



April 10, 2024

Mr. David McNeil, Emergency Services Director
Transylvania County
101 South Broad Street
Brevard, NC 28712

Subject: **Additional repair recommendations for Cafeteria and Gymnasium roof glulams
Brevard High School - 609 N Country Club Rd, Brevard, NC 28712**
Project Number: 758221

Dear Mr. McNeil:

As requested, a Medlock & Associates Engineering, PA (MAE) representative met with an Arborist (Bill Hascher) on Thursday, December 21, 2023, at Brevard High School (609 N Country Club Rd) to conduct testing on the glulam ends adjacent to the baseplates for each glulam. Prior repairs had been provided to ensure the proper transfer of forces from the glulams to the typical bearing base (steel base "boot" with concrete buttress and footing). These repairs were completed in October and November of 2021 for the gymnasium and cafeteria, respectively.

We discovered in late 2023 that the steel flashing shown in our construction documents were not installed during repairs. At the time of this discovery, we discussed additional observations with the county to ensure the continuing structural capacity for the gymnasium and cafeteria glulams. Each system consists of glulams penetrating the exterior walls of the gymnasium and cafeteria. After issuance of our follow up report dated January 23, 2024, we have completed the recommended repairs to extend the lifetime of the structure. After completion of the proposed repairs, it is our opinion that the repairs shall be observed and assessed every three years during occupancy of the structures.

MAE's assessment is based on visual observations and testing of structural properties of the glulams in their existing condition concluded that the attachment of glulams to bases are structurally sound. Please see our following comments and recommendations below:

1. We visually observed the glulams with the worst physical conditions for testing.
2. We evaluated five (5) glulam locations of the cafeteria along the "southeast" of the cafeteria. The glulam ends along the "northwest" side of the cafeteria were enclosed in interior space years ago and do not display any damage as the exterior exposed glulams have.
3. We evaluated three glulams along the northeast side of the gymnasium and along the southwest side of the gymnasium (6 total glulam tests – 3 each side).
4. The wood strength tests were conducted with a IML North American RESI F-400 series resistance drill. These types of drills are typical utilized to test wooden bridge beams for strength characteristics.

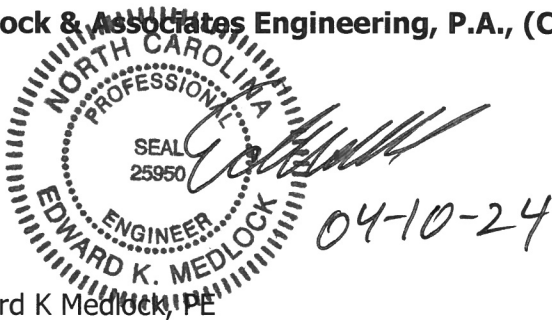
5. The typical testing location was approximately 16" above the top of the steel boot brackets. The testing holes were typically drilled perpendicularly to the top of each glulam at an angle to allow the testing locations between the lowest set of bolts and the adjacent row of bolts above. These tests were performed in this approximate location as the worst deterioration and rot in the glulams was nearest the steel boot brackets. Each test was performed by the arborist and observed and recorded by the Engineer of Record while on site.
6. **Based on the testing information and torque readings recorded by the resistance drill, it is our opinion that the glulam attachments at the typical steel base are stable and substantial to support the required 20 PSF roof live load. To prolong the useful life of the two structures, we recommend that the following recommendations shall be implemented (items 7, 8 and 9 below).**
7. The majority of rot damage observed in the curved glulam beam was typically observed in or near the original steel boots. The rotted wood shall be removed by hand tools to remove damaged and soft wood material. The voids and holes in the wood from the removal of rotted wood shall be filled with *Restore-Rite Non-Sag, High Strength Epoxy Wood Filler* (see the attached cut sheet for preparation and installation of the epoxy material. Alternative products may be submitted to replace the Restore-Rite epoxy based on review and approval by the engineer (MAE).
8. After the areas of rotted wood are addressed with the epoxy, we recommend installation of *Trex Self-Adhering Sheet Flashing* along the exposed top of each glulam that is exposed to the elements. The self-adhering tape shall be wrapped over the top of each glulam a minimum of 1" along each side (see detail sheet BD-1 for installation).
9. In addition to the treatment of rotted wood and installation of the top flashing, we recommend that a minimum 3/8" hole shall be drilled at the low point of each existing boot in accordance with the attached details 4 and 5 on sheet BD-1.
10. The primary purpose of addressing the rotted wood with epoxy and the installation of the flashing tape is to prolong the useful life of the two structures (cafeteria and gymnasium). The existing connection at the boot at each glulam location is currently sound with the installation of newer plates in 2021, but the rot shall be addressed to limit any future deterioration and the application of the proposed flashing is to redirect water from the top of each glulam and from the existing steel boots. As such, the flashing shall be extended a minimum of 2" over the steel boot.
11. **After all work has been completed, contact engineer for assessment and approval of the performed work. We highly recommend having an on-site meeting with a representative of the owner, the proposed contractor, and engineer prior to proceeding with the work to review and ensure that all rotted material near the glulam boots is rotted.**
12. **Due to the age and condition of the glulams for the cafeteria and gymnasium, we recommend a rough estimate of five (5) years of additional service once the repairs have been completed and approved. To ensure the proper performance of the life extension, we request and recommend that a visual inspection of the glulam base connections shall be confirmed by Medlock & Associates Engineering, or another professional engineer licensed in the state of North Carolina on a 2-year basis. This recommendation is based on the harsh exposure of the elements to the glulam beams and the possible abuse that can occur with occupancy. With the implementation of a recurring 2-year inspection program, the life of the structures (cafeteria and gymnasium) can be extended well beyond the 5 years quoted above. The purpose of the 2-year inspection is to ensure continuing performance of the repaired glulam beams (particularly regarding the weatherization taping / flashing).**

Please see the accompanying detail drawing (BD-1 dated 04-04-2024) and product information cut sheets for the proposed epoxy system and the proposed weatherization tape to ensure proper installation and performance of the proposed system. We further recommend that a contractor with experience shall provide the services for the rotted wood repair.

The scope of this report is limited to matters discussed herein. No opinion is offered, and none should be inferred, regarding other aspects of this structure or the structure taken as a whole. This report is based on presently known and available facts, data, and information. To the extent that additional or different facts, data, or information is developed or discovered after the issuance of this report, MAE reserves the right to amend, alter, or change the report as needed to reflect consideration of the additional or different facts, data, or information. Site observations are limited to visibly observable areas; we offer no opinion regarding structural conditions behind finishes or inaccessible areas. If signs of distress are observed or if new information is brought to our attention, invasive testing for further observations may be recommended. We are pleased to be of service. If you have any questions regarding this report or require further assistance, please call.

Sincerely,

Medlock & Associates Engineering, P.A., (Cert. #C3133):



Edward K Medlock, PE
President, Senior Engineer



TECHNICAL DATA SHEET

STRONGBOND EPOXY WOOD FILLER

NON-SAG, HIGH-STRENGTH EPOXY WOOD FILLER & REPAIR ADHESIVE

PRODUCT DESCRIPTION

STRONGBOND EPOXY WOOD FILLER is a two-component, rapid-curing, high-strength epoxy wood filler and multi-purpose repair adhesive. Its non-sag formula fills voids left by dry-rot, restoring strength and shape to damaged wood. It is moisture-insensitive and can be applied on damp surfaces. Because it is shrink-free and does not slump or sag, it is perfect for vertical and overhead repairs.

The Filler creates a high-strength, chemical bond to STRONGBOND EPOXY WOOD SEALER, making repairs to dry-rotted wood last longer. It can be used as a fairing compound to fill air bubbles and voids that may occur during the sanding process, then the repaired wood can be carved or machined to recreate the desired shape before applying a topcoat.

This product also is an excellent multi-purpose adhesive. It will bond to most surfaces, such as brick, ceramic tile, concrete, fiberglass, or stone.

USES

- Epoxy resin bonding for dry-rot repair. Fills voids left by dry-rot, nail holes, or missing wood
- Can be used as a fairing compound
- Cured filled surfaces may be carved or machined to restore the shape of the damaged wood
- Ideal for repairing wooden window frames and sills, rafter tails, exposed beams, decks, doors, floors, fences, boat hulls, and other wooden structural and decorative elements. The restored wood can be primed and painted with water-based paint or other epoxy-compatible topcoat
- As a multi-purpose adhesive, it creates a high-strength bond to most surfaces, such as stone, concrete, ceramic tile, and fiberglass
- Intended to be used outdoors or in well-ventilated indoor areas, in temperatures between 40 °F (4 °C) and 110 °F (43 °C)

FEATURES / ADVANTAGES

- Rapid initial 3-hour cure time at room temperature
- Non-sag, no-shrink formula makes it excellent for vertical and overhead applications
- Low VOC, low odor, and solvent-free



STRONGBOND EPOXY WOOD FILLER

- Creates a high-strength, chemical bond to STRONGBOND EPOXY WOOD SEALER. Once the sealer is tacky, apply Filler over uncured sealer and the two will cure together, saving time to complete projects
- Moisture-insensitive; can be applied on damp surfaces and underwater
- Easy-dispensing with coaxial cartridges, which are packaged with a nozzle that automatically mixes the product in the precise ratio. Cartridges fit into standard 10 oz. caulking guns for flow-control installation

PRODUCT INFORMATION

Availability	Restore-Rite™ products are available through select distributors.
Available Sizes	Coaxial Cartridge – 8.6 oz. (256 ml) Includes one mixing nozzle that automatically mixes precise ratio of Parts A and B. (Cartridges fit into standard 10 oz. caulking guns.) Bulk-Packaging – Quart Kit Kit contains 16 oz. (473 ml) Part A and 16 oz. (473 ml) Part B for 1:1 mixing ratio Bulk-Packaging – 102 oz. Kit Kit contains 51 oz. (1.5L) Part A and 51 oz. (1.5L) Part B for 1:1 mixing ratio
Application Temperature	40°F and 110°F (4°C and 43°C)
Color	Part A (Resin) White; Part B (Hardener) Dark Gray; Mixed: Gray
Cure Time	3 hours at 75°F initial cure; fully cured in 24 hours
Mix Ratio	1:1 by volume (refer to MPII in this TDS)
Gel Time	26 minutes at 75°F (based on 60 gram mass)
Shelf Life	24 months in unopened containers stored in dry and dark conditions.
Storage	Between 40°F (4°C) and 95°F (52°C). Store in closed containers, in a secure, dry place not exposed to direct sunlight or extremely low or high temperatures
VOC Content	17 g/L (mixed)
Working Time	45 minutes at 75°F (nozzle)



STRONGBOND EPOXY WOOD FILLER

LIMITATIONS & WARNINGS

- Cartridge balancing and other installation instructions must be strictly followed. (Refer to MPII)
- Do not thin with solvents, as this will prevent cure.
- Before applying Filler over STRONGBOND EPOXY WOOD SEALER, the sealer must first become tacky.
- Product will cure slower in thinner film and/or colder temperatures and faster in a larger mass and/or elevated temperatures.
- Best when applied in increments at a thickness of 1 inch or less. A larger mass will generate excessive heat. For filling larger voids, a dry piece of scrap wood treated with STRONGBOND EPOXY WOOD SEALER can be used as a filler block, and attach it inside the void with wood screws. This process will allow a smaller mass of Filler to be used.
- May discolor from UV exposure. Filler should cure at least 3 hours prior to sanding and coating with water-based paint or other epoxy-compatible topcoat to meet the desired appearance. Use of solvent-based coatings should be avoided. Coating in a small test area is recommended prior to completing the entire project.
- Product is not intended for repairing weight-bearing structural elements. Consult an architect.
- NEVER leave mixed epoxy in an unattended open container as its thermolytic process generates heat and it will eventually heat-up and produce smoke.
- When dispensing underwater, product may sag.

Clean Up: Always wear appropriate protective equipment such as chemical-resistant nitrile rubber gloves and splash-proof safety chemical goggles during cleanup. Clean uncured materials from tools and equipment with a mild solvent, such as mineral spirits. Cured material can only be removed mechanically. Dispose of product in accordance with federal, state and local regulations.

Safety: Always refer to the Safety Data Sheet (SDS) for both Part A and Part B at www.restore-rite.com. Be sure to wear protective chemically-resistant gloves, clothing and goggles during application and clean-up. Ensure indoor areas are properly ventilated. For more information, call New Enterprises at 1-415-722-9098. In an emergency, contact CHEM-TEL 1-800 255-3924 (24 hours).

INSTRUCTIONS

In order to achieve maximum results, **proper application is imperative**. Carefully read the Manufacturer's Printed Installation Instructions (MPII) in this TDS. Always use the most current version of the MPII, due to occasional updates and revisions.



STRONGBOND EPOXY WOOD FILLER

MANUFACTURER'S PRINTED INSTALLATION INSTRUCTIONS (MPII)

SURFACE PREPARATION

Surface preparation will depend upon the application of the product. The wood being treated must be clean of all dry-rot debris, paint, dust, oil, and wax. A clean surface free of loose material and dust is imperative for good adhesion. Always be sure the bonding surfaces are prepared and sealed with STRONGBOND EPOXY WOOD SEALER in advance before starting a new cartridge or mixing the Filler. To create a long-lasting bond, apply Filler over uncured Sealer once the sealer becomes tacky and the two will cure together. If possible, schedule dispensing to consume an entire cartridge at one time with no interruption of epoxy flow. For bulk, mix only enough product that can be used within the gel time.

CARTRIDGE PREPARATION

CAUTION: Always check the expiration date on the cartridge. **Do not use expired product!**



1. Remove the protective cap from the adhesive cartridge and insert the cartridge into the recommended dispensing tool. Before attaching the mixing nozzle, balance the cartridge by dispensing a small amount of material until both components are flowing evenly.



2. Screw on the mixing nozzle supplied with the cartridge after properly balancing the cartridge. Do not modify mixing nozzle. Confirm that the internal mixing element is in place prior to dispensing adhesive. Take note of the air and base material temperatures and review the working/full cure time prior to injection.



3. Dispense the initial amount of material from the mixing nozzle onto a disposable surface until the product is a uniform gray color with no streaks. Adhesive must be properly mixed in order to perform as published. Dispose of the initial amount of adhesive according to federal, state and local regulations.

CAUTION: When changing cartridges, **never re-use nozzles.** A new nozzle should be used with each new cartridge and Steps 1 - 3 should be repeated.

NOTE: When the work environment or substrate falls below 70°F (21°C) warm the cartridge to 70-75°F (21-24°C) prior to use. All usable material is completely dispensed when plunger reaches halfway. Schedule dispensing to consume an entire cartridge at one time with no interruption of flow to prevent material from hardening in mixing nozzle. If you have any problems in dispensing product, replace the nozzle; the product may have begun to cure in the nozzle which will affect the mix ratio. **NEVER transfer a used nozzle to a new cartridge and DO NOT attempt to force adhesive out of a hardened nozzle.**



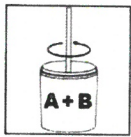
STRONGBOND EPOXY WOOD FILLER

Mixing Without A Nozzle: Remove the protective cap from the cartridge and insert the cartridge into the recommended dispensing tool. Begin to dispense product through the opening until both products dispense equally and discard this small amount. Dispense equal portions of Part A and Part B onto a flat surface. Mix both components together using a putty knife or similar flat tool until a consistent gray color without streaks is achieved.

BULK MIXING

Thoroughly stir Part B with a mixing paddle (i.e. Jiffy mixer or similar) before mixing Parts A and B together. Smaller batches can be mixed by hand in a graduated mixing cup with a paint stir stick, or with a putty knife on scrap cardboard. Blend until a consistent gray color without streaks is achieved.

NOTE: Cold product may become too thick. Product that is too warm will react faster than normal.



1. Before mixing Parts A and B together, thoroughly mix Part B in a clean pail with a low-speed drill (400 – 600 rpm) that has a paddle attachment.
2. Proportion equal parts by volume at an exact 1:1 mix ratio. STRONGBOND EPOXY WOOD FILLER uses 1 part by volume of component Part A and 1 part by volume of component Part B. Mix only the amount of material that can be used before the gel time expires (refer to Product Information in this TDS).
3. Mix thoroughly with a low-speed drill, carefully scraping the sides and the bottom of the container while mixing. Keep the paddle below the surface of the material to avoid entrapping air. Proper mixing will take at least 3 minutes. When well-mixed, the material will be free of streaks or lumps.
4. Smaller batches may be mixed by hand in a graduated mixing cup with a paint stir stick, or with a putty knife on scrap cardboard. Blend until a consistent color without streaks or lumps is achieved.

Once the product is mixed, immediately fill voids and trowel slightly above the surface level, leaving enough material to later sand the surface down to the desired shape. After voids are filled, use a putty knife or plastic spreader to reconstruct the desired shape. For a textured finish, sawdust may be added. Once the uncured Filler no longer sticks to the sandpaper, it may be mechanically sanded. Product can be used as a fairing compound during the sanding process to fill any air bubbles or voids that may occur.

USE AS A MULTI-PURPOSE ADHESIVE

STRONGBOND EPOXY WOOD FILLER is an excellent multi-purpose adhesive. It will bond to most surfaces, such as fiberglass, ceramic tile, concrete, stone, or brick. Use an appropriate amount of material for bonding to clean and prepared surfaces.



Trex[®] Protect[™]
JOIST & BEAM TAPE

2190 WEST BATES AVE.
ENGLEWOOD, COLORADO 80110
TEL + 1-720-348-1385
WWW.TREXPROTECT.COM
INFO@TREXRAINESCAPE.COM

SECTION 07 65 26

Self-Adhering Sheet Flashing – TREX[®] Protect[™]

TREX[®] Protect[™] products are manufactured and sold by IBP, LLC under a Trademark License Agreement with Trex Company, Inc. Protect[™] is a federally registered trademark of IBP, LLC.

TREX[®] Protect[™] our self-adhesive, non-skid deck flashing tape. This butyl-based tape is designed to shield joists and beams from moisture that can lead to wood rot and decay.

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Construction Tapes.

1.2 REFERENCES

- A. ASTM International:
 1. ASTM D 1970/ D 1970 M - 20: Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
 2. ASTM D 3330/D 3330 M - 04: Standard Test Method for Peel Adhesion of Pressure-Sensitive Tape
 3. ASTM D 3767 – Standard Practice for Rubber – Measurement of Dimensions.
 4. ASTM D 5034 - 09: Standard Test Method for Breaking Strength and Elongation of Textile Fabrics.
 5. ASTM G154: Standard that is used as the basis for all other accelerated weathering standards that use fluorescent UV light sources to stimulate exposure to natural sunlight.

1.3 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Installation methods.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Experienced in installation of specified material type with working knowledge of specified products and Project specific application requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Material should be left in its original packaging until use.
- B. Store indoors, between 40 – 100 degrees F.
- C. Acclimate to installation temperature before use.
- D. Do not lay butyl tape on side after removed from packaging.
- E. Do not stack boxes above:
 - 1. Butyl tape 4 or fewer boxes tall
 - 2. Do not stack heavier boxes on lighter boxes
- F. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction

1.6 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.7 WARRANTY

- A. Limited Warranty:
 - 1. Manufacturer warrants materials to not de-laminate, blister, peel, or dissolve from exposure to ultraviolet rays for a period of **twenty years** from the date of purchase when applied according to published directions.
 - 2. Specific terms for warranties can be found at: <https://trexprotect.com/warranty/>

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Contract Documents are based on products supplied by; IBP, LLC, 2190 West Bates Ave., Englewood, CO 80110
- B. Substitutions: Not permitted under Division 01

2.2 CONSTRUCTION TAPES

- A. Self-Adhering Protective Wrap:

TREX® Protect™ is a self-adhering butyl-based deck flashing tape to protect wood decks and posts from premature rot and corrosion. Installation includes horizontal and vertical surfaces including all joists, rim joist, beams, steps, stair stringers, blocking, ledger board, under joists hangers and other surface. Apply at temperatures above 50° F (10°C). The product is self-sealing around fasteners to prevent water damage. Product comes packaged in individually wrapped and labeled rolls. Product offers a 20-year warranty.

1. Product: **TREX® Protect™** as manufactured by IBP, LLC.

- a. **Rim Tape: 11" wide x 50', 0035.**
- b. **Description: A self-adhering butyl-based deck flashing tape that protects the joists and beams from moisture that can lead to wood decay**
- c. **Sealing: Self-sealing around deck fasteners.**
- d. **Protective Release Liners: Removed when product is installed**
- e. **Technical Properties:**
 - 1) **Material Color: Black**
 - 2) **Material Thickness (ASTM D 3767): 20 mils (0.508mm) Nominal.**
 - 3) **Installation Temperature: Greater than 50 degrees F (10 degrees C).**

Performance	Method	Results	
Tensile strength (psi)	ASTM D 5034, modified	15 lbf/in @ 600% elongation	
Water penetration around nails	ASTM D 1970 section 7.9 modified 1.25" water / 24 hours	PASS	
Water penetration around nails after thermal cycling	ASTM D 1970 section 7.9 modified 1.25" water / 24 hours*	PASS	
Water penetration around screws (#10 x 3 1/2")	ASTM D 1970 section 7.9 modified 1.25" water / 24 hours	PASS	
Water penetration around screws (#10 x 3 1/2") after thermal cycling	ASTM D 1970 section 7.9 modified 1.25" water / 24 hours*	PASS	
Peel Adhesion to various substrates (lbf/in)	ASTM D 3330 Method F	OSB (APA-Smooth Side)	4.2
		Anodized Aluminum	2.9
		Extruded PVC	3.1
		Plywood (APA-B/C)	4.5
Accelerated aging	(ASTM G154, cycle 1 for 336 hours)	No Change PASS	
*Elevated temperature exposure AAMA 711-13 Level 3	(7days @ 176F) Thermal Cycling (10 cycles of 8 hours @120F/16 hour @ -40F)	PASS	
Peel adhesion after water Immersion	(7-day soak per AAMA 800 sect. 2.4.1.4.3)	PASS	

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install according to **TREX® Protect™** installation guidelines.
<https://trexprotect.com/#installation>

END OF SECTION