SEALANT•WATERPROOFING & RESTORATION INSTITUTE

Applicator

AWARD-WINNING

Features

Publisher's Statement

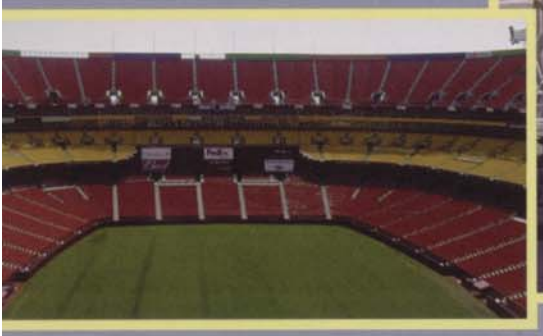
The Applicator is published quarterly by the Sealant, Waterproofing & Restoration Institute (SWR Institute), 14 W. Third St., Suite 200, Kansas City, Missouri 64105 (816) 472-7974.

Publisher & Executive Vice President
Ken Bowman

Editor & Advertising Sales
Rachel Warbington, (816) 472-7974 ext. 128

Editorial Policy

The Applicator is the official publication of the Sealant, Waterproofing & Restoration Institute (SWR Institute). The magazine provides a medium for expressing views and opinions without approving, disapproving, or guaranteeing the validity or accuracy of any data, claim or opinion appearing under a byline, or obtained or quoted from an acknowledged source. The opinions expressed by authors do not necessarily reflect the official views of SWR Institute. Also, the appearance of advertisements does not constitute an endorsement by SWR Institute of products featured.



Photos of structurally sound, watertight stadiums.

Sealing Stadium Expansion Joints: A New Process Yields Watertight Results

By Lester Hensley

Most stadiums leak at expansion joints. Owners cringe at the truth and spend thousands, even millions, of dollars each year to repair leaks. The rare exceptions -- stadiums completed with watertight joints -- are characterized by a design and building process that involves a shift in the traditional way stakeholders relate and execute their work. This process must begin early in the stages of design and planning, and continue until construction is complete.

How can stadium owners ensure that their facility will be leak free? There are several steps that if followed throughout the project, will ensure the stadium remains dry and free of the need for expensive refurbishment.

OWNER RESPONSIBILITIES

Budget Appropriately

Less than half of 1 percent of a typical stadium construction budget is spent on expansion joints. However, a majority of post-tenancy problems with these structures relates to water ingress. Owners must be receptive to recommendations for superior technologies presented to them by designers and be prepared to allocate additional resources to the design contract to allow proper detailing of joints and their relationships to other structural elements. By spending slightly more of the construction budget on waterproofing, stadium owners and managers can expect, and indeed demand, trouble-free, dry and lasting joint seals.

Interior joints are aesthetically versatile and offer a lasting alternative to "rubber and rail" joints in high-point load stadium environments.

Structurally weak joints are replaced with watertight sealants to ensure safe, high-quality structures.

Structural materials have limitations. Cracks as the result of overstressed materials are impossible to seal and can result in dangerous structural weaknesses.

With proper planning, structural materials are aesthetically pleasing and structurally sound.

DESIGNER RESPONSIBILITIES

Design for Joint Sealing Technologies from the Beginning

Even the best waterproofing system is going to fail if there are holes in the membrane. Structural expansion joints represent a planned hole in the waterproofing membrane. It is wise to begin with consideration of how these major holes will be addressed and work the membrane materials out from there.

Designing out expansion joint problems begins with consideration of the following:

Acknowledge the Need for Expansion Joints

Structural materials have limitations. Extreme weather conditions can cause damage over time. Cracks as a result of overstressed materials are nearly impossible to seal and can result in dangerous structural weaknesses. Properly designed expansion joints will prevent cracking, while carefully chosen sealant systems will withstand weather conditions and keep the facility dry.

Chose Expansion Joint Location Carefully

Away from corners -- Corners are a bad place for expansion joints. Do not cast, or use the joints between precast corner units as the place for the structural expansion joints. Corners are impossible to set while creating a consistent expansion joint gap size. Furthermore, the angles created in the corner make awkward geometries for the attachment of sealant systems. Instead, cast the corners solid, or weld these precast connections and make them non-moving. Make the structural expansion joint in a straight line just off the corners.

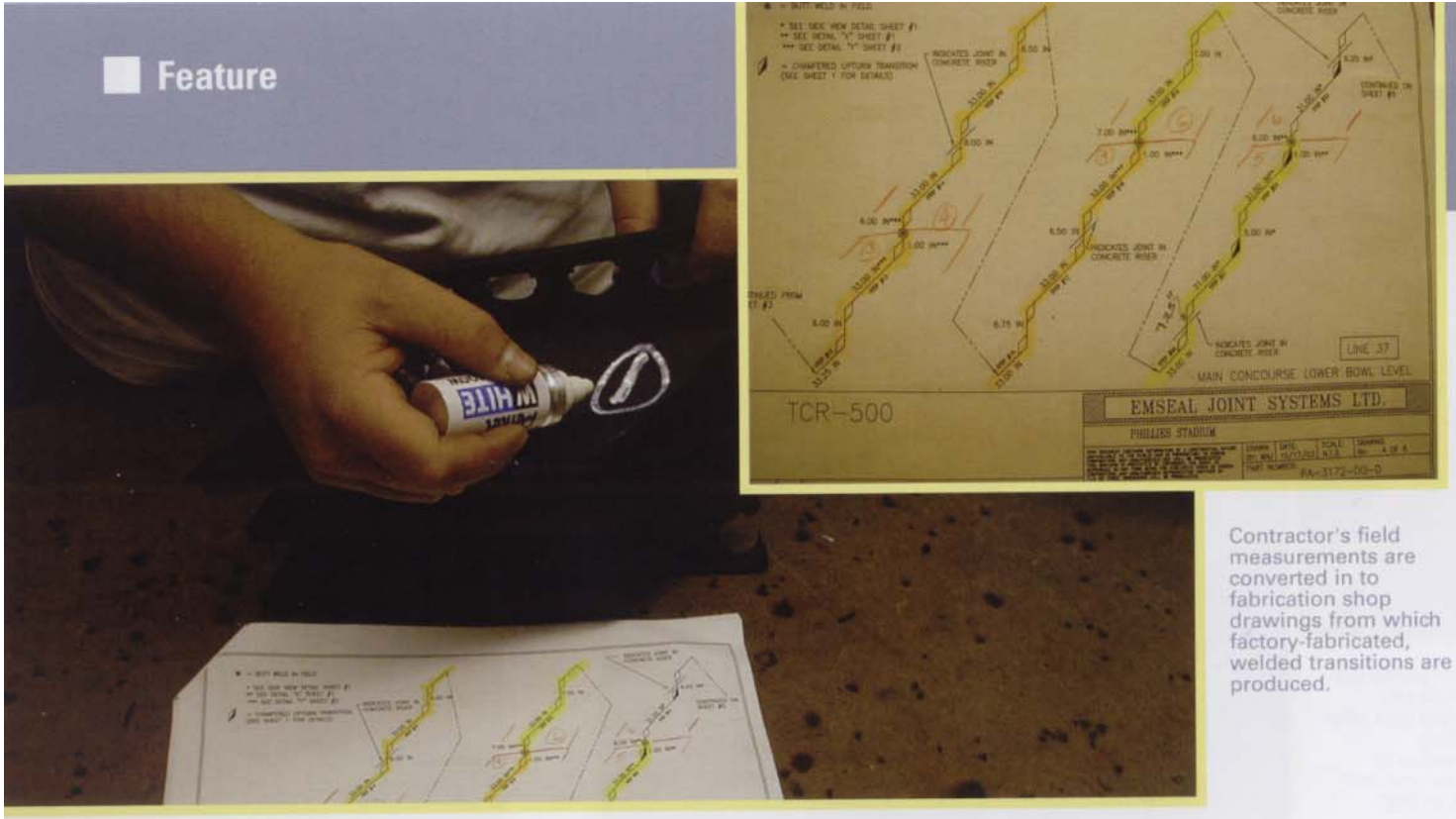
Not through planters -- Never try to waterproof structural expansion joints inside planters. If the joint runs through areas where planters are designed, detail the planters with back-to-back walls, leaving the expansion joint sealable.

Away from obvious water sources -- Keep scuppers away from joints and don't slope drainage across joints. Instead, for example, locate joints at the top of a ramp. Do not expect a deck to drain down a ramp and over, under or through the joint.

Think about interiors -- Joints cut completely through the whole structure. Therefore, think about the interior layouts in relation to expansion joints. Considered early enough, it is even possible to hide some joints between back-to-back interior walls thereby eliminating their aesthetic impact, as well as the need to bridge them. Make sure the interior subcontractors know where joints are, and the effect the joints may have on location of mechanical or plumbing fixtures. Finally, select and specify all-metal, high-point-load expansion joints capable of handling small-wheeled catering, cleaning and other traffic that typically destroys "rubber and rail" joint systems.

Select Structural Supports Wisely

Choose split columns rather than single columns with slide bearing pads. A single-column structure results in hard-to-seal conditions around the column caps that create shear conditions for which most watertight joint systems are not designed. Split columns ensure that a system's sealing integrity can be maintained.



Contractor's field measurements are converted in to fabrication shop drawings from which factory-fabricated, welded transitions are produced.

Size Joints Properly

There are four main facets related to sizing joints properly - expected movement, functional and installation temperature range, tolerance build-up, and movement capability. Architectural teams must also take the lead for sizing in joint design. Often, the structural team will make recommendations without considering a material and its movement capability and other effects on joint design. This can be avoided if the architectural team selects a technology and takes it to the structural team with the question: "What size joint do we need if we seal the joint with THIS specific technology?" The resulting joint size calculation can then take into account the movement capability of the product or technology type to be used.

Take Time to Find the Right Technology

Limit specifications to manufacturers that continually demonstrate a commitment to joint treatment, have sound technology, the ability to ensure and guarantee watertightness in plane and direction changes, and a commitment to quality. A trend in the specialty products industry is the tendency of suppliers to commoditize products, thereby removing much of the value essential to proper performance. The ability and willingness of manufacturers to offer solutions and to fabricate watertight transitions in plane and direction, such as up and down treads and risers, remain rare differentiators.

Features in purpose-designed joint systems include integral heat-weldable, thermoplastic rubber flashing sheets for "sandwiching" into deck waterproofing materials on split-slab decks. This ensures total water-tightness over occupied space below, while heavy-duty aluminum or steel side rails and stainless steel retaining capping strips allow long-term maintenance access to the sealing insert which in turn is designed to handle cyclical movements.

Think and Design in 3-D

Develop isometric, line-sketch schematics to show all the joints and throughout the stadium. Include all changes in plane, direction, and intersection with other materials. This will put the design team on the same page, allowing all participants to identify and design out many problems before construction begins. Cross-reference the material selection for each joint in the schematic with a cross-section detail. In addition, show axonometric details of each transition in plane and direction, especially when illustrating transitions between different material technologies, e.g. between a concourse deck joint and a wall joint. Manufacturers publish on their Web sites most of the axonometric details needed to detail and specify watertight transitions within the same product, as well as between different technologies. This makes detailing these conditions as simple as cutting and pasting.

Communicate Joint Locations to All Involved.

Make sure to show expansion joints on all drawings, including structural, architectural, mechanical and landscape. In the specifications, include a specific reference for responsibility of all trades to appropriate treatment of their work at expansion joints.

Write Project-Specific Specifications

Stadiums are not the place to use a "cookie-cutter" approach to expansion joint design. The specifications for each job must match the specific performance demands of each venue. Research available technologies, implement them into the design and write specifications that reflect the choice. Make sure to stick with the plan throughout the project to ensure technology continuity and continuity of seal.

Have Courage

Joint systems are a tiny percentage of the stadium construction jobs. Having engaged in the aforementioned expansion joint design-emphasis process, designers should have the courage to defend proprietary specifications of superior joint systems, and hold to them even under pressure for substitutions of cheaper, less-effective alternatives.

CONTRACT EXECUTION

General Contractor, Owner Responsibilities

Limit Work to Carefully Selected Contractors

Limiting work to a select group of contractors, often those recommended by the expansion joint system manufacturer, can be a huge factor in ensuring watertight joint seals. These contractors have been properly trained to install the chosen systems and can address substrate conditions that help ensure watertightness. Because they work closely with manufacturers, these contractors are not likely to underbid the job, keeping change-order cost increases to a minimum, and are likely to be versed in, and willing to remain committed to, a communication process involving the designer, owner representative, manufacturer and general contractor.

Communicate Clearly and Often

Hold a pre-construction meeting with all parties involved in the treatment of work at and around expansion joints. This meeting should take place prior to pouring concrete that will define the expansion joints. Make sure all superintendents and forepersons with responsibility for casting activities attend the meeting to review such issues as:

- Forming joint-gaps in relation to temperature changes
- Ensuring solid form construction to prevent collapsed and misaligned joint forming
- Proper consolidation and through vibration, of slab edges and blockouts
- Zero tolerance on blockout formation
- Finesse concrete work for final blockout preparation
- Location, elevation and configuration of joint curbs
- Execution of concrete work to handle transitions to vertical plane
- Protection of joints and traffic routing until decks are opened to normal use

Emphasize Expansion Joints During All Construction Phases

Continue to place expansion joints on meeting agendas throughout the construction process. Many subcontractors, including electrical, HVAC, masonry, flooring, façade panel, waterproofing and caulking, work in close proximity to expansion joint locations and they must be aware their work cannot impede structural movement that will occur at expansion joints or compromise the achievement of watertightness at expansion joints in any way. As the construction progresses, the general contractor must emphasize expansion joints during each stage. Expansion joints must be considered a critical path item, rather than an added piece at the end of the project. Failure to emphasize expansion joints during construction is a significant contributor to delays, cost overruns and the reworking that characterizes preparation of joints to receive the expansion joint systems.

In Conclusion

Sky boxes that won't heat or cool; damage to high-dollar corporate boxes; lost concession-vendor revenue; and icy slip hazards are among the numerous complaints stadium owners and managers have endured as a result of leaking expansion joints. Furthermore, most retrofit expansion joint contracts far exceed the cost of doing it right the first time. Yes, stadium construction is a complex process. Nevertheless, with notable new construction successes, including Phillies Ballpark and Keyspan Park, and numerous retrofit successes, including FedEx Field, Fenway Park and American Airlines Arena, have demonstrated that a new paradigm for expansion joint treatment is not only possible but also practical.

The right products can form to various contours found in stadiums.

Lester Hensley is President and CEO of EMSEAL Joint Systems Ltd. Having first joined the company in 1990, Hensley is credited with using EMSEAL's base product offering as a springboard for market-driven product innovation and for securing a solid reputation among architects, engineers, contractors and distributors, as well as the company's network of independent manufacturers' representatives.