ROOF CONDITION SURVEY

for

Town of Sudbury

Peter Noyes Elementary School
280 Old Sudbury Road
Sudbury, Massachusetts

August 24, 2010

RBA Project No. 201056.00

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EXECUTIVE SUMMARY

Peter Noyes Elementary School
280 Old Sudbury Road
Sudbury, Massachusetts

General Roof Description

The roof area of the entire building is approximately 53,505 square feet (SF).

- Eighteen (18) low-sloped roof areas contain approximately 53,505 SF of adhered EPDM roofing, labeled Roof Area Nos. 1-18 on the roof plan. All 18 roof areas reportedly were installed as a "tear-off" applications (the original roofing system was removed and replaced) in either 1982 or 1985. Roof Area Nos. 1-7, 12, & 18 were reportedly installed in 1982 (currently 28 years old). Roof Area Nos. 8-11, & 13-17 reportedly were installed in 1985 (currently 25 years old).

- The existing roof assembly construction reportedly consists of an adhered EPDM membrane installed over 1/2"± of rigid board (fiberboard) insulation which in turn was installed over rigid foam insulation. Fiberboard installed in the 1982 roof areas is reportedly adhered with hot asphalt. Fiberboard insulation installed in the 1985 roof areas is reportedly attached with mechanical roofing fasteners and distribution plates.
- Roof Area Nos. 1, 13, 15, 16, 17, & 18 (35,780 SF) are over classrooms. Roof Area Nos. 2, 3, 4, 5, 7, 8, 9, 11, 12, & 14 (8,115 SF) are over entry doors, lobbies, corridors, and offices. Roof Area No. 6 (7,310 SF) is over the gymnasium. Roof Area No. 10 (2,300 SF) is over the boiler room/maintenance room.

Roof Observations/Issues

The roofing systems that exist at this location are in poor condition. Leaks are reported to occur in various locations; water stains were observed on ceiling tiles, interior walls, 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. Splits and punctures were observed at several locations.

Additional Observations/Issues

Deteriorated mortar joints were observed in the above roofline wall of the Gym (Roof Area No. 6). Certain roof areas (**8 total**) contain low base wall flashing height conditions, and caulked weep holes at the above roofline masonry walls were observed. The caulked weep hole situation leads us to believe that defective through-wall flashing conditions exist. A number of roofs have no access. The sloped glazing system adjacent to upper and lower roof areas 9 & 12 and 15 & 16 is deteriorated. The windows above Roof Area No. 18 are low to the existing roof and are not weather tight (deteriorated caulking, glazing and wood components).

Corrective Recommendations

1. Replace the low-sloped adhered EPDM roofs (Roof Area Nos. 1-18 at 53,505 SF) in **year 2011**. 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, snow guards, repairs to deteriorated roof decking, repairs to suspected defective above roofline masonry wall thru-wall flashings, and a roofing manufacturer's 20-year full system labor and material warranty. Replacement of the referenced deteriorated above roofline window system and sloped glazing systems are recommended to be included in the scope of this project.

   Note: At the steeper low-sloped Roof Area No. 1 (approximate pitch is 2:12), measures to deal with snow slides include snow guards over existing entrances and walkways.

   Estimated Construction Cost

   The recommended work estimated construction cost is broken down as follows. It should be noted that these values are figured utilizing 2010 dollars. Reference is made to the "Recommended Roof Repair and Replacement Spreadsheet" located in the in the Master Executive Summary Report, for the recommended work year estimated construction estimate

   - Replace 53,505 SF of roof area x $16.50/SF = $ 882,832
   - Repair 3,000 SF of steel roof decking x $ 6.00/SF = $ 18,000
   - Repair 2,000 SF of gypsum plank roof decking x $ 11.00/SF = $ 22,000
   - Replace 21 cast iron roof drains x $750/each = $15,750
   - Remove and replace windows above Roof Area No. 18 = $15,000
   - Remove and replace above roofline sloped glazing systems = $18,000
   - Remove and replace 350 LF of defective above roofline masonry wall thru-wall flashing x $150/LF = $52,500
   - Contingency Costs: $30,000
   - *Estimated Construction Cost (2010 cost)*: **$1,054,082**
   - *Estimated Construction Cost (2011 cost)*: **$1,096,245**

I. IDENTIFICATION

Subject:	Peter Noyes Elementary School Roof
Location:	280 Old Sudbury Road Sudbury, Massachusetts
Observation Date:	Inspected during the month of August 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
Joseph Kupczewski, Sudbury Public Schools

Readily Available Documents

Roof plans were available for review.

III. DESCRIPTION

The subject of this report is the roof condition at the Peter Noyes Elementary School located in Sudbury, Massachusetts. The Peter Noyes Elementary School contains EPDM roofing with tongue and groove gypsum plank, and steel roof decking. The roof area of the entire building is approximately 53,505 square feet (SF). There exist various typical penetrations throughout the roof area such as vent pipes, exhaust fans, chimney, with associated sloped glazing system.

Roofing System Details

Identification	Area (SF)	Roofing System Type	Estimated Age	Condition
Roof Area No. 1 (Elev. 15' ±) *Classroom*	13,775	Adhered EPDM with tongue and groove gypsum plank roof decking. Roof is low-sloped (slope: 2"±:12"). Roof drains over perimeter edge.	28 Years	Poor
Roof Area No. 2 (Elev. 14' ±) *Offices*	1,550	Adhered EPDM with tongue and groove gypsum plank roof decking. Roof is low-sloped (slope: ¼"±:12"). Roof drains via roof drains.	28 Years	Poor
Roof Area No. 3 (Elev. 14' ±) *Offices*	375	Adhered EPDM with tongue and groove gypsum plank roof decking. Roof is low-sloped (slope: ¼"±:12"). Roof drains via roof drains.	28 Years	Poor
Roof Area No. 4 (Elev. 19' ±) *Lobby*	415	Adhered EPDM with tongue and groove gypsum plank roof decking. Roof is low-sloped (slope: ¼"±:12"). Roof drains via roof drains.	28 Years	Poor
Roof Area No. 5 (Elev. 14' ±) *Offices*	340	Adhered EPDM with tongue and groove gypsum plank roof decking. Roof is low-sloped (slope: ¼"±:12"). Roof drains via roof drains.	28 Years	Poor
Roof Area No. 6 (Elev. 37' ±) *Gymnasium*	7,310	Adhered EPDM with tongue and groove gypsum plank roof decking. Roof is low-sloped (slope: ¼"±:12"). Roof drains via roof drains.	28 Years	Poor
Roof Area No. 7 (Elev. 15' ±) *Offices & Classrooms*	3,515	Adhered EPDM with tongue and groove gypsum plank roof decking. Roof is low-sloped (slope: ¼"±:12"). Roof drains via roof drains.	28 Years	Poor

Identification	Area (SF)	Roofing System Type	Estimated Age	Condition
Roof Area No. 8 (Elev. 10' ±) *Entry Door*	60	Adhered EPDM with tongue and groove gypsum plank roof decking. Roof is low-sloped (slope: ¼"±:12"). Roof drains via roof drains.	28 Years	Poor
Roof Area No. 9 (Elev. 23' ±) *Entry Door, & Corridor*	1,100	Adhered EPDM with tongue and groove gypsum plank roof decking. Roof is low-sloped (slope: ¼"±:12"). Roof drains via roof drains.	25 Years	Poor
Roof Area No. 10 (Elev. 23' ±) *Boiler Room*	2,300	Adhered EPDM with tongue and groove gypsum plank roof decking. Roof is low-sloped (slope: ¼"±:12"). Roof drains via roof drains.	25 Years	Poor
Roof Area No. 11 (Elev. 10' ±) *Entry Door*	60	Adhered EPDM with tongue and groove gypsum plank roof decking. Roof is low-sloped (slope: ¼"±:12"). Roof drains via roof drains.	25 Years	Poor
Roof Area No. 12 (Elev. 25' ±) *Boiler Room*	640	Adhered EPDM with tongue and groove gypsum plank roof decking. Roof is low-sloped (slope: ¼"±:12"). Roof drains via roof drains.	28 Years	Poor
Roof Area No. 13 (Elev. 25' ±) *Classrooms*	12,850	Adhered EPDM with steel roof decking. Roof is low-sloped (slope: ¼"±:12"). Roof drains via roof drains.	25 Years	Poor
Roof Area No. 14 (Elev. 10' ±) *Entry Door*	60	Adhered EPDM with tongue and groove gypsum plank roof decking. Roof is low-sloped (slope: ¼"±:12"). Roof drains via roof drains.	25 Years	Poor
Roof Area No. 15 (Elev. 25' ±) *Classrooms*	1,420	Adhered EPDM with steel roof decking. Roof is low-sloped (slope: ¼"±:12"). Roof drains via roof drains.	25 Years	Poor
Roof Area No. 16 (Elev. 13' ±) *Classrooms*	420	Adhered EPDM with steel roof decking. Roof is low-sloped (slope: ¼"±:12"). Roof drains via roof drains.	25 Years	Poor

Identification	Area (SF)	Roofing System Type	Estimated Age	Condition
Roof Area No. 17 (Elev. 13' ±) *Classrooms*	6000	Adhered EPDM with steel roof decking. Roof is low-sloped (slope: ¼"±:12"). Roof drains via roof drains.	25 Years	Poor
Roof Area No. 18 (Elev. 37' ±) *Classrooms*	1,315	Adhered EPDM with steel roof decking. Roof is low-sloped (slope: ¼"±:12"). Roof drains via roof drains.	28 Years	Poor

IV. MAINTENANCE & WARRANTY INFORMATION

Roof Warranty:

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

History of Repairs:

Gale Associates 1997 Roof Repair Specification Documents. There have been many repair attempts throughout all roof areas.

History of Roof Studies/Inspections:

Gale Associates Roof Condition Report, Dated June 5, 1997
Gale Associates 5-Year Maintenance Program, Dated June 30, 1992