FORENSIC INSPECTION OF THE EPDM ROOF SYSTEM:

Bar Harbor Town Hall

93 Cottage St.
Bar Harbor, Maine

Inspection and Report by Robert Fulmer, Principal
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Inspection Date:
October 25th, 2011

BUILDING ENVELOPE CONSULTANTS

Table of Contents

Part 1: General Summary and Inspection details…… 2

Part 2: Roof System Observations…….. 3

Part 3: Conclusions and Remediation Options and Costs…… 3

Photo Section 5

PART 1: GENERAL SUMMARY: ECS (Existing Condition Survey) FORMAT AND DETAILS.

1.0.1. INTENT AND PURPOSE OF THIS SCOPE OF WORK:

A. Building Envelope Consultants Inc. (herein referred to as BEC) has been requested to perform a comprehensive forensic ECS (Existing Condition Survey) Inspection on the EPDM roof system of the Bar Harbor Town Hall, on behalf of the Town of Bar Harbor (herein referred to as the Client). The initial BOD (Basis of Design) visual (non-forensic) inspection and report was conducted in January 2011. In order to confirm as-built and existing conditions as a preliminary requirement for roof design documents, a forensic inspection was necessary. The forensic inspection was performed on October 25th, 2011. Prior to the inspection, there were no reports of water infiltration within the building.
The inspector on behalf of BEC was Robert Fulmer, Principal.

1.0.2. ECS INSPECTION DETAILS:

INSPECTION DATE AND TIME: Tuesday, October 25th, 2011. Beginning at 9:00 AM and concluding at 11:45 AM.

INSPECTION CONDUCTED BY: Robert L. Fulmer, Principal Building Envelope Consultants Inc

WEATHER: Sunny, 53 degrees (F).

OTHERS PRESENT ON SITE: Roofing personnel from Roof Systems of Maine, Bangor Maine, to perform the roof test cuts and subsequent repairs.

DOCUMENTS AND INFORMATION SUPPORT: BEC was informed of the roof condition during a previous roof inspection.

ROOF ACCESS: Access to the roof for inspection, observation and testing was gained via interior building access the rooftop.

INSPECTION METHODS: The inspection was conducted utilizing both “non-destructive” and “intrusive” test methods. For the intrusive aspect of the inspection process, test areas were selected based on their location to provide random samples of multiple roof system components on the building within areas of potential water infiltration.
The non-destructive testing was conducted by visual inspection documented with digital photographs of the test area and all associated roof elevations.
Roofing material samples were not removed from the site.

PART 2: ROOF SYSTEM OBSERVATIONS:

2.0.1. SUBJECT PROPERTY OVERVIEW:

The subject property is the Bar Harbor Town Hall, 93 Cottage St., Bar Harbor Maine.
The primary focus of this inspection was to confirm as –built conditions and structural details as a preliminary step in the roof design process. Prior to this inspection there were no reports of water infiltration within the building. Test cuts during this inspection revealed an additional BUR roof system beneath the existing EPDM system. Excessive volumes of water infiltration were observed between the roof layers throughout the entire system. The ISO (polyisocyanarate) insulation layer is saturated and indications of long-term leakage were observed. The data acquired and observations made during the forensic inspection, indicate the existing EPDM roof system has failed and has no remaining service life. The entire roof system should be replaced as soon as possible.

2.0.3. EXISTING ROOF SYSTEM CONDITIONS: TEST AREAS AND OBSERVATIONS:

A. Test Area #1: West Elevation, Upper Ballasted EPDM Roof.

Location: Near a roof drain in a location along the West elevation parapet. This test location was chosen because it is located in an area that can provide roof structure and roof drainage information.

1. Observations from Test Area #1:

Roof System Assembly: A fully ballasted EPDM and insulation system installed over a previous BUR (Built Up Roof) system with pea gravel aggregate. An extensive amount of water was observed between the two roof systems, with the layer of “ISO” insulation completely saturated. The complete as-built assemblies were observed as follows:

- An exterior top layer of #4 washed gravel stone ballast, over;
- A layer of mechanically fastened EPDM (Ethelyene Diene Propolyene Monomer) single-ply roofing, over;
- A single layer of 1 1/2” ISO (Polyisocyanurate) insulation, over;
- A layer of slag aggregate, over;
- A previous four ply, hot asphalt BUR system, over;
- A 1” softwood, “tongue and groove” roof sheathing deck.

B. Test Area #2: North Elevation, Upper Roof.

Location: Along the approximate center of the North elevation parapet. This test location was chosen because it is located in an area that can provide roof structure and roof drainage information.

1. Observations from Test Area #2:

Roof System Assembly: A fully ballasted EPDM and insulation system installed over a previous BUR (Built Up Roof) system with pea gravel aggregate. An extensive amount of water was observed between the two roof systems, with the layer of “ISO” insulation completely saturated. The complete as-built assemblies were observed as follows:

- An exterior top layer of #4 washed gravel stone ballast, over;

- A layer of mechanically fastened EPDM (Ethelyene Diene Propolyene Monomer) single- ply roofing, over;
- A single layer of 1 1/2" ISO (Polyisocyanurate) insulation, over;
- A layer of slag aggregate, over;
- A four ply, hot asphalt BUR system, over;
- A 1" softwood, "tongue and groove" roof sheathing deck.

C. Test Area #3: East Elevation, Upper Ballasted EPDM Roof.

Location: Located along the East elevation parapet. This test location was chosen because it is located in an area that can provide roof structure and roof drainage information.

1. Observations from Test Area #3:

Roof System Assembly: A fully ballasted EPDM and insulation system installed over a previous BUR (Built Up Roof) system with pea gravel aggregate. An extensive amount of water was observed between the two roof systems, with the layer of "ISO" insulation completely saturated. The complete as-built assemblies were observed as follows:

- An exterior top layer of #4 washed gravel stone ballast, over;
- A layer of mechanically fastened EPDM (Ethelyene Diene Propolyene Monomer) single- ply roofing, over;
- A single layer of 1 1/2" ISO (Polyisocyanurate) insulation, over;
- A layer of slag aggregate, over;
- A four ply, hot asphalt BUR system, over;
- A 1" softwood, "tongue and groove" roof sheathing deck.

PART 3: CONCLUSIONS AND REMEDIATION RECOMENDATIONS:

3.0.1. INVESTIGATION SUMMARY OF FINDINGS:

Based on data collected and the observations made during the ECS, EPDM roof system inspection of the Bar Harbor Town Hall on October 25th, 2011, the following conclusions have been formulated:

A. The data acquired and observations made during the forensic inspection, indicate the existing EPDM roof system has completely failed and has no remaining service life. The entire roof system should be replaced as soon as possible.

3.0.2. REMEDIATION OPTIONS:

As a result of the large volume of water observed within the roof system layers during the inspection, the entire existing roof system should be removed to the sheathing surface and replaced with a new fully adhered .090 EPDM roof system, designed to current code and energy standards.

The existing roof system should be replaced as soon as possible to avoid the possibility of significant quantities of water infiltration into the building and/or mold growth within the roof system assembly.

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Photo 1; The existing ballasted EPDM roof system, looking toward the West elevation and the site of Test Area #1.

Photo 2; Preparing Test Area #1.

Photo 3; Test Area #1. Note the BUR roof beneath the EPDM roof. The ISO insulation was saturated with significant water trapped between the two systems. These same conditions were encountered in all Test Areas.

Photo 4; Showing the level of saturation within the ISO when compressed. These conditions were encountered in all Test Areas.

Photo 5; Showing the existing roof assembly (EPDM over BUR) down to the sheathing surface.

Photo 6; The number (four) and size (1 1/2”) of the existing roof drains, is insufficient to drain a roof system of this size. A current and compliant drainage design is required for the new roof system.