Soft-Story Retrofit Solutions
for Northern California
New Soft-Story Retrofit Ordinances

Cities in seismic regions have recognized the magnitude of the danger that unsafe soft-story buildings can pose in a serious earthquake. Therefore, several cities, including San Francisco and Berkeley, have already passed ordinances requiring seismic retrofitting of these structures. A typical retrofit solution involves adding the necessary bracing to keep the ground story of soft-story buildings strong and prevent collapse in earthquakes.

Simpson Strong-Tie is an industry leader of state-of-the-art structural solutions specifically designed to meet the code requirements of soft-story retrofits. Depending on the scope of the retrofit and the particular applications involved, our products can minimize construction time and reduce project risks.

A soft-story retrofit requires the expertise and guidance of a licensed design professional such as a structural engineer or architect. These structural design professionals understand the soft-story ordinance requirements and will work with contractors to ensure the retrofit is done correctly.

How Simpson Strong-Tie Can Help

Simpson Strong-Tie has long been involved in soft-story retrofit initiatives. This depth of experience has helped us develop a wide variety of state-of-the-art structural solutions specifically designed for soft-story retrofits. Depending on the scope of the retrofit and the particular applications involved, our products can minimize design and construction time, reduce the number of special inspections and mitigate other project risks. For more information, visit strongtie.com/softstory or call (800) 999-5099.
Special Moment Frames and Shearwalls

Simpson Strong-Tie provides moment-frame and prefabricated shearwall solutions with many different design options based on the height and width of the building opening, the building codes and an engineer’s overall structural design criteria. These solutions are designed to install easily and safely under occupied living or commercial spaces.

Strong Frame® Special Moment Frame

For buildings with large openings (garages, storefronts) and smaller wall space, the Simpson Strong-Tie® Strong Frame special moment frame provides greater performance and easier installation than traditional solutions. Its patented Yield-Link® structural fuse at the beam-column connection is designed to protect the rest of the frame by bearing the brunt of seismic forces. This reduces the risk of collapse and isolates the damage, which results in a less labor-intensive and more rapid post-earthquake repair since only the Yield-Link will need to be replaced instead of the entire frame. Strong Frame special moment frames are 100% bolted in place during installation, eliminating the need for onsite welding, a leading cause of jobsite fires in wood structures as well as unhealthy fumes or gases that can require displacement of existing occupants.

With Yield-Link Technology

Strong Frame special moment frames feature a partially restrained beam-to-column connection, consisting of a modified, single-plate shear tab for shear transfer and a modified Yield-Link structural fuse for moment transfer designed to prevent moment transfer through the shear tab connection. This ensures the frame’s structural integrity during and after a seismic event.

Strong-Wall® Shearwalls

Strong-Wall shearwalls can be the appropriate choice for providing added lateral support where conventional shearwalls are not able to be used and moment frames are not required based on available wall space and additional strength required. Strong-Wall shearwalls provide the needed added lateral strength in a strong, ductile and compact prefabricated panel. Our Strong-Wall product line includes the Steel Strong-Wall (SSW) and Strong-Wall Wood Shearwalls (WSW) in various widths and heights.

End-Plate Link for Shallow-Beam Application

The new Yield-Link end-plate link (EPL) for shallow-beam applications has a welded shear tab attached to a bolted end-plate connection. This link has the same features as our original T-stub Yield-Link, with the advantage that it can be used with shallower beams. The end-plate link is designed to fit into beams that are 8¼” deep to create additional height clearance for tight spaces, such as parking garages. The end-plate link has been tested and approved under ICC-ES ESR-2802.
Wood Connectors

Holdowns, Tension Ties and More

For 60 years, Simpson Strong-Tie has been the leading manufacturer of No-Equal® structural connectors for wood construction. Our moment frame, holdowns, plates, ties and straps are just some of the many connectors that secure the building and shearwalls to ensure effective load transfer and help prevent the kind of “racking” damage that was seen as a result of the 1989 Loma Prieta earthquake.

Soft-story building collapses from the 1989 Loma Prieta earthquake caused by inadequate lateral support on the first floor.

**HDU Holdowns**

Simpson Strong-Tie® holdowns provide a tension connection between a site-built shearwall and the foundation. They attach with our Strong-Drive® SDS screws into the wood member and into the concrete with an anchor bolt, an anchoring adhesive or a mechanical anchor, such as the Titen HD®.

**Code:**

ICC-ES ESR-2330

**HTT Tension Ties**

For smaller load requirements, Simpson Strong-Tie tension ties also offer a connection between site-built shearwalls and the foundation and can be used to complement our holdown solutions depending on a structure’s design criteria.

**Code:**

IAPMO UES ER-130

**Universal Retrofit Foundation Plate (URFP)**

In applications where minimal vertical clearance exists, the URFP retrofit foundation plate is ideal for securing first-floor framing to the foundation to prevent a building from sliding off in an earthquake.

**Code:**

ICC-ES ESR-2616

For more information, refer to our Seismic Retrofit Guide (F-SEISRETRGD), Detail Sheets or strongtie.com/seismic.
Concrete Anchors and Adhesives

Simpson Strong-Tie offers mechanical and adhesive anchoring solutions that are particularly effective for soft-story retrofits where wood structures need to be securely connected to existing concrete foundations.

**Titen HD® Heavy-Duty Screw Anchors**

For securing a soft-story structure to its foundation by bolting the mudsill to the foundation or to secure a wood ledger to concrete or masonry, the Titen HD screw anchor provides optimum performance in both cracked and uncracked concrete. The Titen HD is now available in stainless steel.

**Code:** ICC-ES ESR-1056 and ESR-2713

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**SET-3G™ High-Strength Epoxy Anchoring Adhesive**

Formulated for high-strength anchorage of threaded rod and rebar into cracked and uncracked concrete and is frequently used to install anchor bolts for holdowns and tension ties in site-built shearwalls. SET-3G anchoring adhesive offers increased strength and reliability in adverse conditions, including static and seismic loading.

**Code:** ICC-ES ESR-4057 (concrete)

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**AT-XP® High-Strength Anchoring Adhesive**

Formulated for use under a wide range of conditions, AT-XP adhesive dispenses easily even in below-freezing temperatures with no need to warm the cartridge. When mixed properly, this low-odor formula is a dark teal color for easy post-installation identification.

**Code:** IAPMO UES ER-263 and ER-281
We Would Like to Help
To learn more about how Simpson Strong-Tie can help you with Northern California soft-story retrofit mandates, call (800) 999-5099 or visit strongtie.com/softstory

With dedicated pages for: Building Owners, Engineers and Architects, Contractors, and Inspectors.

Retrofit Checklist for Building Owners
If you think that your building might be affected by your city's mandatory soft-story retrofit program, we encourage building owners to do the following as soon as possible to meet the appropriate deadlines from the city.

1. Determine if your building has a soft-story
By classic definition, a soft-story building generally has large openings, such as garages, tuck-under parking or even large windows, on the first floor of a multiple-story building. These openings make the first floor weaker and unable to carry the weight of the stories above during an earthquake.

2. Verify with your city's Department of Building and Safety regarding the following:
• Whether your building is within the scope of the mandatory retrofit program for soft-story buildings
• Important deadlines regarding submittal documentation, permits, construction completion and certificates of compliance
• Additional information on city programs that might be available to help building owners

3. Find and schedule a licensed engineer to assess your soft-story building according to the requirements of the city's retrofit ordinances
• Visit seaonc.org/structural-engineer-referral-list for a licensed retrofit engineer

4. Should a licensed engineer determine a retrofit is needed, hire a contractor and, if desired, an architect
• For licensed and insured contractors in California, visit the Contractors State License Board at www.cslb.ca.gov
• Visit cab.ca.gov for information on licensed architects in California

5. Submit plans for your building's retrofit to the city's Department of Building and Safety including:
• Previous retrofit work
• Structural analysis/calculation package
• Architectural plans
• Structural plans

The Department of Building and Safety will assist building owners with all the steps needed to obtain the appropriate retrofit permits, including clearances from all agencies during your building's retrofit work.

Professional Tools for Specifiers
Simpson Strong-Tie provides several tools to assist specifiers with retrofit solutions of soft-story buildings, including:

The Strong Frame® moment frame selector software helps designers select an ordinary or special moment frame for a project's given geometry and loading.

The Weak Story Tool with Simpson Strong-Tie® Strong Frame Moment Frames assists in performing the analysis outlined in FEMA P-807 with the aid of a CAD interface to account for the locations and structural properties of the various lateral-load-resisting elements before and after retrofitting. This enhanced software program for specifiers combines the convenience of designing a variety of retrofit solutions that include Strong Frame special moment frames with a simplified method for cost evaluation.

Also available: Onsite training and online courses related to soft-story retrofit; check strongtie.com/training for more information.

Resources for Contractors
Our Soft-Story Retrofit Guide (F-L-SSRG) includes soft-story design codes and requirements, retrofit solutions and design tools.

For a complete list of available videos and other resources about Simpson Strong-Tie® products, please visit strongtie.com/resources.