

March 25, 2010

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**ASTM C 1549 Solar Reflectance of Three Samples  
CTLGroup Project No. 315069**

Dear Steve:

As authorized by you, CTLGroup measured the solar reflectance of three samples, submitted by you, in general accordance with ASTM C 1549 – 04, *Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer*.

The samples, shown in Figure 1, were received at CTLGroup on March 17, 2010. The samples were labeled by you as “IV201001,” “WB201002,” and “BL201003.” The samples were stored at room temperature until they were tested. Sample “IV201001” is 17 $\frac{5}{8}$  in. long by 11 $\frac{5}{8}$  in. wide by 1 $\frac{1}{2}$  in. thick. The top surface is flat and mostly smooth but pitted over the entire surface. Samples “WB201002” and “BL201003” are 11 $\frac{1}{2}$  in. long by 11 $\frac{1}{2}$  in. wide by 1 in. thick. The top surface of sample “WB201002” is somewhat rough and very bumpy with brownish discoloring over the bottom portion of the top surface. The top surface of sample “BL201003” is rough and mostly flat with light gray discoloring over the left and upper portions of the top surface.

On March 24, 2010, each of the 3 samples was divided into three equal strips (5 $\frac{7}{8}$  in. wide by 11 $\frac{5}{8}$  in. long for sample “IV201001” and approximately 3 $\frac{3}{4}$  in. wide by 11 $\frac{1}{2}$  in. long for samples “WB201002” and “BL201003”) by drawing lines with a pencil. The solar reflectance of the top surface of each of the samples’ three strips was measured in three locations. The air mass on the solar spectrum reflectometer was set at 1.5, which approximates the length a beam of sunlight travels through the atmosphere over the conterminous United States. The measured solar reflectance, average, and standard deviation are reported in the attached data sheets in Appendix A. The measurements are summarized in Table 1.

**Table 1. Average Solar Reflectance, Standard Deviation and Solar Reflectance Index (Rounded)**

Sample Labels	Solar Reflectance	Standard Deviation	Solar Reflectance Index (SRI)*
IV201001	0.60	0.01	72
WB201002	0.33	0.01	36
BL201003	0.19	0.01	18

\*Assuming an emittance of 0.9, which is appropriate for non-metallic opaque building materials.

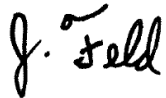
The solar reflectance *index* (SRI) was also calculated according to ASTM E 1980 – 01, *Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped*

*Opaque Surfaces*, assuming an emittance of 0.9, which is appropriate for non-metallic opaque building materials<sup>1</sup>. The SRI is also shown in Table 1.

If you have any questions, please do not hesitate to call.

Sincerely,

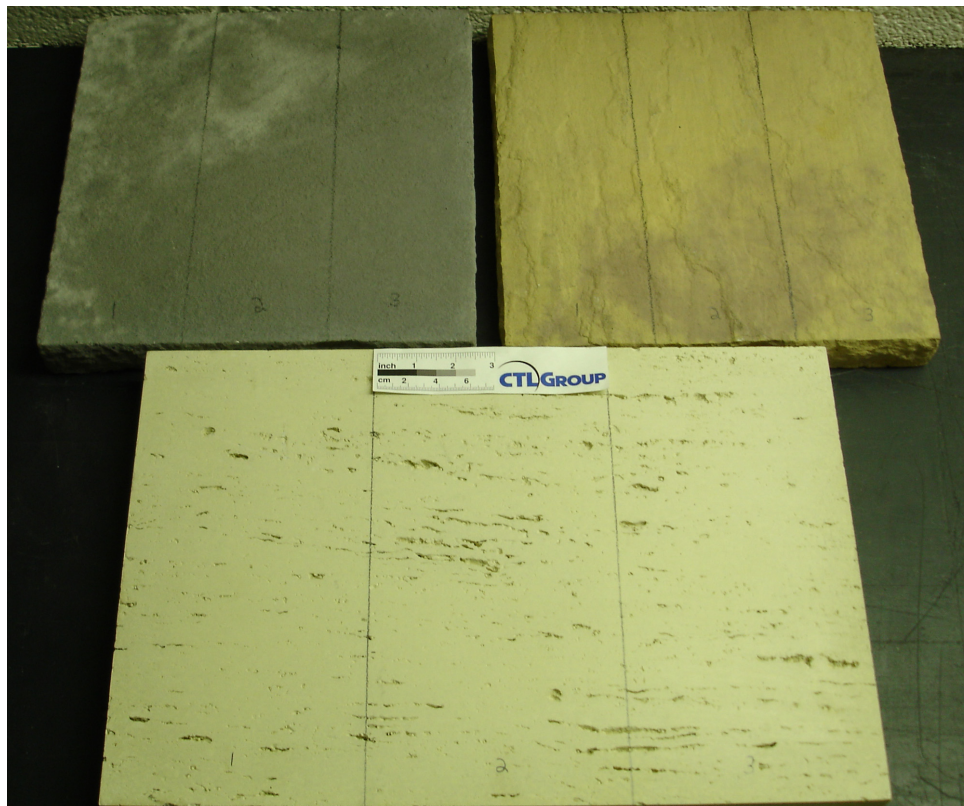
**CONSTRUCTION TECHNOLOGY LABORATORIES, INC.**  
*An AASHTO Accredited Laboratory – Aggregates, Cement & Concrete*



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**Figure 1 – Samples (left to right, top to bottom): “BL201003,” “WB201002,” and “IV201001”**

<sup>1</sup> *LEED Reference Guide for Green Building Design and Construction. For the Design, Construction and Major Renovations of the Commercial and Institutional Buildings Including Core & Shell and K-12 School Projects*, 2009 edition, page 112.

## **APPENDIX A**

ASTM C 1549, SOLAR REFLECTANCE NEAR AMBIENT TEMPERATURE USING A  
PORTABLE SOLAR REFLECTOMETER, DATA SHEETS

Client:	Silver Creek Stoneworks	CTLGroup project no.:	315069
Project:	C1549 - Silver Creek - Bennett	CTLGroup project mgr.:	M. VanGeem
		Analyst:	J. Feld
Contact:	Steve Bennett	Approved:	M. VanGeem
	507-424-4690	Date tested:	Mar 24, 2010

**ASTM C 1549, Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer<sup>1, 2</sup>**  
**Specimen Set - IV201001**

Specimen	Location	Location reflectance	Specimen reflectance
IV201001 - 1	1	0.62	0.61
	2	0.61	
	3	0.60	
IV201001 - 2	1	0.60	0.60
	2	0.60	
	3	0.59	
IV201001 - 3	1	0.62	0.60
	2	0.61	
	3	0.58	
<b>Standard deviation</b>			0.01
<b>Overall average</b>			0.60
<b>Solar reflectance index (SRI)<sup>3</sup></b>		<b>Low wind</b>	70
<b>corresponding to convective</b>		<b>Medium wind</b>	72
<b>coefficients of three wind conditions</b>		<b>High wind</b>	73

1. Tested in accordance with ASTM C 1549 - 04, *Standard Test Method for Determining Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer*.

2. Air mass index is 1.5.

3. Solar reflectance index calculated according to ASTM E 1980 - 01, *Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces* with an emittance for non-metallic opaque building materials of 0.9.

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Client: Silver Creek Stoneworks  
Project: C1549 - Silver Creek - Bennett  
Contact: Steve Bennett  
507-424-4690

CTLGroup project no.: 315069  
CTLGroup project mgr.: M. VanGeem  
Analyst: J. Feld  
Approved: M. VanGeem  
Date tested: Mar 24, 2010

**ASTM C 1549, Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer<sup>1, 2</sup>**  
**Specimen Set - WB201002**

Specimen	Location	Location reflectance	Specimen reflectance
WB201002 - 1	1	0.36	0.33
	2	0.36	
	3	0.27	
WB201002 - 2	1	0.36	0.34
	2	0.38	
	3	0.28	
WB201002 - 3	1	0.34	0.32
	2	0.29	
	3	0.34	
<b>Standard deviation</b>			0.01
<b>Overall average</b>			0.33
<b>Solar reflectance index (SRI)<sup>3</sup></b>		<b>Low wind</b>	34
<b>corresponding to convective</b>		<b>Medium wind</b>	36
<b>coefficients of three wind conditions</b>		<b>High wind</b>	37

1. Tested in accordance with ASTM C 1549 - 04, *Standard Test Method for Determining Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer*.

2. Air mass index is 1.5.

3. Solar reflectance index calculated according to ASTM E 1980 - 01, *Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces* with an emittance for non-metallic opaque building materials of 0.9.

Client: Silver Creek Stoneworks  
Project: C1549 - Silver Creek - Bennett  
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CTLGroup project no.: 315069  
CTLGroup project mgr.: M. VanGeem  
Analyst: J. Feld  
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Date tested: Mar 24, 2010

**ASTM C 1549, Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer <sup>1, 2</sup>**  
**Specimen Set - BL201003**

Specimen	Location	Location reflectance	Specimen reflectance
BL201003 - 1	1	0.21	0.19
	2	0.19	
	3	0.17	
BL201003 - 2	1	0.24	0.20
	2	0.18	
	3	0.17	
BL201003 - 3	1	0.17	0.17
	2	0.18	
	3	0.17	
<b>Standard deviation</b>			0.01
<b>Overall average</b>			0.19
<b>Solar reflectance index (SRI)<sup>3</sup></b>		<b>Low wind</b>	17
<b>corresponding to convective</b>		<b>Medium wind</b>	18
<b>coefficients of three wind conditions</b>		<b>High wind</b>	18

1. Tested in accordance with ASTM C 1549 - 04, *Standard Test Method for Determining Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer*.

2. Air mass index is 1.5.

3. Solar reflectance index calculated according to ASTM E 1980 - 01, *Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces* with an emittance for non-metallic opaque building materials of 0.9.

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