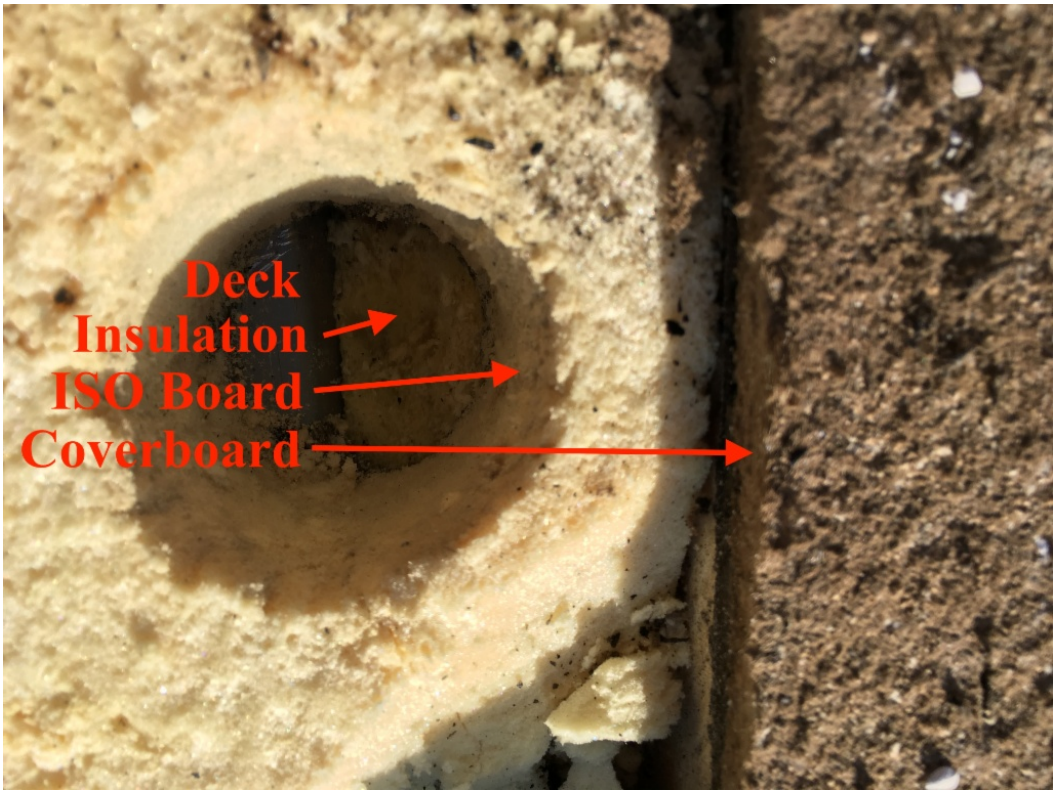

Photo 3

Photograph shows roof components currently installed over gym.

Photo 4

Photograph shows before photo of destructive test location dimensions before extraction process began.

Photo 5

Photograph shows dimension of roof sample scheduled to be removed from roof system.

Photo 6

Photograph shows test sample extracted from roof with slope direction marked.

Photo 7

Photograph shows depth of roof system components installed over gym location.

Photo 8

Photograph shows existing insulation (polyisocyanurate) board installed over gym location.

Photo 9

Photograph shows existing cover board dimension hot mopped to to insulation board over gym location.

Photo 10

Photograph shows all roof components installed in roof system over gym location. Roof components listed from roof surface down to deck below:

a) Surfacing- 3/8" gravel
b) 3 plies felt built up roof cap sheet
c) 1/2" cover board
d) 2.5" insulation board
e) metal deck (core location)

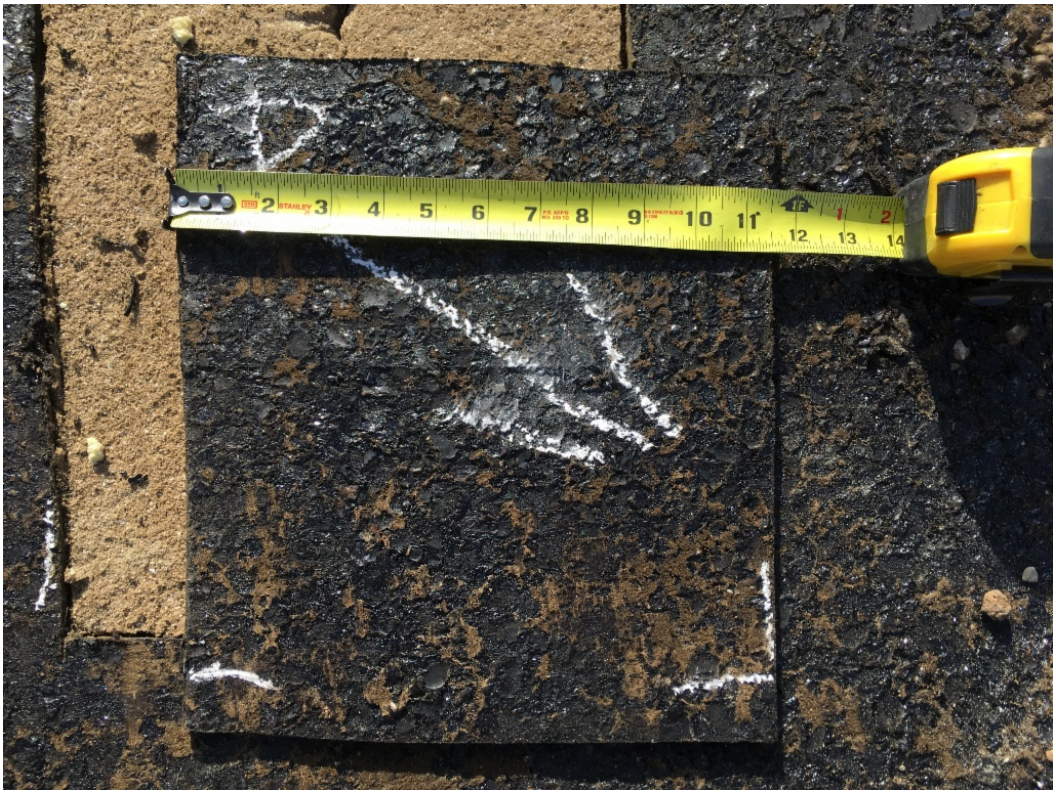

Photo 11

Photograph shows dimension an slope of test sample removed from roof system.

Photo 12

Photograph shows repair completed on roof system at destructive test location.

Photo 13

Photograph shows gravel (surfacing) placed over repair location.

Photo 14

Photograph shows test sample and identification card that were mailed to laboratory for ASTM D 2829-07 testing.

Solution Options

Client: The City of Coppell

Facility: Aquatic & Recreation Center- CORE

Roof Section: Flat Roof- Built Up Roof

Replace Options			
Solution Option:	Replace	**Action Year:**	2020
Square Footage:	10,500	**Expected Life (Years):**	30
Budget:	$160,000.00		

US Communities- COOP # **MICPA # 14-5903**
Address: 3800 E 91st, Cleveland, OH 44105
Garland/DBS Vendor #: **41477 GARLAND DBS, INC.**

SCOPE OF WORK- Sustainable Design High Performance Modified Built-up Roof System Incorporating the Use of Environmentally Responsible Components. Modified Bituminous Built-Up-Roof System including but not limited to: Provide all labor, equipment, and materials to install the roof system over the properly prepared substrate.

*****Complete Infrared Scan to ensure no moisture is trapped in roof system before work commences*****

Roof Sections are included in scope of work: (Built Up Roof section above Gym)

a. General Contractor awarded job must attend pre-construction meeting to determine approved mobilization zones and all other OSHA safety requirements to be observed during entire roof replacement process.
b. General Contractor responsible to provide safety foremen, supervisor for crew any time roof technicians are onsite.
c. Manufacturer to provide wind uplift calculations to awarded general contractor for bidding and installation purposes.
d. Remove and replace any/all insulation detected by approved thermographer and recorded in infrared scan provided to roofing contractor. Photographic Documents required of removed wet insulation for compensation.
e. Wet Vac all existing gravel from roof system and haul off from job-site.
f. Remove existing roof flashings from curbs and parapet walls down to roof surface.
g. Remove and replace all drains, pitch pans, sealant and all other accessories adjoining roof system surface.
h. Install asphalt based roof primer over existing roof surface at approved manufacturer rates specified.
i. Install 1/2" Primed secure-rock in low rise foam adhesive. Apply Insul-Lock HR directly to the substrate, using a ribbon pattern. Space 1⁄4" to 1⁄2" (12.7mm) wide beads, 12" (300mm) o.c., to achieve proper coverage rates.
j. Install new cant strips on all vertical wall assemblies and parapet walls.
k. Install one (1) torch HPR Base Sheet with woven fiberglass scrim reinforcement with the following minimum performance requirements ASTM D 6163. Install base sheet in cold process inter-ply low voc adhesive.
l. Install one (1) StressPly UV Mineral surfaced rubber modified roofing membrane with a fiberglass and polyester composite scrim surfaced minerals. Install mineral cap sheet in cold process low voc adhesive according manufacturers installation instructions.
m. Install HPR Base Sheet and StressPly UV Modified Mineral Cap Sheet on all penetrations and units per

manufacturers specifications.

n. Install HPR Base Sheet and StressPly UV Modified Mineral Cap Sheet on all vertical wall assemblies according to manufactures specifications.
o. Seal all vertical laps of flashing membrane with a six inch strip of mineral torch.
p. Inspect all through wall flashing and replace as needed to ensure all applicable warranty requirements.
q. General Contractor responsible for contacting manufactures representative 36 hours in advance to schedule a punch list walk at the completion phase of new roof system.
r. General Contractor is responsible for completing all punch list items 72 hours from the date punch list walk with manufacturers representative.
s. Workmanship Warranty Included: 5 Years
t. Manufacturers Warranty Included

Masonry Wall Restoration: Scope of Work

i. Power wash all vertical wall masonry surfaces
ii. apply sealant over exposed penetrations, detached equipment and exposed fasteners to reduce moisture degradation.
iii. Install damp proofing materials at manufacturers' approved rates specified in installation instructions.
iv. Install sealant as needed at vertical wall expansion joints
v. Haul off all debris from job site
vi. 2 Year workmanship warranty included
vii. Manufacturers warranty included

MANUFACTURERS RESPONSIBILITY

- The Garland/DBS company will be responsible for providing prices for materials to general contractors providing bids for project specified above in this report.
- The Garland/DBS company will be responsible for providing shop drawings and details to all general contractors providing bids.
- The Garland/DBS company will schedule and conduct recorded pre-construction meeting before work commences.
- The Garland/DBS company will provide water tight details and best practices for maintaining a water tight building during removal and installation of new metal roof system.
- The Garland/DBS company will acquire three bids from three different general contractors, review bids to ensure all specifications have been included.
- The Garland/DBS company will provide weekly progress reports to facility director of City Coppell.
- The Garland/DBS company is responsible for providing all warranty paperwork to City of Coppell.