



RELIABLE ANALYSIS INC.

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REPORT FOR

True Harbor
2145 Cole Street
Birmingham, MI 48009

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Work Requested

Perform a Light Availability Test on one (1) sample submitted in accordance with laboratory procedures described in the Cambridge Material Testing Technical report, as provided by the customer.

Sample Description

One (1) sample was received for testing in good condition on August 25, 2008, and was identified as:

1. RA#1

Terms

Surface Light: Light which passes through the slots of the dock surface.

Partially Illuminated Area (PIA): The area under the dock that is illuminated by the light passing through the slots in the surface of the dock. It is calculated as the total dock area minus the Edge Light Area.

Frame Shadow Area (FSA): The shadow area under the dock that is created by the frame, which supports the dock panel.

Corrected PIA: The FSA is subtracted from PIA which determines the Corrected PIA.

Edge Light: Light which illuminated the floor beneath the dock panel, but did not pass through the panel. The light intensity in the edge light was the same with or without the panel in place and was assigned as 100%

Light Availability Due to Surface Light was calculated as the Corrected PIA multiplied by the Light Intensity Ratio.

Total Light Available was calculated by adding the Light Available due to Surface Light and the Edge Illumination %.



Work Performed

Testing was conducted at two (2) ground-to-surface heights: 18 inches and 60 inches. A 150-watt light source was positioned above the geometric center of the panel. Three light readings were taken from the top of the panel at its center and at both sides. The light was then moved up to cover the panel with equal amounts of light intensity. Readings of 228 lux on the left side, 236 lux center and 229 lux at right were recorded. The light source fixture was pivoted to the following angles: 90°, 75°, 60°, 45°, 30°, 20°, 10°, and 0°. The light source at 90° simulated the sunlight at noon and the light source at 0° simulated sunrise, and/or sunset. The distance between the light and the center of the dock remained constant throughout all angles. A light meter was used at each angle to measure the light intensity with and without the dock in place. The reading with the dock in place was divided by the reading without the dock to calculate the Light Intensity Ratio. The LIR was then multiplied by the Corrected Partially Illuminated Area giving us the Light Availability due to Surface Light %. This was added to Edge Illumination % to give us the total light available at all angles. The total light available % was averaged to get the Total Average Light Availability %. See figure 1 (pg 6) for schematic of test procedure.

Test Results

Light Availability – True Harbor Panel
18 – Inch dock height

Incident Light Angle **0° 10° 20° 30° 45° 60° 75° 90°**

Surface Light

Partially Illuminated Area %	0	0	0	66.6	83	100	100	100
Frame Shadow Area %	0	0	0	8	4	0	0	0
Corrected Partially Illuminated Area	0.0	0.0	0.0	58.6	79.0	100.0	100.0	100.0

Light Intensity

Light Intensity (Lx) - without dock	0	0	0	105	111	124	138	133
Light Intensity (Lx) - with dock	0	0	0	35	39	62	69	82
Light Intensity Ratio	0.00	0.00	0.00	0.33	0.35	0.50	0.50	0.62

Light Availability due to Surface Light % **0.0 0.0 0.0 19.3 27.8 50.0 50.0 62.0**

Edge Light

Edge Illumination (inches)	48	48	48	16	8.16	0	0	0
Edge Illumination %	100	100	100	33.3	17	0	0	0

Total Light Available % **100.0 100.0 100.0 52.8 44.8 50.0 50.0 32.5**

Total Average Light Availability % 0 - 90° 69.9



Test Results (continued)

Light Availability – True Harbor Panel
60 – Inch dock height

Incident Light Angle **0° 10° 20° 30° 45° 60° 75° 90°**

Surface Light

Partially Illuminated Area %	0	0	0	0	0	97	100	100
Frame Shadow Area %	0	0	0	0	0	4	0	0
Corrected Partially Illuminated Area	0.0	0.0	0.0	0.0	0.0	93.0	100.0	100.0

Light Intensity

Light Intensity (Lx) - without dock	0	0	0	0	0	56	55	62
Light Intensity (Lx) - with dock	0	0	0	0	0	35	37	38
Light Intensity Ratio	0.00	0.00	0.00	0.00	0.00	0.63	0.67	0.61

Light Availability due to Surface Light % **0.0 0.0 0.0 0.0 0.0 58.1 67.3 61.3**

Edge Light

Edge Illumination (inches)	48	48	48	48	48	1.5	0	0
Edge Illumination %	100	100	100	100	100	3	0	0

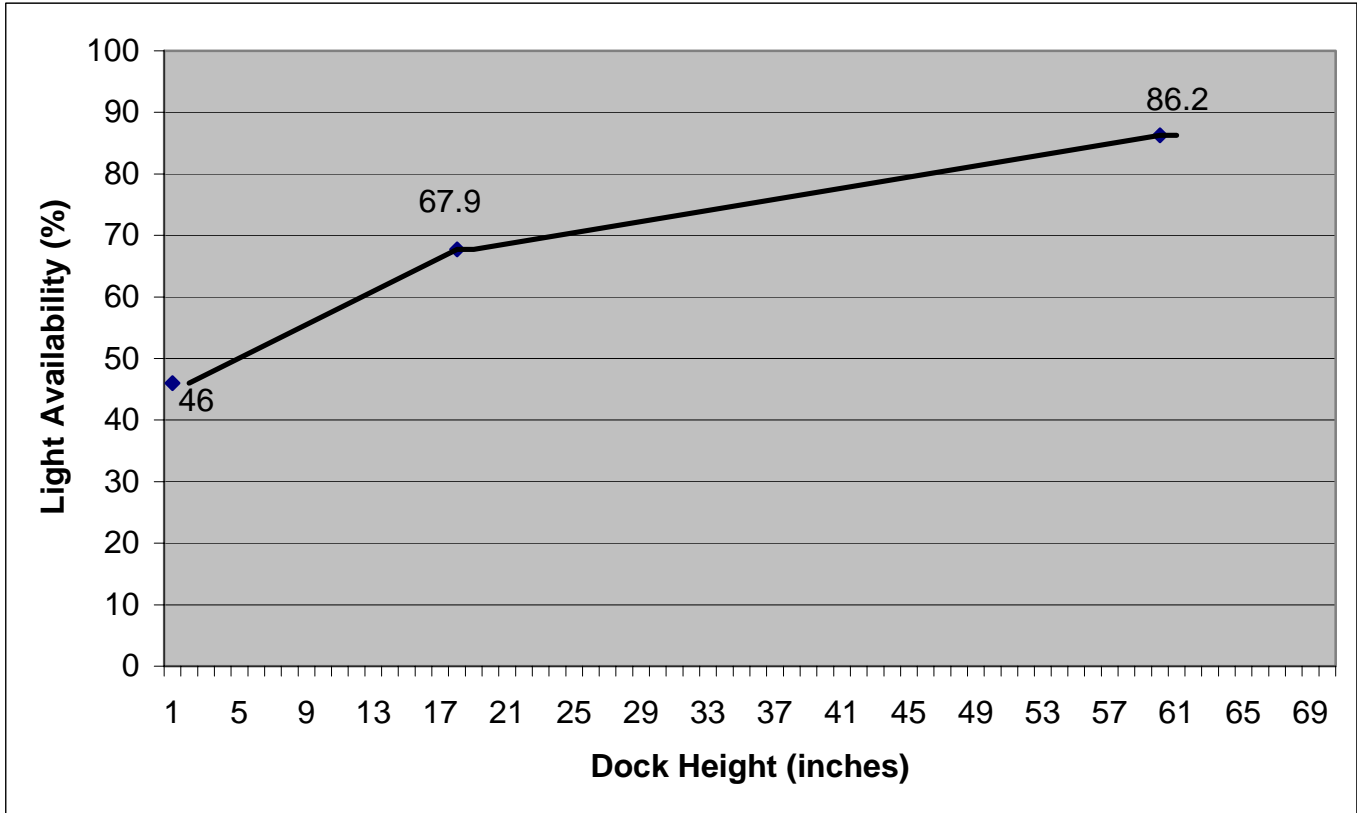
Total Light Available **100.0 100.0 100.0 100.0 100.0 61.1 67.3 61.3**

Total Average Light Availability % 0 - 90° 86.2



Test Results (continued)

The tables on pages 2 and 3 show the results of the measurements and calculations for the light availability under the True Harbor Dock Panel. The Total Average Light Available at 18 inches was 67.9% and at 60 inches the Total Average Light Available was 86.2%. Below is a graph extrapolating the expected light availability over the height range of 0 to 60 inches.



* The slots in the part accounted for an estimated 46% on the dock surface, allowing for a start point in the test.

Test Equipment

Description	Manufacturer	Model Number	Serial Number	Cal. Due
Light Meter	Extech	401025	Q389952	08/27/09
Digital Protractor	Pro 360	360		09/07/08



Sample Disposition

The samples are being held for customer pickup or disposal.

Reliable Analysis, Inc.

A handwritten signature in cursive script that reads "Winston Seto".

Winston Seto
Lab Manager

Tested By: Aaron Yarbrough
Written By: Aaron Yarbrough

Drawing of Test Set up and Procedure for Light Availability

