



July 27, 2017

Portland Public Library  
5 Monument Square  
Portland, Maine 04101  
Attn: George Cooper, Director of Finance

Structural Roof Evaluation for Solar Array  
Portland Public Library  
Portland, Maine

Dear George:

In accordance with our agreement, we reviewed structural capacity of the roof in the vicinity of the proposed solar array to be installed at the Portland Public Library. The new array is to be located on the roof near the existing skylight, and directly adjacent to Elm Street. The array is to be attached to a ballasted rack which in turn will bear on the existing roof membrane. Based on information provided by the rack supplier, the array and ballasted rack will add approximately 7 pounds per square foot (psf) to the existing roof in the area specified in the documentation provided to us.

For our review, we referenced a prior report prepared by Becker Structural Engineers, Inc. in 2006, and performed a structural gravity analysis of the framing directly below the proposed array location. Note that based on the prior documentation, it is believed that the roofs of the building were designed for future vertical expansion. Based on the drawings, the existing roof is framed with steel wide flanged sections and a composite slab-on-metal deck in the same manner as the elevated floor construction for the building.

Based on our analysis, the roof in the area where the array is to be located has a live load capacity of 150 psf. Based on the American Society of Civil Engineers Standard 7-2005, "Minimum Design Loads for Buildings and other Structures" as referenced in the 2009 Edition of the International Building Code (IBC), the calculated flat roof snow load in this area would be 46 pounds per square foot. Adding the new solar array, the total transient load on the roof would be increased to 53 pounds per square foot. Since the total transient load is less than the roof live load capacity, we take no exception to the solar array being placed on the roof in the proposed location.

Please feel free to contact me if any question or concerns.

Sincerely,  
**BECKER STRUCTURAL ENGINEERS, Inc.**

A handwritten signature in black ink, appearing to read "Ethan A. Rhile", written over a light blue horizontal line.

Ethan A. Rhile, P. E.  
Associate

