



Installation Guidelines for TerraCraft® Natural Stone Veneer

Information included in these guidelines is intended for use with TerraCraft® Natural Stone Veneer distributed by CSI - All Things Stone (CSI). Please refer to your local building codes as specific requirements may vary by City, State/Province. **Be sure to check with local authorities for code requirements in your area before proceeding with your installation.**

ESTIMATING STONE REQUIRED

Calculate the total square footage of flat stone required by multiplying the width x height of the area to be covered. Deduct the square footage for openings such as doors & windows. Calculate the linear footage of outside corners. Add additional stone to allow for cutting & trimming if required.

Note: Refer to corner coverage by product type.

FORMULA:

Length x Height = Wall Area

Opening Width x Opening Height = Opening Area

Wall Area - Opening Area - Wall Area Covered by Corners = Sq.Ft. Flats Required

Additional stone may be required to allow for cutting and trimming.

RECOMMENDED TOOLS

Select the tools required for your specific application.

- Safety Glasses & Gloves
- Dust Mask*
- Tape Measure
- Hammer Type Stapler
- Power Staple Gun
- Wheelbarrow & Hoe
- Hock & Trowel
- Mason's Trowel
- Margin Trowel
- Whisk Broom
- Masonry Brush
- Level

CUTTING TOOLS:

- Wet Saw*-Masonry (With Diamond Blade)
- Hatchet
- Hardened Steel Chisel

*Dust mask refers to particulate-filtering disposable NIOSH-approved respirator.

ADDITIONAL MATERIALS REQUIRED

Sheathing Membrane - Breather Type: General Information — “Sheathing Membrane - Breather Type” it is often referred to by different names within the industry including Weather Resistant Barrier, Water Resistive Barrier, and House Wrap. *These guidelines will reference this as Sheathing Membrane - Breather Type (SM-BT).* The use and requirements of Sheathing Membrane - Breather Type may vary by region. **Note: Some regional building codes may require 2 layers of SM-BT, check local building codes for requirements in your area.** Sheathing Membranes shall comply with ASTM D226, E2556, or approved equal.

Mortar — TerraCraft® should be installed using a minimum Type S Mortar (ASTM C270 or ASTM C1714) or ANSI A118.1 Mortar. For exterior applications over 10' (3 m), or applications over cement board, polymer modified mortar meeting ANSI A118.4 or ANSI A118.155 should be used.

Mortar Bonding Agents/Bond Enhancing Modifiers — If required, should comply with ASTM C270 or ASTM C1714, the additional requirements of ASTM C1384 must also be met.

Flashings — Flashings should be of corrosion resistant materials. Flashing type and locations should comply with applicable building codes.

Weep Screeds — Local building codes may require the use of a weep screed on exterior installations. If required, weep screeds should be of corrosion resistant materials and comply with local code requirements and be installed as per the manufacturer's installation instructions.

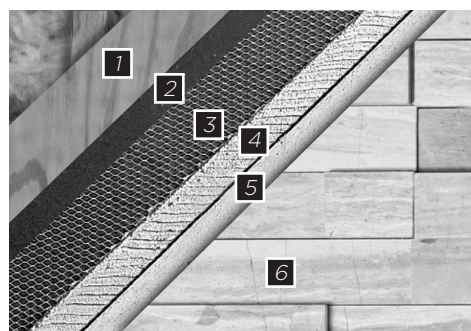
Lath — Select a material meeting one or more of the following standards:

- ASTM C847, minimum 2.5 lb/yard expanded metal lath
- ASTM C847, minimum 3.4 lb/yard, 3/8" rib, expanded metal lath
- ASTM C1032, minimum 18 gauge, woven wire mesh
- ASTM C933, welded wire lath
- Non-metallic lath, with a current evaluation report, confirming compliance to ICC-ES AC 275 by an ANSI accredited evaluation service, confirming alternative to one of the above lath products

Fasteners for Attaching Lath — Must meet the requirements of ASTM C1063 (Standard Specification for Installation of Lathing and Furring).

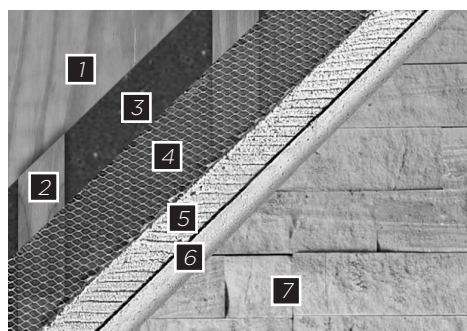
TYPES OF SURFACE PREPARATION

FIG 1. WOOD OR STEEL STUD WALL



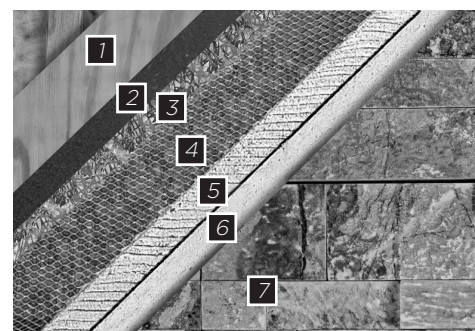
[1] Sheathing, [2] SM-BT, [3] Lath, [4] Mortar/scratch coat, [5] Mortar setting bed, [6] TerraCraft®

FIG 2A. RAINSCREEN – STRAPPING



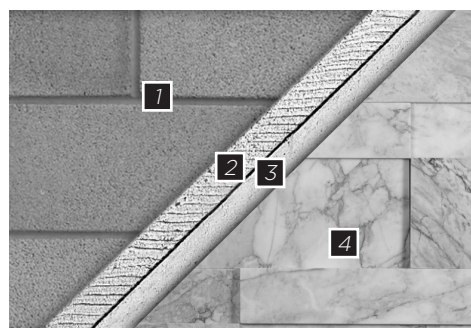
[1] Sheathing, [2] 10mm P.T. wood strapping, [3] SM-BT, [4] Lath, [5] Mortar/scratch coat, [6] Mortar setting bed, [7] TerraCraft®

FIG 2B. RAINSCREEN – DRAINAGE MAT



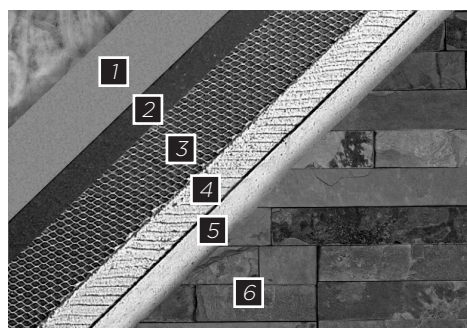
[1] Sheathing, [2] SM-BT, [3] Drainage mat, [4] Lath, [5] Mortar/scratch coat, [6] Mortar setting bed, [7] TerraCraft®

FIG 3. CONCRETE & MASONRY



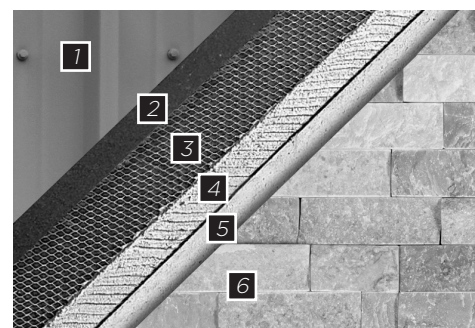
[1] Untreated/unpainted masonry concrete, [2] Mortar/scratch coat, [3] Mortar setting bed, [4] TerraCraft®

FIG 4. RIGID FOAM INSULATION



[1] Rigid foam insulation, [2] SM-BT, [3] Lath, [4] Mortar/scratch coat, [5] Mortar setting bed, [6] TerraCraft®

FIG 5. METAL BUILDING



[1] Metal building, [2] SM-BT, [3] Lath, [4] Mortar/scratch coat, [5] Mortar setting bed, [6] TerraCraft®

SM-BT — Sheathing Membrane - Breather Type.

P.T. — Pressure treated strapping.

Mortar setting bed — Can be applied to the scratch coat, back of the stone or both.

Note: Some regional building codes may require 2 layers of SM-BT. Please check local building codes for requirements in your area.

ADDITIONAL DRAWINGS THAT MAY BE OF ASSISTANCE — For your convenience CSI - All Things Stone has assembled a collection of detail drawings showing generally accepted methods of specific surface preparations and wall assemblies for the installation of NTSV including TerraCraft®. To access these drawings please visit www.AllThingsStone.com.

Fig 1. Wood or Steel Stud Wall

Exterior & Interior surface preparation: *Interior applications are prepared the same as below, except no clearances or weep screeds are required.*

1. SHEATHING MEMBRANE – BREATHER TYPE (SM-BT)

Install code approved Sheathing Membrane - Breather Type (SM-BT) using corrosion resistant fasteners (staples) onto sheathing. Refer to SM-BT manufacturer's instructions for specifics, but at a minimum overlap horizontal joints a minimum of 2" and vertical joints a minimum of 6". Inside and outside corners must be overlapped a minimum of 16 inches past the corner in both directions. Sheathing membrane should be integrated with all flashing accessories, doors, windows, penetrations, and cladding transitions. **Note:** Some regional building codes may require 2 layers of SM-BT. Be sure to check with local building codes in your area.

2. ATTACH LATH

Install over the Sheathing Membrane. Installation should be in accordance with IBC Sections 2510.3 (ASTM C 1063) and 2511.1.1. Install lath overlapping a minimum of 1" on both horizontal & vertical joints adjoining at corners or intersections. Overlap outside and inside corners a minimum of 12". **Do not butt at joints.** While recommendations vary, existing codes and standards do not stipulate the orientation of the lath "cups" (keys) once installed.

Tip — To assist in keeping the sheets of lath flat and avoid bulges, fasten lath sheets from the center of each sheet and work outward.

Fasteners for Attaching Lath — Attach lath using corrosion resistant fasteners conforming to ASTM C 1063 placed 7" on center vertically and 16" on center horizontally. Fasteners should penetrate wood studs a minimum of 3/4" or 3/8" into metal studs or panels. Lath should be furred out 1/4" (6.4 mm) from the framing members or solid substrates. For Masonry Walls fasten with concrete screws or powder actuated fasteners (or cap fasteners), with heads or washers large enough to not pull through lath.

3. CLEARANCES

On exterior walls, stone veneer should be held a minimum of 4" above finished grade or 2" above pavement. This can be reduced to 1/2" if the paved surface is a walking surface supported by the same foundation supporting the wall.

Fig 2A. & 2B. Rainscreen Wall Assembly

Some applications of TerraCraft® may require a Rainscreen Wall Assembly.

RAINSCREEN REQUIREMENTS

Rainscreen design and assembly options often vary by project and specific applications within the project (such as window openings). Installations may require engineered design criteria, materials and assemblies, or regional specific applications. Be sure to select the options that are right for your specific application. Materials and installation methods should conform to local building codes, Architectural/Engineering specifications and details, and product Manufacturer's Installation Instructions.

CSI - All Things Stone has assembled a collection of suggested Rainscreen details complete with engineered details covering a wide variety of Rainscreen applications for NTSV including TerraCraft®. Sections in this guide include: 10mm Pressure Treated Wood Strapping, Drainage Mat, Exterior Insulated Wood Framed, Exterior Insulated Steel Framed, Interior & Exterior Steel Framed. To access these drawings please visit www.AllThingsStone.com.

Fig 3. Concrete & Masonry Wall

A) CONCRETE WALLS & CMU WALLS— NEW OR UNTREATED:

Note: A Rainscreen system may be required in some regions.

Inspect new concrete to ensure there are no release agents, form oils, dirt or dust on the surface that may inhibit bonding. If present, *see Cleaning Surfaces below.*

If the Concrete or CMU surface is untreated (no paint or other coatings) there is no additional preparation required prior to installation. If the wall will be exposed to excessive moisture check to see if a cementitious or other waterproofing agent or a Rainscreen system is required.

CMU's that have been water proofed during the manufacturing process will require preparation with a SM-BT, lath, and scratch coat prior to installing stone. Be sure to fasten lath with corrosion resistant fasteners, concrete screws or powder actuated fasteners (or cap fasteners) or with heads or washers large enough to not pull through lath.

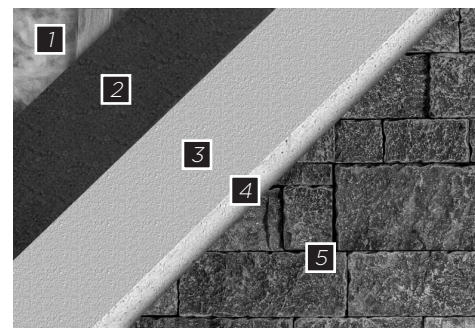
Notes:

Cleaning Surfaces — If the wall requires cleaning, sandblast or water blast the surface to remove materials that may inhibit bond. **Caution: If cleaning with a pressure sprayer do not use excessive water pressure that may damage the wall surface.** You may also etch the surface of the concrete with muriatic acid. If so, rinse thoroughly after treatment. Painted surfaces should be sand blasted or otherwise stripped of paint.

If the wall surface cannot be cleaned to accept a good bond, install a SM-BT, lath, and scratch coat.

Existing Brick Walls — If installing stone over existing brick such as a fireplace facing, evaluate the surface texture of the brick to determine if lath and a scratch coat is required. If surface is smooth or painted then lath and scratch coat is required. If surface is rough, porous, or unpainted, and mortar joints are in good condition, clean the surface and apply mortar and stone.

FIG 6. CEMENT BOARD



[1] Wood or steel studs, [2] SM-BT, [3] Cement board, [4] Mortar setting bed*, [5] TerraCraft®

**Mortars that meet the requirements of ANSI A118.4 or ANSI A118.15*

Fig 4. Rigid Insulation

Fig. 4 illustrates one example of a “typical” Wall Assembly over a framed stud wall with rigid sheathing. Check the requirements for your specific installation such as local building codes, Architectural/Engineering specifications and details, as well as product manufacturer’s installation instructions.

Fig 5. Metal Buildings

Fig 5. illustrates a typical exterior wall surface preparation over a metal building. Individual projects may require regional engineered design criteria, materials and assemblies specific to your local building code requirements.

Fig 6. Cement Board

Cement board may be used in place of lath and scratch coat. When used, cement board must comply with ASTM C1325 and must also be evaluated for interior or exterior use in accordance with ICC-ES AC308 based on the desired applications. **Do not use conventional mortars with cement board installations.** When using cement board, only modified mortars complying with ANSI A118.4 or ANSI A118.15 should be used as the setting bed mortar. For exterior applications, joints in cement board should be treated per manufacturer’s recommendations with modified mortars meeting ANSI A118.4 or ANSI A118.15 and 4” wide alkali-resistant fiberglass mesh tape. Refer to ASTM C1780 and manufacturer recommendations for additional details on cement board installations.

STONE INSTALLATION

Preparation

Note: *Protect surface areas or plants that could be damaged during the stone installation.*

Prepare the Work Area — Layout stone and materials near the installation area prior to application (25 to 30 sq.ft. of stone is typical). Layout stone to the desired blending of sizes shapes and colors similar to how it will be applied to the wall. Be sure to mix stones from different boxes and wash stone before installation (if required) to remove dust or dirt that may have gathered (especially for interior applications).

Mortar

MIXING MORTAR

Mortar can be mixed in a mortar tray, wheelbarrow, or mortar mixer. Mix to a firm, moist consistency. Mortar that is too dry and crumbly will not bond properly. Mortar that is too wet will be weak and messy. *Tip — Mortar that sticks to the trowel when held vertically is a good indicator of the right consistency.* Ingredient proportions and water ratio are important. Mix in accordance with the manufacturer’s instructions. *Tip — Mix mortar at the rate it can be used. If the mortar dries and stiffens before use, restore workability by adding water and remixing.* Re-tempering may slightly reduce mortar’s compressive strength, but bond is typically more important than compressive strength. **Do not re-temper colored mortar as it may lighten the mortar’s color.**

Thin Set Mortar — (ANSI 118.4). On interior projects a thin set mortar may be used when applied over a properly prepared substrate. **Note:** Be sure to refer to the thin set manufacturer’s recommendations to ensure selection of the correct type of thin set mortar, and for mixing and application instructions.

Installing A Scratch Coat

Apply a nominal 1/2” thick layer of mortar to the properly prepared surface ensuring the lath is completely encapsulated with mortar. When the mortar is thumb print dry score the surface horizontally to create a roughened (grooved) surface that will assist in achieving a good mechanical bond between the scratch coat and mortar setting bed. After the scratch coat has set up, use a fog spray technique to keep scratch coat damp during the curing process. Cure for a minimum of 24 hours before installing stone. Set and cure time will vary depending on weather and climatic conditions. Scratch coating can be done in its entirety before adhering stone, but it is also acceptable to “scratch-as-you-go”.

Applying Stone

PRIOR TO STONE INSTALLATION

Dampen the Wall & Stone — Mist or brush the prepared substrate (scratch coat, masonry or concrete), and back of the stone (*especially in hot weather*). Surfaces should be damp but free of surface water. This will assist in preventing excessive moisture being drawn from the mortar. **Note:** Moisture absorption rates depend upon weather conditions, type of stone, and substrate.

Cold or Freezing Conditions — Protect applications from temperatures below 4° Celsius (40° Fahrenheit) as mortar will not cure properly under such conditions. **Do not use antifreeze compounds to lower the freezing point of mortar.**

CUTTING & TRIMMING

Note: *Safety glasses and a dust mask should always be worn when cutting stone.*

To cut or trim stones a masonry wet saw with a diamond cutting blade can be used. After cutting or trimming ensure any residue and dust is removed prior to installation.



STARTING POINT

If applying stone using a mortar setting bed - Do not spread mortar on more than a workable area (8 to 10 sq.ft.), this will avoid mortar setting up before the stone is applied. *Tip — Tight fitted stones should be applied from bottom up. Starting from the bottom allows placement of a level temporary starter strip such as a 2”x4”.*

A. Apply Mortar Setting Bed — A min 1/2” mortar setting bed should be applied to the scratch coat or buttered on to the back of the stone (or both). **Note:** If applying mortar to the back of the stone, cover completely with mortar to avoid open pockets that may allow for the accumulation of water build up. *See image on the right.*

B. Installing with a Tight Fitted Joint - Tight fitted stones should be applied from bottom up. *Tip — Install a temporary level starter strip, such as a 2”x4”, at the bottom course. This will help maintain a uniform straight line, a consistent clearance and avoid stone slippage prior to the mortar setting up.*



Start with the corner pieces of the course first. Then place the adjacent bottom course of flat stones. Remove excess mortar on the top edges of placed stones to allow tight fitting of the next course.

Then, place the remaining courses of corner and flat stones working inward towards the center of the wall. Be sure to stagger flat stones to avoid long running vertical joints.

Tip — When installing horizontally shaped stones, run a level horizontal chalk line every 12” or 16” up the wall as a check point to keep horizontal joints aligned consistently.

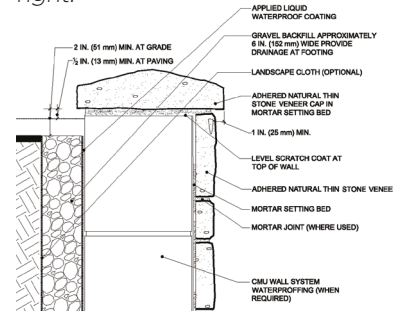
C. Setting Stones — Set stones firmly onto the scratch coat or setting bed applying modest pressure and wiggling slightly until you feel the mortar begin to “grab” with the scratch coat. Apply enough pressure so that mortar extrudes out around the stones edges. **Note:** Moving stones after the initial grab will result in breaking the bond. If this occurs the stone and mortar should be removed and mortar replaced before resetting.

ADDITIONAL DRAWINGS THAT MAY BE OF ASSISTANCE — For your convenience CSI - All Things Stone has assembled a collection of detail drawings showing generally accepted methods and details of specific surface preparations and wall assemblies for the installation of Natural Thin Stone Veneer including TerraCraft®. To access these drawings please visit www.AllThingsStone.com.

ADDITIONAL CONSIDERATIONS

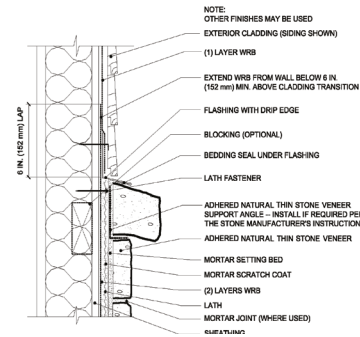
INSTALLING WATERTABLE/SILLS

Watertable/Sills are typically used as a wainscot cap/transition piece or a window sill. Install using galvanized metal support brackets (such as Simpson Strong Tie A21) or other galvanized right angle supports with a 5 lb./lin.ft. holding capacity. Fasten brackets with galvanized screws or nails penetrating studs 1" at a minimum of 16" on center. Use construction adhesive to bond sill to support brackets. Flash & caulk. Flashing should extend to the surface of the exterior wall finish. Use code approved flashing & installation methods. See drawing on the right.



INSTALLING CAP STONES & RETAINING WALLS

Wall & Pier caps are functional and provide a finished architectural finish. Caps should extend 1" to 2" beyond the finished surface below them. Set caps onto a minimum 1/2" full mortar bed over properly prepared surfaces. Ensure mortar bed is free of voids or open pockets that could allow water to accumulate. Mortar joints between wall caps should be completely filled and compacted to minimize moisture penetration. Use peaked caps in areas with heavy water run off. See drawing on the left.



APPLYING OVER EXISTING STUCCO WALLS

Evaluate the wall surface to determine if lath and a scratch coat are needed. If the stucco surface is damaged, has cracking, is painted or too smooth, a lath and a scratch coat is required. Be sure to evaluate flashings and surfaces at all openings such as windows and doors. If there are any indications of moisture penetration, the wall should be repaired before stone can be applied. **Do not apply stone over a stucco wall that has any of the above defects. When the wall surface has been properly prepared, apply stone as in Fig 1. on page 2.**

EXPANSION/CONTROL JOINTS

TerraCraft® should not be installed over these joints. Check with local building codes or the project architect/engineer for specifications or details for expansion/control joint requirements.

SEALING STONE

A sealer may be specified to assist in preventing stains from gutter runoff, splashing water, smoke, or other contaminants. If required, use a Silane based breathable type sealer that is non film forming. Note: Some sealers may cause a yellowing effect on the stone surface. Sealers may need to be reapplied periodically and may alter the appearance of the stone. *Tip – We recommend applying a small test area prior to complete application. Refer to the sealer manufacturer's information for appropriate use and installation instructions.*

CLEANING & MAINTENANCE

To remove dust or light dirt, wash the surface with a garden hose starting at the top and working down. To remove concentrated dirt, wet the stone thoroughly, apply a strong mixture of detergent or granulated soap and water and scrub lightly with a soft bristle brush. Rinse off immediately with clean water. Caution: High pressure washing or sand blasting may damage the stone and is not recommended. If using a power washer be sure to select a nozzle that produces a wash type spray versus a concentrated blast of water. Keep the spray nozzle far enough away from the stone to wash thoroughly but not so close as to blast the surface and cause damage. **Do not use harsh chemicals, such as acid. Do not use abrasive tools such as a wire brush.**

OVERHEAD APPLICATIONS

Installation of TerraCraft® on overhead, horizontal or sloped applications may require approval and/or inspection by local building code authorities. Consult with your project Architect or Engineer for design assistance and additional information.

EFFLORESCENCE

Efflorescence is a water-soluble salt that may occasionally appear on the surface of stone, and other masonry products caused by the evaporation of water from the wall. On rare occasions, efflorescence may occur at the joints or on the surface of TerraCraft® Natural Stone Veneer. To remove, allow the stone to dry completely, then scrub affected areas with a stiff bristle brush and clean water. **Do not use a wire brush. Rinse thoroughly right away washing from the top down. For difficult efflorescence occurrences apply a mixture of 5 parts water to 1 part white vinegar, scrub thoroughly with a soft brush and rinse immediately with clean water.**

ADDITIONAL CONSIDERATIONS - Continued

INSTALLATION BELOW OR AT WATER LEVELS

While TerraCraft® is durable, surface staining may occur on installations where stone is submerged or exposed to dirty water or water that has been treated with chemicals.

INSTALLATION OVER INSULATED CONCRETE FORMS

Applications over Insulated Concrete Forms (ICF) vary depending on the ICF manufacturer and the products configuration. For specific details on installing TerraCraft® over ICF we recommend contacting the ICF manufacturer or your local ICF supplier.

ACCENT & TRIM STONES

Accents and Trim Stones provide attractive additions to the overall finished look of any project. Trim Stones are commonly used to trim out window and door openings. Trim Stones are applied the same as flat stones (see stone application section). Watertable/Sills are often used for a wainscot cap or as a window sill or as a separate transition add an attractive design accent to a wall surface (See - *Installing Watertable/Sills*).

DISCLAIMER

These Guidelines are provided as a collection of commonly used methods and materials for the installation of adhered TerraCraft®. CSI makes no expressed or implied warranty or guarantee of the installation techniques, materials, construction procedures or methods included in the guidelines. Alternative means or methods may be required and/or recommended based on specific code requirements, construction project conditions, manufacturers or product recommendations. Information provided in these guidelines is not intended as specific recommendations for construction procedures or uses of the building materials or structures included in the guidelines. Users are responsible to ensure their installations conform to local building codes for materials and installation procedures incorporated on their project.

NOTE: Drawings provided in this Installation Guideline for TerraCraft® are designed to assist in the installation of TerraCraft® products distributed by CSI and may not apply to every design circumstance. These drawings may require modifications to meet your particular project requirements. CSI accepts no responsibility or liability for the use of these or other construction drawings. Refer to the applicable building code for specific requirements.

WARNING: Crystalline silica may be present in Natural Stone Veneer products. Dust created from drilling, cutting, or sawing these products can be hazardous to your health. Prolonged exposure to crystalline silica dust may lead to lung cancer, silicosis, kidney disease, and chronic obstructive pulmonary disease. Cutting dust may cause irritation of the nose, throat and respiratory tract. Use a wet saw, dust vacuum system, and a respirator to minimize dust generation when cutting. Refer to OSHA and any local/regional regulations for specific requirements. Avoid prolonged or repeated inhalation of dust. Wear a properly fitted, particulate-filtering disposable NIOSH-approved respirator when mechanically altering the product (sawing, cutting, drilling, etc.). Wear a long-sleeved shirt, long pants, gloves and safety glasses with side shields when handling and installing material. Wash hands and face with soap and warm water immediately after handling

To learn more about TerraCraft® and CSI - All Things Stone's other products, visit www.AllThingsStone.com or call 1.800.977.8663.

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