

### PROSOCO, Inc.

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Technical Services TECH Note RILEM Test Method No. II.4

Product Data literature for all products evaluated





- FOR:Bernie Salvatorecc:Doug BarronPerry SurberStephen DeanJohn Bourne
- SUBJECT: The Concrete Service, Inc. Traverse City, MI

**DATE:** April 25, 2002

**PROJECT:** 0203-05 PTP

**SAMPLES SUBMITTED:** Eight different CMU faces of three colors and three types.

<u>Sample</u>	<u>Color</u>	<u>Size</u>
"CS-02" Split-face CMU face with Dry Block	"Gray"	8" x 16" x 1.5"
"CS-02" Smooth face CMU face with Dry Block	"Gray"	8" x 16" x 1.5"
"CS-04" Split-face CMU face with Dry Block	"Buff"	8" x 16" x 1.5"
"CS-04" Smooth face CMU face with Dry Block	"Buff"	8" x 16" x 1.5"
"CS-04" Burnished CMU face with Dry Block	"Buff"	8" x 16" x 1.5"
"CS-08" Split-face CMU face with Dry Block	"Brown"	8" x 16" x 1.5"
"CS-08" Smooth face CMU face with Dry Block	"Brown"	8" x 16" x 1.5"
"CS-08" Burnished CMU face with Dry Block	"Brown"	8" x 16" x 1.5"

Submitted by : Perry Surber





#### PURPOSE OF TESTING:

Three different integrally colored split and smooth-face and two burnished CMU faces with large, small and fine aggregate were submitted for testing using PROSOCO, Inc.'s new construction cleaning and water repellent products.

**A. Cleaning Concrete Masonry Units -** Sure Klean<sup>®</sup> Custom Masonry Cleaner and Sure Klean<sup>®</sup> Burnished Custom Masonry Cleaner were tested at various dilutions for removal of laboratory applied mortar from the CMUs.

To simulate new construction soiling, all CMUs are placed on a bench with finished surface facing upward. Hollow cylinders measuring 50 mm in diameter and 75 mm tall are positioned on top of each CMU and filled with a wet mixture of Ash Grove<sup>®</sup> Type S cementitious mortar. The wet, mortar-filled cylinder is allowed to remain in contact with the CMU for 10 minutes before removal.

Soiled CMUs are allowed to dry before test cleaning.

Heavy deposits of mortar are removed with dry scraping after 24 hours. Prepared cleaning solutions are then evaluated for their effectiveness in removing residual Ash Grove<sup>®</sup> Type S mortar staining after 14 days of curing.

Refer to "\*Note: When cleaning integrally colored CMU" in the following section, "Surface Alteration Testing."

**B.** Surface Alterations Testing - Sure Klean<sup>®</sup> Custom Masonry Cleaner and Sure Klean<sup>®</sup> Burnished Custom Masonry Cleaner were tested at various dilutions to determine if a cleaning program implemented to remove excess mortar and related new construction soiling would otherwise alter the appearance of cleaned surfaces. Surface alterations were evaluated visually based upon perceived discoloration or erosion/etching of the masonry unit.

<u>Aggregate Exposure</u> is the visual examination of the CMU comparing aggregate exposure of the untreated control surface to surfaces cleaned with selected product(s) at given dilutions.

<u>Surface Pigment Alteration/Removal\*</u> is the visual examination of the CMU comparing the surface pigmentation of the untreated control to surfaces cleaned with selected product(s) at given dilutions.

<u>Matrix Erosion</u> is the visual examination comparing the untreated control surface to surfaces cleaned with selected products at given dilutions looking for any potential erosion/digestion of the cementitious matrix of the CMU.

<u>Staining</u> is the visual examination for changes that are the result of a chemical reaction that leaves a staining precipitate.

The following is the scale used for reporting results of all categories:

- 0 no change 3 heavy
- 1 slight 4 excessive
- 2 moderate

#### \* NOTE: When cleaning integrally colored CMU.

Integrally colored concrete masonry units (CMUs) frequently have high amounts of pigments concentrated on the surface of the cured concrete unit. Variation of surface pigment concentrations from one CMU to the next creates a blotchy appearance in the completed wall. Allowed to remain on the surface of the CMU, the weakly bound pigment will weather and streak, further detracting from the appearance of the completed CMU wall.

In addition to removing excess mortar and construction related soiling, the goal of any cleaning operation undertaken on integrally colored CMU should include removal of unnaturally high concentrations of surface pigment. By revealing the natural through-body color on the integrally colored unit, the overall color uniformity and weathering resistance of the completed CMU wall is improved.





**C. Protective Water Repellents -** Sure Klean<sup>®</sup> Custom Masonry Sealer and Sure Klean<sup>®</sup> Weather Seal Siloxane WB Concentrate were evaluated for their ability to provide water repellency to the submitted samples.





### CLEANING AND SURFACE ALTERATIONS PRODUCTS EVALUATED

Block Type	Product	Dilution
All submitted CMUs	Sure Klean <sup>®</sup> Custom Masonry Cleaner	1:2, 1:4, 1:6
	Sure Klean <sup>®</sup> Burnished Custom Masonry Cleaner	1:2, 1:3

### WATER REPELLENT PRODUCTS EVALUATED

Block Type	Product	Dilution
All submitted CMUs	Sure Klean <sup>®</sup> Custom Masonry Sealer	Concentrate
	Sure Klean <sup>®</sup> Weather Seal Siloxane WB Concentrate	1:9, 1:14





## SECTION A – CLEANING INTEGRALLY COLORED CMUs

#### **DESCRIPTION OF PRODUCTS EVALUATED**

These cleaning trials were conducted to determine the optimal cleaning/cure time combination.

**Sure Klean<sup>®</sup> Custom Masonry Cleaner** – A general purpose, concentrated acidic cleaner for most custom masonry and colored concrete. Removes concrete splashes, excess mortar, mud, heavy efflorescence and surface soiling, leaving the masonry clean and uniform with no acid burning or streaking. Liquid concentrate for dilution with 2-6 parts water. Apply by brush or low-pressure spray.

**Sure Klean<sup>®</sup> Burnished Custom Masonry Cleaner** – A general purpose, non-etching acidic cleaner removes rust, mud, oil, atmospheric dirt, mortar smears and other stains without altering the surface texture. Liquid concentrate for dilution with 2-3 parts water. Apply by brush or low-pressure spray.

### **TEST METHOD – Cleaning**

Dilution ratios refer to mixtures of parts concentrated cleaner : parts fresh water. Chemical cleaners were evaluated using the following procedure:

- 1. Prewet the surface with water.
- 2. Apply the cleaner.
- 4. Pressure rinse thoroughly.\*

\* Pressure rinsing was conducted at approximately 1300 psi with a warm water flow rate of 1.9 gallons per minute.





### **TEST RESULTS - Cleaning**

Block Type	Cleaner	Dilution	Cure	% Effectiveness
	Sure Klean <sup>®</sup>	1:2		100%
"Gray" Split-face CMU	Custom Masonry	1:4	14 day	100%
	Cleaner	1:6		100%
Block Type	Cleaner	Dilution	Cure	% Effectiveness
	Sure Klean <sup>®</sup>	1:2		100%
"Buff" Split-face CMU	Custom Masonry	1:4	14 day	100%
	Cleaner	1:6		100%
Block Type	Cleaner Dilution		Cure	% Effectiveness
	Sure Klean <sup>®</sup>	1:2		98%
"Brown" Split-face CMU	Custom Masonry	1:4	14 day	95%
	Cleaner	1:6		99%
Block Type	Cleaner	Dilution	Cure	% Effectiveness
"Gray" Smooth CMU	Sure Klean <sup>®</sup> Burnished		14 day	100%
Gray Shiouti CMU	Custom Masonry Cleaner	1:3	14 day	100%

Note: Due to limited samples available for testing, 3 day and 7 day mortar removal was not performed.





### **TEST RESULTS – Cleaning Continued**

Block Type	Cleaner	Dilution	Cure	% Effectiveness
"Buff" Smooth CMU	Sure Klean <sup>®</sup> 1:2 Burnished J Custom		14 day	100%
	Masonry Cleaner	1:3	ady	100%
Block Type	Cleaner	Dilution	Cure	% Effectiveness
"Brown" Smooth CMU	Sure Klean <sup>®</sup> Burnished Custom	1:2	14 day	98%
	Masonry Cleaner	1:3		95%
Block Type	Cleaner Dilution		Cure	% Effectiveness
"Buff" Burnished CMU	Sure Klean <sup>®</sup> Burnished Custom	1:2	14 day	100%
	Masonry Cleaner	1:3		99%
Block Type	Cleaner Dilution		Cure	% Effectiveness
"Brown" Burnished CMU	Sure Klean <sup>®</sup> Burnished "Brown" Burnished CMU Custom		14 day	100%
	Masonry Cleaner	1:3	in duy	100%

Note: Due to limited samples available for testing, 3 day and 7 day mortar removal was not performed.





#### **CONCLUSIONS - Cleaning**

Based on the test data, all of the submitted block samples were efficiently cleaned with each dilution of Sure Klean<sup>®</sup> Custom Masonry Cleaner or Sure Klean<sup>®</sup> Burnished Custom Masonry Cleaner. Use higher concentrations and surface agitation to maximize aggregate exposure. Use low concentration and surface agitation to minimize aggregate exposure.

All dilutions of Sure Klean® Custom Masonry Cleaner tested affected the substrate in a similar manner, removing slight concentrations of pigmented matrix from the split-face CMU faces, exposing small and large aggregate, and enhancing the natural appearance of the integrally colored concrete masonry unit.

All dilutions of Sure Klean<sup>®</sup> Burnished Custom Masonry Cleaner tested affected the substrate in a similar manner, removing slight concentrations of pigmented matrix from the smooth and burnished CMU faces, exposing small and large aggregate, and enhancing the natural appearance of the integrally colored concrete masonry unit.

### **RECOMMENDED PRODUCTS AND DILUTIONS – CLEANING**

Recommendations for cleaning for each type CMU submitted by The Concrete Service, Inc., Traverse City, MI, are provided in the chart below. Recommendations are based on the optimum dilution for complete removal of mortar while limiting surface alterations.

Block Type	New Construction Cleaning (Type S, 14 day cleaning)	
"Gray" Split-face CMU	Sure Klean <sup>®</sup> Custom Masonry Cleaner (1:6)	
"Buff" Split-face CMU	Sure Klean <sup>®</sup> Custom Masonry Cleaner (1:6)	
"Brown" Split-face CMU	Sure Klean <sup>®</sup> Custom Masonry Cleaner (1:6)	
"Gray" Smooth CMU	Sure Klean <sup>®</sup> Burnished Custom Masonry Cleaner (1:3)	
"Buff" Smooth CMU	Sure Klean <sup>®</sup> Burnished Custom Masonry Cleaner (1:3)	
"Brown" Smooth CMU	Sure Klean <sup>®</sup> Burnished Custom Masonry Cleaner (1:2)	
"Buff" Burnished CMU	Sure Klean <sup>®</sup> Burnished Custom Masonry Cleaner (1:2)	
"Brown" Burnished CMU	Sure Klean <sup>®</sup> Burnished Custom Masonry Cleaner (1:3)	

Apply all products in accordance with the manufacturer's recommendation provided on container labels and product data sheets. On-site testing should be conducted to determine the most appropriate cleaning product and procedures for a particular project. See product literature for additional application and product information.





#### **SECTION B – Surface Alterations**

#### **DESCRIPTION OF PRODUCTS EVALUATED – Surface Alterations**

**Sure Klean<sup>®</sup> Custom Masonry Cleaner** – A general purpose, concentrated acidic cleaner for most custom masonry and colored concrete. Removes concrete splashes, excess mortar, mud, heavy efflorescence and surface soiling, leaving the masonry clean and uniform with no acid burning or streaking. Liquid concentrate for dilution with 2-6 parts water. Apply by brush or low-pressure spray.

**Sure Klean<sup>®</sup> Burnished Custom Masonry Cleaner** – A general purpose, non-etching acidic cleaner removes rust, mud, oil, atmospheric dirt, mortar smears and other stains without altering the surface texture. Liquid concentrate for dilution with 2-3 parts water. Apply by brush or low-pressure spray.

#### **TEST METHOD – Surface Alterations Testing:**

Dilution ratios refer to mixtures of parts concentrated cleaner : parts fresh water. Chemical cleaners were evaluated using the following procedure:

- 1. Prewet the surface with water.
- 2. Apply the cleaner.
- 4. Pressure rinse thoroughly.\*

\* Pressure rinsing was conducted at approximately 1300 psi with a warm wat er flow rate of 1.9 gallons per minute.





### **TEST RESULTS – Surface Alterations**

Substrate: Split-face CMU	Pigment	Color: "Gray	,"		
Product	Dilution	Aggregate Exposure	Surface Pigment Alteration/Removal	Matrix Erosion	Staining
Custom Masonry Cleaner	1:2	1	1	1	0
Custom Masonry Cleaner	1:4	1	1	1	0
Custom Masonry Cleaner	1:6	1	1	1	0
Substrate: Split-face CMU	Pigment	Color: "Buff"	3		
Product	Dilution	Aggregate Exposure	Surface Pigment Alteration/Removal	Matrix Erosion	Staining
Custom Masonry Cleaner	1:2	1	1	1	0
Custom Masonry Cleaner	1:4	1	1	1	0
Custom Masonry Cleaner	1:6	1	1	1	0
Substrate: Split-face CMU	Pigment	Pigment Color: "Brown"			
Product	Dilution	Aggregate Exposure	Surface Pigment Alteration/Removal	Matrix Erosion	Staining
Custom Masonry Cleaner	1:2	1	1	1	0
Custom Masonry Cleaner	1:4	1	1	1	0
Custom Masonry Cleaner	1:6	1	1	1	0
Substrate: Smooth CMU	Pigment Color: "Gray"				
Product	Dilution	Aggregate Exposure	Surface Pigment Alteration/Removal	Matrix Erosion	Staining
Burnished Custom Masonry Cleaner	1:2	0	1	0	0
Burnished Custom Masonry Cleaner	1:3	0	1	0	0

Scale used for reporting results of all categories

0 – no change

3 – heavy 4 – excessive

1 – slight

2 – moderate

+ - excessive





### **TEST RESULTS – Surface Alterations Continued**

Substrate: Smooth CMU	Pigment Color: "Buff"				
Product	Dilution	Aggregate Exposure	Surface Pigment Alteration/Removal	Matrix Erosion	Staining
Burnished Custom Masonry Cleaner	1:2	1	1	1	0
Burnished Custom Masonry Cleaner	1:3	1	1	1	0
Substrate: Smooth CMU	Pigment C	olor: "Brown'	9		
Product	Dilution	Aggregate Exposure	Surface Pigment Alteration/Removal	Matrix Erosion	Staining
Burnished Custom Masonry Cleaner	1:2	1	1	1	0
Burnished Custom Masonry Cleaner	1:3	1	1	1	0
Substrate: Burnished CMU	Pigment Color: "Buff"				
Product	Dilution	n Aggregate Surface Pigment Matrix Exposure Alteration/Removal Erosion			Staining
Burnished Custom Masonry Cleaner	1:2	1	1	1	0
Burnished Custom Masonry Cleaner	1:4	1	1	1	0
Substrate: Burnished CMU	Pigment Color: "Brown"				
Product	Dilution	Aggregate Exposure	Surface Pigment Alteration/Removal	Matrix Erosion	Staining
Burnished Custom Masonry Cleaner	1:2	1	1	1	0
Burnished Custom Masonry Cleaner	1:3	1	1	1	0

Scale used for reporting results of all categories

- 0 no change
- 1 slight
- 2 moderate

- 3 heavy
- 4 excessive



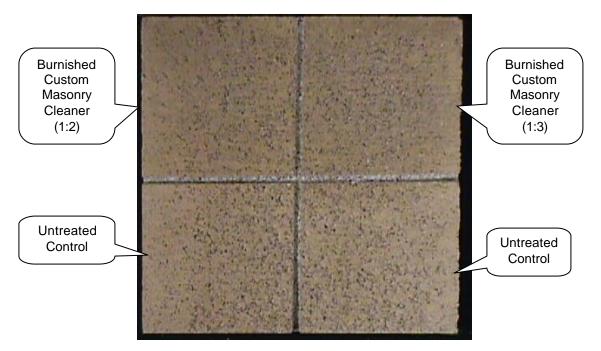


### PHOTOGRAP HS – Surface Alterations

"Buff" Split-face CMU after 14 day cleaning



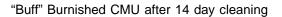
"Buff" Smooth CMU after 14 day cleaning

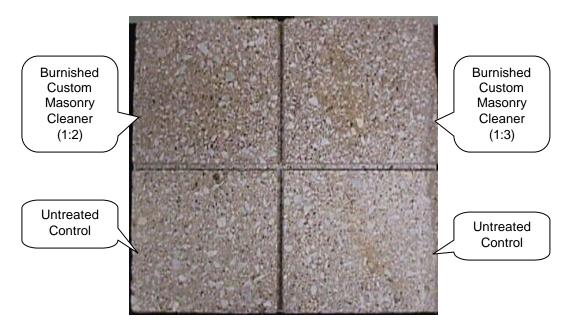






### **PHOTOGRAPHS – Surface Alterations Continued**









#### **CONCLUSIONS – Surface Alterations**

All dilutions of Sure Klean<sup>®</sup> Custom Masonry Cleaner tested affected the substrate in a similar manner, removing slight concentrations of pigmented matrix from the smooth and burnished CMU faces, exposing small and large aggregate, and enhancing the natural appearance of the integrally colored concrete masonry unit.

All dilutions of Sure Klean<sup>®</sup> Burnished Custom Masonry Cleaner tested affected the substrate in a similar manner, removing slight concentrations of pigmented matrix from the smooth and burnished CMU faces, exposing small and large aggregate, and enhancing the natural appearance of the integrally colored concrete masonry unit.

### **RECOMMENDATIONS – SURFACE ALTERATIONS**

Recommendations for cleaning for each type CMU submitted by The Concrete Service, Inc., Traverse City, MI, are provided in the chart below. Recommendations are based on the optimum dilution for complete removal of mortar while limiting surface alterations.

Block Type	Surface Alterations	
"Gray" Split-face CMU	Sure Klean <sup>®</sup> Custom Masonry Cleaner (1:6)	
"Buff" Split-face CMU	Sure Klean <sup>®</sup> Custom Masonry Cleaner (1:6)	
"Brown" Split-face CMU	Sure Klean <sup>®</sup> Custom Masonry Cleaner (1:6)	
"Gray" Smooth CMU	Sure Klean <sup>®</sup> Burnished Custom Masonry Cleaner (1:3)	
"Buff" Smooth CMU	Sure Klean <sup>®</sup> Burnished Custom Masonry Cleaner (1:3)	
"Brown" Smooth CMU	Sure Klean <sup>®</sup> Burnished Custom Masonry Cleaner (1:2)	
"Buff" Burnished CMU	Sure Klean <sup>®</sup> Burnished Custom Masonry Cleaner (1:2)	
"Brown" Burnished CMU	Sure Klean <sup>®</sup> Burnished Custom Masonry Cleaner (1:3)	

Apply all products in accordance with the manufacturer's recommendation provided on container labels and product data sheets. On-site testing should be conducted to determine the most appropriate cleaning product and procedures for a particular project. See product literature for additional application and product information.





### PROSOCO, Inc.

#### **SECTION C - PROTECTIVE WATER REPELLENTS:**

The testing described below evaluates the suitability of water repellent treatments.

The surface treatments evaluated were selected for their suitability for application based on the following selection criteria:

- 1. Weatherproofing properties
- 2. Color change
- 3. Ease of application

#### **DESCRIPTIONS OF PRODUCTS EVALUATED - Protective Water Repellents:**

**Sure Klean<sup>®</sup> Custom Masonry Sealer -** A clear, solvent-based silicone elastomer formulated to weatherproof custom masonry units, cast stone, and concrete block without altering the natural appearance. Custom Masonry Sealer penetrates and fills pores to prevent water penetration through exterior walls exposed to normal weathering as well as long-lasting protection against many types of graffiti.

**Sure Klean<sup>®</sup> Weather Seal Siloxane WB Concentrate** – A self-emulsifying water repellent concentrate designed for dilution with fresh water at the jobsite. This solvent-free blend of silanes and oligomeric alkoxysiloxanes mixes easily with water to produce a penetrating water repellent ideal for application to dense or porous masonry surfaces.

#### SAMPLEPREPARATION - Protective Water Repellents:

The submitted blocks were scored, allowed to dry, and to reabsorb atmospheric humidity for 24 hours prior to treatment. The treatment method consisted of a wet-on-wet brush application. All treatments were allowed to cure at least three days prior to testing.

#### **TEST METHODS - Protective Water Repellents:**

#### Water Absorption Tube Test: RILEM II.4, 60 mph, 20 Minutes

The water absorption tube test simulating wind driven rain conditions was performed. This test simulates 60 mile per hour wind driven rain conditions for a period of 20 minutes.





#### **TEST RESULTS - Protective Water Repellents:**

#### Water Absorption Tube Test: RILEM II.4, 60 mph, 20 Minutes

	RESULTS
"Gray" Split-face CMU	
Untreated Control	48 mph
Custom Masonry Sealer	59 mph
Siloxane WB Concentrate (1:9)	55 mph
Siloxane WB Concentrate (1:14)	58 mph
"Buff" Split-face CMU	
Untreated Control	55 mph
Custom Masonry Sealer	56 mph
Siloxane WB Concentrate (1:9)	57 mph
Siloxane WB Concentrate (1:14)	56 mph
"Brown" Split-face CMU	
Untreated Control	< 40 mph
Custom Masonry Sealer	59 mph
Siloxane WB Concentrate (1:9)	58 mph
Siloxane WB Concentrate (1:14)	56 mph
"Gray" Smooth CMU	
Untreated Control	59 mph
Siloxane WB Concentrate (1:9)	58 mph
Siloxane WB Concentrate (1:14)	59 mph



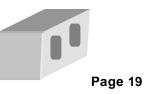


### **TEST RESULTS - Protective Water Repellents Continued**

### Water Absorption Tube Test: RILEM II.4, 60 mph, 20 Minutes

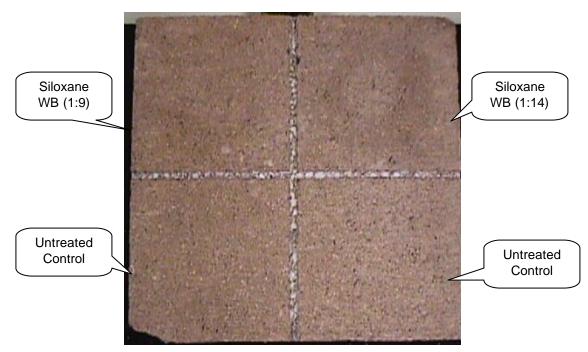
	RESULTS
"Buff" Smooth CMU	
Untreated Control	56 mph
Siloxane WB Concentrate (1:9)	59 mph
Siloxane WB Concentrate (1:14)	57 mph
"Brown" Smooth CMU	
Untreated Control	46 mph
Siloxane WB Concentrate (1:9)	59 mph
Siloxane WB Concentrate (1:14)	59 mph
"Buff" Burnished CMU	
Untreated Control	54 mph
Siloxane WB Concentrate (1:9)	59 mph
Siloxane WB Concentrate (1:14)	60 mph
"Brown" Burnished CMU	
Untreated Control	49 mph
Siloxane WB Concentrate (1:9)	58 mph
Siloxane WB Concentrate (1:14)	59 mph





### **PHOTOGRAPHS – Protective Water Repellents**

"Brown" Smooth CMU after water repellency treatment



### "Brown" Burnished CMU after water repellency treatment

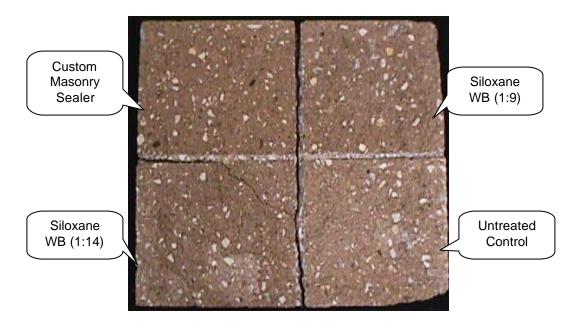






### **PHOTOGRAPHS – Water Repellency Continued**

"Brown" Split-face CMU after water repellency treatment



### **CONCLUSIONS – Protective Water Repellents**

Based upon laboratory evaluations, Sure Klean<sup>®</sup> Custom Masonry Sealer and Sure Klean<sup>®</sup> Weather Seal Siloxane WB Concentrate in both dilutions provided above average water repellency to all submitted split, smooth and burnished CMUs. Sure Klean<sup>®</sup> Custom Masonry Sealer moderately enhanced the natural color of the split-face CMUs and Sure Klean<sup>®</sup> Weather Seal Siloxane WB Concentrate slightly enhanced the natural color of most of the split, smooth and burnished CMUs. The CMU type smooth "gray" did not show evidence of color enhancement.





#### **RECOMMENDATIONS - Protective Water Repellents:**

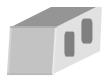
Recommendations for water repellency treatment for each type of CMU submitted by The Concrete Service, Inc., Traverse City, MI, are provided in the chart below. Recommendations are based on the treatment that proved most effective and can provide water repellency on all types submitted if possible.

Block Type	Water Repellents
"Gray" split-face CMUs	Sure Klean <sup>®</sup> Weather Seal Siloxane WB Concentrate (1:9), (1:14)
	Sure Klean <sup>®</sup> Custom Masonry Sealer
"Buff" split-face CMUs	Sure Klean <sup>®</sup> Weather Seal Siloxane WB Concentrate (1:9), (1:14)
	Sure Klean <sup>®</sup> Custom Masonry Sealer
"Brown" split-face CMUs	Sure Klean <sup>®</sup> Weather Seal Siloxane WB Concentrate (1:9), (1:14)
	Sure Klean <sup>®</sup> Custom Masonry Sealer
"Gray" Smooth CMUs	Sure Klean <sup>®</sup> Weather Seal Siloxane WB Concentrate (1:9), (1:14)
"Buff" Smooth CMUs	Sure Klean <sup>®</sup> Weather Seal Siloxane WB Concentrate (1:9), (1:14)
"Brown" Smooth CMUs	Sure Klean <sup>®</sup> Weather Seal Siloxane WB Concentrate (1:9), (1:14)
"Buff" Burnished CMUs	Sure Klean <sup>®</sup> Weather Seal Siloxane WB Concentrate (1:9), (1:14)
"Brown" Burnished CMUs	Sure Klean <sup>®</sup> Weather Seal Siloxane WB Concentrate (1:9), (1:14)

Apply all products in accordance with the manufacturer's recommendation provided on container labels and product data sheets. On-site testing should be conducted to determine the most appropriate water repellent product and procedures for a particular project. See product literature for additional application and product information.

Lisa Toburen Assistant Laboratory Technician

LT/



Laboratory Report

# **Pallet Tag Program Evaluation**

# The Concrete Service, Inc. Traverse City, MI

Project No. 0203-05 PTP

Prepared For:

Bernie Salvatore The Concrete Service, Inc. 3742 West Front Street Traverse City, MI 49684

Prepared By:



PROSOCO, Inc. April 2002