



Earthquake Retrofit Solutions and Resources Webinar Webinar Q&A

Here is the Q&A Report from our live webinar on **Earthquake Retrofit Solutions and Resources**, held on November 6, 2024.

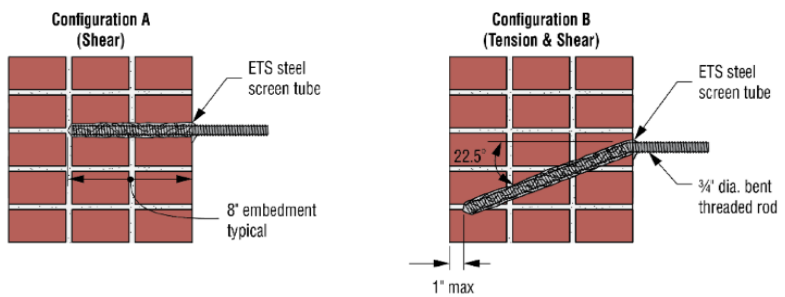
Thank you for submitting your questions. You can also [view this webinar's recording](#) and the [slide deck](#). Please send any additional questions to Jonathan Freeman (jfreeman@strongtie.com) or Carlos Zarate (czarate@strongtie.com)

Question	Answer
Doesn't your definition of "Raised Foundation" include those homes with a full-height basement?	To clarify, raised foundations do not include basements, but assuming the question is, "Should the basement also be retrofitted similar to the way we would retrofit a raised foundation?" The answer is yes.
If a design meets Florida hurricane requirements, is that similar to earthquake requirements?	No, the demand loads created by hurricanes are different than those created by earthquakes. While they both result in lateral and uplift loads, they can be quite different and need to be resisted by connectors and fasteners in a specific way. Make sure to design your structures to resist the loads that are necessary in your location.
Why are you ignoring framed structures without cripple walls, i.e., floor bears on foundation walls? Are you only focused on homes with a cripple wall from foundation up to first floor wood framing?	I don't think we're ignoring framed structures without cripple walls. For the portion of the presentation where we were talking about raised foundation retrofits, we are focused on cripple walls because they tend to be the weak point that we want to fix. If you look through our <i>Seismic Retrofit Guide</i> , there are examples without the cripple wall and examples with a cripple wall up to a certain height. Anything up to about 48" is where you would want to be shorter than 48". And once you exceed that height, you fall into an area with additional requirements.
If there is already exterior plywood sheathing on the cripple wall, is it required on the interior of the cripple wall?	When retrofitting your home, visible plywood beyond the studs on the exterior may be sufficient, depending on the load requirements and the condition of the existing plywood. In many older homes, however, there's often just siding attached to the exterior. If you're uncertain about if that's sufficient, it's best to consult a professional, as additional reinforcement on the interior may be necessary. In some cases, the exterior alone could suffice.
Do posts supporting beams also need to be adequately anchored to the footing?	Yes, this connection will also need to be inspected.
What are the holes in the plywood sheathing for?	The holes in the plywood are for ventilation. Please see p.13 in the <i>Seismic Retrofit Guide</i> , F-SEISRETRGD19.
What are the edge distance requirements for the new anchors?	The dimensions required for the URFP can be found on p.11 of the <i>Seismic Retrofit Guide</i> , F-SEISRETRGD19.

<p>As opposed to the lateral shear clips installed on the cripple wall and raised foundation, sill plate anchor bolts could be used. Which would you say are cheaper?</p>	<p>Titen HD® screw anchors are a great solution for retrofitting, but you don't always have the space to install them. It will depend on the cripple wall height. When you are limited on the height, the URFP becomes a better solution.</p>
<p>Regarding the retrofit in Napa, was the owner required to inspect the connectors and replace those that had exceeded a certain deflection after the earthquake?</p>	<p>There's no requirement to inspect those connections after an earthquake. However, just as good standard practice after a sizable event, definitely a 6.0 earthquake, you definitely do want to get somebody down there to do a good visual inspection of all the connections and verify that there isn't any significant structural damage.</p>
<p>Would the ACHZ post cap make a stronger connection than the AC post cap?</p>	<p>The ACHZ does have higher allowable load ratings than the AC post cap, but the AC is still a great solution for retrofitting the beam-to-post connection. Depending on the heights of your post and beam, the AC is shorter, and can more easily fit on shorter members.</p>
<p>Is a Special Inspection required for the bolting inspection of the Moment Connection?</p>	<p>Yes, a special inspection is required for the installation of the moment connection to ensure it meets the necessary tension strength. After a seismic event, when evaluating the building, it's important to check for any signs that the link has yielded beyond its intended capacity. For instance, paint delamination may indicate yielding. If you observe such signs, we encourage you to contact us. We're available to collaborate with an inspector, structural engineer or contractor to assess any potential limitations on deflection and overall performance.</p>
<p>Is the Yield-Link® moment frame equivalent to a special moment frame, R = 8 system?</p>	<p>Yes, the Yield-Link® moment frame qualifies as a special moment frame and can be designed with an R value of 8. However, for soft-story retrofits, it may be designed with an R value of 6.5 if it aligns with wood structural shear walls, as outlined in AISC Chapter 7. This adjustment allows for a justified reduction in the R value for compatible designs.</p>
<p>For soft story, does Simpson Strong-Tie have the beams and columns?</p>	<p>For moment frames, we do not offer the beams and columns. We do offer the Yield-Link® moment connection.</p>
<p>For the Yield-Link® moment connection, post event, do you provide custom link elements to address residual displacements?</p>	<p>After an event, the links need to be inspected. If they yielded, only the links need to be replaced.</p>
<p>How can you get HOA / condo associations to retrofit?</p>	<p>The first step is open communication. If you're concerned about the seismic resilience of your building, start by discussing it with the building owner or manager. Ask whether the building is under a retrofit mandate or if there are any known structural concerns. This is especially important for buildings constructed before the 1960s, and even more so for those built in the 1930s or 1940s. Confirming whether the building has already been retrofitted or if a retrofit is needed can help start the conversation and promote safety awareness within the HOA or condo association.</p>

<p>Does Simpson Strong-Tie have a design guide with examples of how to complete a design of a moment frame with examples? Something similar to an AISC Design Guide series would be awesome.</p>	<p>We have a modeling guide for the Yield-Link® moment connection. The guide walks designers through the structural analysis and connection design. You can find it on our website by looking for item F-L-YLMCMG24.</p>
<p>How do we know if our house has been retrofitted for seismic resilience (in Seattle)? The remodel before we moved in was not permitted so there might not be records.</p>	<p>It depends on the type of foundation. For a raised foundation, looking at the crawl space underneath the house is a good starting point. For a soft-story condition, one will have to cut some observation holes to see what's behind the walls.</p>
<p>When you have the room to install, which is better? Titen® bolts or anchor bolts glued with epoxy?</p>	<p>This comes down to personal preference. Most folks prefer to use the Titen HD® over epoxy due to the speed of installation and thus completion. However, in certain cases, epoxy may be the optimal option depending on specific site conditions/factors.</p>
<p>Is there an exterior mount rafter tie for buildings with no interior access?</p>	<p>Our connectors can be used on the exterior of the building, but you'll need to remove your finish surface to ensure the connections are made directly onto the wood framing members. Additionally, you'll need to consider your environment and address any corrosion resistance needs.</p>
<p>I thought there was already a major mandate to reinforce soft stories after the Northridge earthquake? Why are there so many still not retrofitted after 30 years?</p>	<p>The mandate following the Northridge earthquake was for specific building types and occupancies, so many smaller buildings were not required to retrofit and may still lack reinforcement.</p> <p>If you live in a single-family home built before the 1950s on a raised foundation (not a slab), it's a good idea to check whether a retrofit is needed. One simple way to get an initial sense is to look under the house. If you see only ½" anchor bolts along the perimeter, you may want to have it inspected further. Some contractors offer free inspections to help homeowners assess whether a retrofit is recommended. The most thorough approach, however, is to consult a structural engineer familiar with your area's seismic requirements and building codes.</p>
<p>Is there a seismic / wind event severity that triggers structural review of the Simpson Yield-Link® moment frame? Are there obvious signs for the user when the link has yielded?</p>	<p>Currently there is not. But a great visual trigger that should merit inspection, is if the building (after an event) has structural damage or is out of plum/level. If so, the Yield-Links should be inspected.</p>
<p>If you have a CMU block with brick veneer is it likely to be URM? Or does this apply to brick buildings only?</p>	<p>By definition, unreinforced masonry (URM) buildings typically refer to structures made of solid red brick without reinforcement. A CMU (concrete masonry unit) block structure with a brick veneer is generally not classified as URM. However, it's important to consider how the brick veneer is attached to the CMU wall. In a seismic event, improperly anchored brick veneer could detach and pose safety risks. Ensuring the veneer is securely anchored to the CMU can help prevent potential hazards to people or property.</p>
<p>It looks like 5/8"x10" Titens are not available at most lumberyards. Are these special order? When we need them, they are quite difficult to get.</p>	<p>Check with your local lumberyard sales associate to see if they can special order what you need. They may not stock them, but they can get our entire catalog of products through their ordering portal. Even</p>

	Lowe's and The Home Depot pro desk should be able to order 5/8" Titens for you.
Does Simpson Strong-Tie have tables for the out-of-plane and shear capacities of their FRP products?	Simpson Strong-Tie does not provide tables for FRP design. FRP is a composite material in itself, but it also works in composite with the receiving substrate to which it is applied. Different substrate conditions and strengths need to be considered by a designer familiar with FRP to ensure the performance and viability of the specific application. Please contact Senior Strengthening Solutions Engineer Alex Daddow, PE, CDT, if you are considering FRP reinforcement on a project or have questions: 714.448.9143, adaddow@strongtie.com
What column base bracket would Simpson Strong-Tie recommend for a new concrete pier and post connection?	For a new concrete and post connection, there are multiple options available. With new concrete, you can choose between brackets that are cast-in-place during the pour or ones that can be post-installed after the concrete has cured. The CBSQ, among other options, offers reliable solutions for these connections. We'd be happy to guide you in selecting the best bracket based on your specific requirements.
In slide 42, how would the epoxied anchor be installed at an angle shown with (E) wall ledger/blocking in place?	The EOR would need to detail this based on existing conditions. If existing floor or roof framing are in the way of drilling at an angle, that will need to be considered.
On UR #5 repair and the roof and floor attachment, with existing ledger, does the hole in the ledger need to be at the sloped angle since it is already in place? Do the stock lengths accommodate that extra length or does the ledger need to be overcut to allow the rear angled drill and flat front? Can the angled drill go in any of the 360 degrees (up, side, etc.) or must go down only?	This is a great question with some detailed considerations! For specific guidance, we'd recommend reaching out to us directly so we can better understand the exact conditions of your project.
What Simpson Strong-Tie products were used for the Napa Courthouse rehab?	Our FRCM was amongst the most heavily used to repair the courthouse. You can find a few case studies by searching Napa Courthouse on our website.
How about earthquakes on the east coast?	You are correct, according to the USGA map, there are seismic zones across North America.
What is the full name of the publication for the retrofit for residential, NEHRP?	National Earthquake Hazards Reduction Program
Could you explain why Simpson Strong-Tie connectors are usually less accessible and more expensive in Canada compared to the US? I'd like to understand if the higher cost is due to import fees, specific standards compliance or other regional factors. We always get the question from contractors and homeowners: Why are we using special connectors that	Please reach out to the Simpson Strong-Tie Canadian office directly to discuss this further. https://www.strongtie.com/about/locations#canada

<p>are not readily available to us and are expensive? As an example, the ECCLRQ666-SDS model is significantly more expensive in Ontario, Canada, than in the US.</p>	
<p>What about mass unreinforced masonry structures such as the National Building Museum on G Street NW in Washington, DC? About 8' diameter by four story tall interior brick columns.</p>	<p>The National Building Museum is a spectacular building completed in the late 19th century. Any retrofit requirements would be based on the seismic/wind requirements of the area and the original design of the structure.</p>
<p>For the floor or roof tie-in to existing unreinforced masonry wall detail — why is the threaded rod drilled on an angle and bent down? Why not drill in horizontal?</p>	<p>For shear only application (Config. A), it can be horizontal. For shear and tension (Config. B), it is at an angle. This is how we tested. See image below.</p>  <p>The diagram illustrates two configurations for masonry wall tie-in. Configuration A, labeled 'Configuration A (Shear)', shows a horizontal ETS steel screen tube embedded into a brick wall. The embedment is labeled as '8" embedment typical'. Configuration B, labeled 'Configuration B (Tension & Shear)', shows a 3/4" dia. bent threaded rod embedded into a brick wall at a 22.5-degree angle. The embedment for Configuration B is labeled as '1" max'.</p>
<p>What about retrofitting a URM chimney chase (72" x 24" x 18') which is the gable end wall in a wood frame residential structure?</p>	<p>Look at FEMA P-1100- 2C, Vulnerability-Based Seismic Assessment and Retrofit of One- and Two-Family Dwellings, Volume 2C - Plan Set for Masonry Chimneys and see if that can be applied to what you are doing.</p>
<p>Where could we find out more about strengthening cripple wall heights over 48"?</p>	<p>According to FEMA, cripple walls over 48" typically must be designed by a qualified engineer though some standard details are available such as in FEMAP11002A.</p>
<p>Doesn't FEMAP11002A allow over 4' height and up to 7' height cripple walls without needing engineering?</p>	<p>Yes, though determining the correct design may still require a qualified engineer.</p>
<p>Are there solutions for walls that the lower half is concrete and the upper half is wood? Does this need a retrofit?</p>	<p>Yes, they may possibly be similar to cripple walls. Your approach can be similar to that of cripple walls.</p>
<p>A building with a bulky reinforced concrete frame (including beams and columns) at the parking ground floor level — is it still recognized as a soft story and shall need retrofit?</p>	<p>Soft story retrofits are typically referring to wood construction with first floor garages or tuck under parking. This would require a more in depth conversation. Feel free to give us a call.</p>
<p>How do you classify concrete masonry walls and composite poured concrete floors? Is this a raised foundation? Here in Ecuador foundations are often deficient. In our area there are many volcanoes.</p>	<p>I am not familiar with the requirements in Ecuador. I suggest talking with the local building jurisdiction to decide how to classify your building type.</p>

<p>Do we have to consult Simpson Strong-Tie with the engineer's drawing to purchase the recommended beams and columns?</p>	<p>No, Simpson Strong-Tie products are for sale at most building materials distributors. Please use the Dealer Locator at the top of the strongtie.com homepage.</p>
<p>About post-to--foundation connectors, what should we do regarding the side cover requirement, usually 3", when we are going flush to the footing (1-3/4")?</p>	<p>For are limited in space, perhaps you can evaluate the use of our RPBZ retrofit post base.</p>
<p>For a structure with an existing post-and-beam foundation and no concrete cripple wall, is there an approved method to construct a wood cripple wall that includes the perimeter posts around the perimeter to provide lateral support and stability, instead of pouring a new concrete cripple wall?</p>	<p>This seems like it would fall outside of any prescribed methods. I'd suggest discussing this situation with a structural engineer.</p>
<p>Would all the before-retrofit techniques work and/or help at an unstable soil area, not specifically at an earthquake area, as an extra or another way to help with all the movements involved with unstable soil?</p>	<p>If the foundation is not sufficient for the existing soil conditions, that would be the first thing to remedy. The end goal for these is to create a continuous load path that can resist the forces applied, and that goes all the way to the soil through the foundations.</p>
<p>Old foundations are not typically reinforced. Would the retrofit connectors perform at old concrete walls that have cracks and are unreinforced?</p>	<p>Great question. It would be best to have such a foundation inspected by a qualified expert.</p>

<p>For Yield-Link moment frames in line with wood framed shear walls (R=6.5), what is the recommendation for shear to the walls and steel frame (i.e., deformation compatibility)?</p>	<p>According to Section 12.2.3 of ASCE 7-16, when a moment frame is combined with other lateral systems in the horizontal direction, the R-value used for design in the direction under consideration shall not be greater than the least value of R for any system in that direction (i.e., when combining a wood shearwall with R = 6.5 and a steel SMF with R = 8.0, R = 6.5 shall be used for the design of the SMF). However, there is an exception if the following three conditions are all met:</p> <ol style="list-style-type: none"> 1. Risk category I or II building 2. The building is two stories or less above grade 3. The use of light-frame construction or flexible diaphragms <p>If the above three conditions are met, then lateral-resisting elements are permitted to be designed using the least value of R found in each independent line of resistance. For example, if a wood shearwall with R = 6.5 is used at the interior wall of a garage and a steel SMF is used at the front of the garage parallel to the interior shearwall, then the SMF can be designed using an R-value of 8.</p> <p>For vertical combinations of lateral systems, according to ASCE 7-16 Section 12.2.3.1, where the lower system has a lower R-value compared to the upper system, a higher R-value can be used for the upper system. In other words, when combining an OMF (R = 3.5) at the first level and a wood shearwall (R = 6.5) at the upper level, the design of the shearwall above can use an R = 6.5. However, the lower system shall be designed using the lower R-value (i.e., R = 3.5 for the OMF). In addition, force transferred from the upper system to the lower system shall be increased by multiplying by the ratio of the higher R-value to the lower R-value (in the OMF and shearwall example, this ratio would be 6.5/ 3.5).</p> <p>When the upper system has an R-value lower than that of the lower system, the R-value of the upper system shall be used for both systems (i.e., when a SMF [R = 8] is used at the lower level and a wood shearwall is used at the upper level, R = 6.5 shall be used for the design of both systems). When it comes to retrofits with moment frames, the International Existing Building Code (IEBC) allows the use of moment frames with a higher R-value at the base regardless of the existing lateral system at the top of the frames. Check with your local building official for applicable ordinance or additional requirements.</p>
<p>For URM buildings, is it possible to retrofit them by allowing controlled sliding movement between the foundations and the upper structure (Like rollers)?</p>	<p>For specific guidance, we'd recommend reaching out to us directly so we can better understand the exact conditions of your project.</p>
<p>Is there a threshold PGA for retrofit?</p>	<p>Refer to your local building codes or seismic design standards, as the threshold may vary depending on the region and the specific type of structure being retrofitted.</p>