

ROOF CONDITION SURVEY

**For
Town of Sudbury**

**Fairbank Complex
40 Fairbank Road
Sudbury, Massachusetts**

February 3, 2012

RBA Project No. 201056.00

Prepared by:



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EXECUTIVE SUMMARY

Fairbank Complex Roof
40 Fairbank Road
Sudbury, Massachusetts

General Roof Description

The roof area of the entire building is approximately 42,550 square feet (SF).

- Two low-sloped roof areas contain approximately 13,350 SF of stone ballasted EPDM roofing, labeled Roof Area Nos. 1 & 2 on the roof plan. Roof Area No. 1 (10,650 SF) is over the Pool. Roof Area No. 2 (2,700 SF) is over the lobby/electric rooms. Roof Area Nos. 1 & 2 reportedly was installed as new construction in 1987.
- Three low-sloped roof areas contain approximately 20,600 SF of adhered EPDM roofing, labeled Roof Area Nos. 3, 4, & 6 on the roof plan. Roof Area Nos. 3 & 4 (18,700 SF) is over the school administration & recreation department offices. Roof Area No. 6 (1,900 SF) is over the kitchen. Roof Areas 3, 4, & 6 reportedly were installed as a “go-over” application (installed over the original roofing system) in 1990.
- One general steep-sloped roof area contains approximately 8,600 SF of shingle roofing, Roof Area No. 5 labeled as Roof Area Nos. 5A, 5B, 5C and 5D on the roof plan. This roof area is over the Senior Center and Gymnasium. Roof Area 5A (4,300 SF) contains 21 year old shingle roofing applied to a 3” thick nailable rigid board roof insulation that is mechanically attached to a steel roof deck. Roof Area 5B (1,000 SF) contains 21 year old shingle roofing applied to plywood roof decking. Roof Area 5C (1,200 SF) contains 21 year old shingle roofing applied to tongue and groove wood plank roof decking. Roof Area 5D (2,100 SF) contains 5 year old shingle roofing reportedly installed over the original bituminous built-up roof membrane that is attached to the tongue and groove wood plank roof decking.

Roof Observations/Issues

The roofing systems that exist at this location are in good to fair to poor condition. Leaks are reported to occur in various locations; water stains were observed on ceiling tiles and at exposed undersides of roof decking. Numerous previous repairs to the roofing systems were observed; some are failing. Numerous areas of ponding water on the EPDM roof surfaces were observed. Various locations of soft/spongy conditions were observed on the EPDM roof areas (when walked upon), indicating the possibility that the underlying rigid board roof insulation and associated components (fasteners & wood blocking) are wet. Deterioration of EPDM seams was observed. Flashing deterioration was observed. Low base flashing height was observed. Fragmented and cracked stone ballast was observed. Deterioration of shingles was observed along with many previous repairs implemented with roofing cement (now cracked and split open). Portions of plywood roof decking at the shingle roofing have failed and have popped-up exposing the roof deck.

The Town hopes to improve the thermal resistance of the sloped shingle roof areas. Currently, Roof Area 5A, an obvious addition to the building, includes rigid board roof insulation above the roof deck bringing the thermal resistance of that area of roof to approximately R=20. Roof Area 5B, part of the addition intended to blend Roof 5A into 5C, includes an estimated thermal resistance rating of approximately R=6. Roof Areas 5C and 5D, part of the original gymnasium building, includes an estimated thermal resistance rating of approximately R=6.

Additional Observations/Issues

Rusting was observed at the exposed sheetmetal ductwork and sheetmetal curbs of some rooftop units. Deteriorated conditions of wood elements (fascia, soffit, siding, window frames) were observed including peeling paint and rot. Cracks were observed in the masonry chimney. Deteriorated conditions of the acrylic domes of some skylights were observed. Deteriorated conditions of the insulated translucent panel skylights (at the shingle Roof Area 5A and over the main entrance) were observed. The roof hatch located on Roof No. 2 is very close to the roof edge, presenting a safety issue.

Corrective Recommendations

The following recommended work Estimated Construction Costs are broken down as follows. Reference is made to the "Recommended Roof Repair and Replacement Spreadsheet" located in the Master Executive Summary Report, for the recommended work year Estimated Construction Costs.

1. Replace the steep-sloped shingle roofing (Roof Area No. 5 - Roof Area Nos. 5A, 5B, 5C and 5D at 8,600 SF) and the low-sloped stone ballasted EPDM roofing (Roof Area No. 2 at 2,700 SF) in **year 2010**.

The low-sloped roof recommendation (Roof Area No. 2) is complete removal ("tear-off" application) and replacement with an adhered 60-mil reinforced PVC roof membrane system to include new rigid board roof insulation (tapered as necessary so as to achieve positive drainage; R-value to meet stretch energy code), flashings, edge metal, roof drainage system, snow guards, repairs to deteriorated roof decking, and a roofing manufacturer's 20-year full system labor and material warranty.

The steep-sloped recommendation (Roof Area No. 5) is to remove all shingle roofing, including the more recently installed roofing over Roof Area 5D, down to the roof deck (in the case of Roof Area 5A, down to the existing rigid board roof insulation). Roof Area 5D does not require renovation at this time but in order to improve thermal performance and avoid irregular appearance and detailing and to maintain watertightness, replacement is recommended. Roof Area 5A should receive new plywood sheathing (over the existing rigid board roof insulation) and shingle roofing. Roof Area 5B should receive new plywood sheathing and shingle roofing and should have new thermal insulation installed in the confined space below the roof deck. Roof Areas 5C and 5D should receive new nailable rigid board roof insulation and shingle roofing.

The recommended work is broken down as follows.

- Replace 8,600 SF of roof area (Roof No. 5) broken down as follows:

5A: Replace shingles, add sheathing: 4,300 SF.

5B: Replace shingles, add sheathing: 1,000 SF.

Insulate space below 5B roof decking: 1,300 SF.

5C: Replace shingles, add nailable insulation: 1,200 SF.

5D: Replace shingles, add nailable insulation: 2,100 SF.

- Replace 2,700 SF of roof area (Roof No. 2).
- Repair 2,500 SF of roof decking.
- Fascia and soffit repairs.
- Replace gutters & downspouts.
- Replace insulated translucent panel skylights (2 total).
- Install safety railing around roof hatch at Roof No. 2.

2. Replace the adhered EPDM roofs (Roof Area Nos. 3, 4 & 6 at 20,600 SF) in **year 2012**. The recommendation is complete removal ("tear-off" application) and replacement with an adhered 60-mil reinforced PVC roof membrane system to include new rigid board roof insulation (tapered as necessary so as to achieve positive drainage; R-value to meet stretch energy code), flashings, edge metal, roof drainage system, skylights, repairs to deteriorated roof decking, waterproofing of sheetmetal ductwork & rusted sheetmetal at rooftop units, repairs to deteriorated wood elements and a roofing manufacturer's 20-year full system labor and material warranty.

The recommended work is broken down as follows.

- Replace 20,600 SF of roof area.
- Repair 4,000 SF of roof decking.
- Fascia, soffit & window frame repairs.
- Replace scuppers & downspouts.
- Replace acrylic dome skylight assemblies (7 total).
- Repair masonry chimney.

- Waterproof sheetmetal ductwork & rusted sheetmetal at rooftop units.
3. Replace the stone ballast EPDM roof (Roof Area No. 1 at 10,650 SF) in **year 2013**. The recommendation is a “go-over” application replacement with an adhered 60-mil reinforced PVC roof membrane system to include new overlay rigid board roof insulation (R-value to meet stretch energy code), flashings, edge metal, roof drainage system, repairs to deteriorated roof decking, and a roofing manufacturer’s 20-year full system labor and material warranty.

Note: This roof area is a steeper low-sloped roof area (approximately 3:12 pitch) and the recommendation of a new adhered 60-mil reinforced PVC roof membrane system includes simulated standing seams (PVC material that provides a standing seam profile which mimics the look of a metal roofing system). The PVC membrane comes in many different colors. This option provides a long-term watertight roof system, has the aesthetic look of an attractive standing seam metal roof, has low maintenance requirements, and includes a manufacturer’s 20-year full system labor and material warranty. Measures to deal with snow slides include snow guards over existing entrances and walkways.

The recommended work is broken down as follows.

- Replace 10,650 SF of roof area (Roof No. 1).
- Replace gutters & downspouts.
- Install snow guard assemblies.

I. IDENTIFICATION

Subject: Fairbank Complex Roof

Location: 40 Fairbank Road
Sudbury, Massachusetts

Observation Date: Inspected during the month of July 2010 & September 2010

Site Contact: James F. Kelly, Building Inspector
978-443-2209 ext 1361

Client: Town of Sudbury, Massachusetts

Reliance: This report is for exclusive use and may be relied upon by the Town of Sudbury, MA. No parties or persons other than those identified as authorized users may use or rely on the information or opinions in this report without the express written consent of Russo Barr Associates, Inc.

II. OBJECTIVE

Objective

This report has been prepared according to the accepted proposal between the Town of Sudbury, MA (Client) and Russo Barr Associates, Inc. (RBA).

The purpose of this report is to provide a description of roof conditions, consisting of the roof surfacing with associated flashing and roof drainage systems, and an evaluation of their general physical condition for the Town of Sudbury, MA. This report includes a schematic roof plan and photo documentation of existing conditions and observed deficiencies.

This report is based on observations made during a walk-through visual survey of the roof areas and accessible interior areas, readily available documents pertaining to roof conditions, information provided by interested parties, and interviews. Roof test cuts and an infrared moisture survey were not performed.

The report identifies physical deficiencies and for each, provides a corrective recommendation action and a corresponding estimate of probable construction cost. Any estimates of construction cost prepared by RBA are intended as an aid in budgeting. They are not quotations, or proposals to do the work for that price, and their accuracy is not guaranteed.

Interviews

James F. Kelley, Building Inspector
Gifford Perry, Sudbury PBC

Readily Available Documents

Roof plans were available for review.

III. DESCRIPTION

The subject of this report is the roof condition the Fairbank Complex located in Sudbury, Massachusetts. The Fairbank Complex contains EPDM roofing and shingle roofing systems with cementitious wood fiber, steel and wood roof decking. The roof area of the entire building is approximately 42,550 square feet (SF). There exist various typical penetrations throughout the roof area such as vent pipes, exhaust fans, chimney, HVAC units with associated ductwork, and skylights.

Roofing System Details

| Identification | Area (SF) | Roofing System Type | Est. Age | Condition |
|---|-----------|---|----------|-----------|
| Roof Area No. 1 (Elev. 23' ±) <i>Pool</i> | 10,650 | Ballasted EPDM (new construction in 1987) with tongue and groove wood roof decking. Roof is sloped (approx. 3:12 pitch). Roof drains via gutters and downspouts. | 23 Years | Good |
| Roof Area No. 2 (Elev. 14' ±) <i>Lobby/Electric Rooms</i> | 2,700 | Ballasted EPDM (new construction in 1987) with steel roof decking. Roof is low-sloped (flat with little or no slope). Roof drains via gutters and downspouts. | 23 Years | Poor |
| Roof Area No. 3 (Elev. 11' ±) <i>School Administration & Recreation Dept. offices</i> | 18,350 | Adhered EPDM (reportedly installed over original built-up roofing system) with cementitious wood fiber roof decking. Roof is low-sloped (flat with little or no slope). Roof drains via scuppers (spill out type and downspout type). | 20 Years | Fair |
| Roof Area No. 4 (Elev. 13' ±) <i>Same as No. 3</i> | 350 | Adhered EPDM (reportedly installed over original built-up roofing system) with cementitious wood fiber roof decking. Roof is low-sloped (flat with little or no slope). Roof drains directly onto Roof Area No. 3. | 20 Years | Fair |
| Roof Area No. 5 (Elev. 25' ±) <i>Senior Center & Gymnasium</i> | 8,600 | Shingles with steel, plywood and T&G wood roof decking. Roof is sloped (approx. 5:12 pitch). Roof primarily drains direct to ground and also flows onto Roof Area No. 3. | | |
| 5A | 4,300 | Shingles on insulation and steel roof deck. | 21 yrs | poor |
| 5B | 1,000 | Shingles on plywood roof deck – no insulation | 21 yrs | poor |
| 5C | 1,200 | Shingles on wood plank roof deck – no insulation | 21 yrs | poor |
| 5D | 2,100 | Shingles on wood plank roof deck – no insulation | 5 yrs | good |
| Roof Area No. 6 (Elev. 12' ±) <i>Kitchen</i> | 1,900 | Adhered EPDM (reportedly installed over original built-up roofing system) with steel roof decking. Roof is low-sloped (flat with little or no slope). Roof drains via scuppers (downspout type). | 20 Years | Fair |

IV. MAINTENANCE & WARRANTY INFORMATION

Roof Warranty:

No warranties are currently in place for the various roof areas.

History of Repairs:

Not Known. There have been many repair attempts throughout all roof areas. Roof Area 5D shingles were replaced 5 years ago.

History of Roof Studies/Inspections:

There have been no previous roof studies performed.



Photo No. 01

Location: Fairbank Complex

Description: Aerial View of Roof. Roof Area No. 1 is at the top of the picture.



Photo No. 02

Location: Fairbank Complex

Description: Overview of Roof Area No. 1. Note that stone ballast has migrated away from the roof ridge.



Photo No. 03

Location: Fairbank Complex

Description:
Overview of Roof Area No. 2



Photo No. 04

Location: Fairbank Complex

Description:
Partial overview of Roof Area No. 3



Photo No. 05

Location: Fairbank Complex

Description:
Partial overview of
Roof Area No. 4



Photo No. 06

Location: Fairbank Complex

Description:
Overview of Roof
Area Nos. 5A, 5B
and 5C.



Photo No. 07

Location: Fairbank Complex

Description:
Overview of Roof Area No. 6.



Photo No. 08

Location: Fairbank Complex

Description:
Ballast retention bar of Roof Area No. 1 is loose.



Photo No. 09

Location: Fairbank Complex

Description: Roof hatch on Roof Area No. 2 opens towards the roof edge creating a safety concern.



Photo No. 10

Location: Fairbank Complex

Description: EPDM base flashings of Roof Area No. 2 are pulling away from the parapet due to membrane shrinkage.



Photo No. 11

Location: Fairbank Complex

Description: Roof Area No. 3: Enclosed skylight curb has had numerous EPDM repairs.

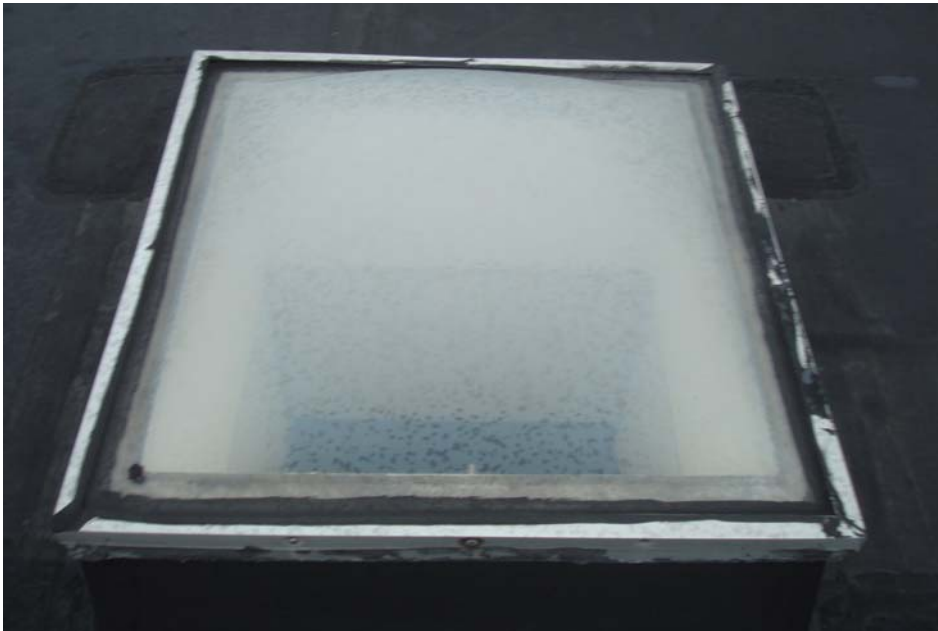


Photo No. 12

Location: Fairbank Complex

Description: Roof Area No. 3: Skylight domes are weathered and brittle.



Photo No. 13

Location: Fairbank Complex


Description: Roof Area No. 3 drains poorly. Mechanical equipment is rusting.

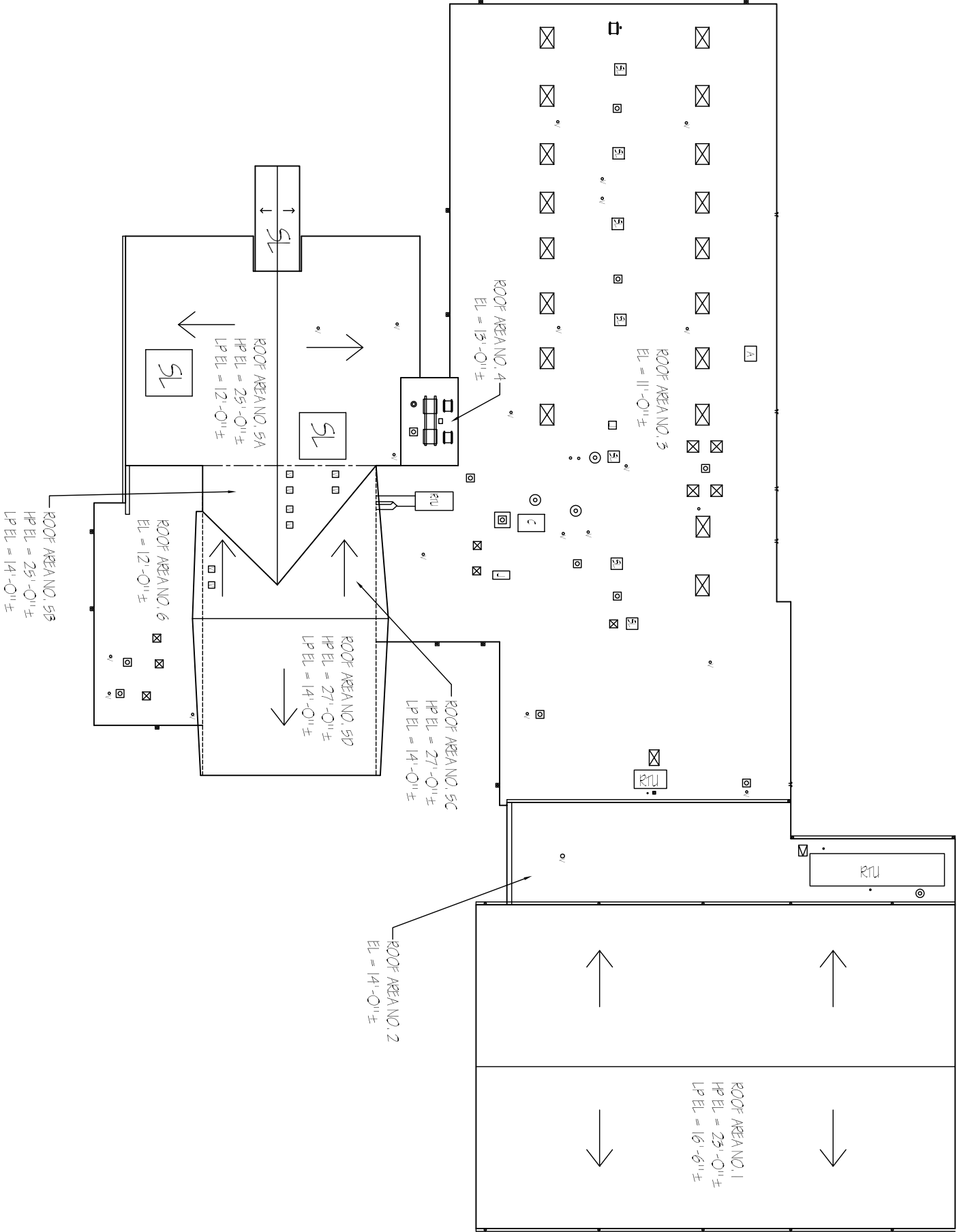
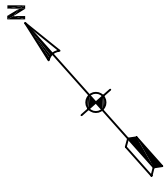


Photo No. 14

Location: Fairbank Complex

Description: Plywood roof decking on Roof Area No. 5B has popped up.

| | |
|--|---|
|  | <p>Photo No. 15</p> <p>Location: Fairbank Complex</p> <p>Description: Shingle valley between Roof Areas 5B and 5C is irregular due to loose or poorly applied plywood roof decking.</p> |
|  | <p>Photo No. 16</p> <p>Location: Fairbank Complex</p> <p>Description: Ridge between Roof Area Nos. 5C and 5D (5D has the newer/darker shingle roof covering). The older shingles are cracked throughout. The newer shingles are in good condition.</p> |



| LEGEND | |
|--------|-----------------------|
| | VENT PIPE |
| | ROOF DRAIN |
| | PIPE PENETRATION |
| | HOT PIPE |
| | PITCH POCKET |
| | EXHAUST FAN |
| | ROOF HATCH |
| | UNIT SLEEPER SUPPORTS |
| | ABANDONED PENETRATION |
| | SKYLIGHT |
| | GRAVITY VENT |
| | ANTENNA |
| | J VENT |
| | CHIMNEY |
| | ROOF TOP UNIT |
| | OVERFLOW SCUPPER |
| | SCUPPER BOX |
| | GUTTER & DOWNSPOUT |
| | EXPANSION JOINT |
| | ROOF OVERHANG |
| | SLOPE DIRECTION: DOWN |

| DESCRIPTION | BY | DATE | NO |
|-------------|----|------|----|
| | | | |
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| | | | |
| | | | |

RUSSO·BARR

ASSOCIATES

33 Center Street, 2nd Floor, Burlington, MA 01803

TOWN OF SUDBURY

FAIRBANK COMPLEX
40 FAIRBANK ROAD
ROOF CONDITION SURVEY
ROOF AREA PLAN

| | |
|-----------------------|-----------|
| DATE | 02.03.12 |
| SCALE | AS NOTED |
| DRAWN BY / CHECKED BY | JFW/RJG |
| PROJECT NO | 201056.00 |
| DRAWING NO | |

FAIRBANK COMPLEX - ROOF AREA PLAN

SCALE: NOT TO SCALE