SIMPSON STRONG-TIE® COMPANY, INC.
The World's "No Equal" Structural Connector Company
4120 Dublin Blvd., Suite 400 • Dublin, California 94568
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Anchor Tiedown System

The Anchor Tiedown System (ATS) is a new method for anchoring shearwalls in mid-rise wood frame construction to resist large uplift forces in stacked shearwall systems caused by earthquakes and high winds.

The revolutionary ATS method restrains overturning forces through bearing plates and Simpson Strong-Rod, provides a high capacity restraint (40,000 lbs plus capacity) which exceeds most horizontally bolted connections, increases shearwall performance by eliminating fastener slip due to possible oversized horizontal bolt holes from traditional holdown connections, and can eliminate 60~70% of labor costs. The patented ATS product also offers an optional Take-up Device to compensate for wood shrinkage and settlement due to the dead load.

The ATS method also eliminates the need to design lumber in tension as the wood members on either side of the Strong-Rod only resist compression forces. The shrinkage of the wood structure is also compartmentalized at each level by breaking the Strong-Rod connection through a patented tension bracket. This bracket allows for rod travel at each level due to shrinkage and provides an easy method for reducing rod sizes as the system continues up the structure.

The load path for the ATS product is summarized by: the bearing plates resisting the incremental story overturning forces and the Strong-Rods and compression posts resisting the cumulative overturning tension and compression forces. A sketch of a typical three-story system is shown in figure 1 with illustrations depicting the load path of the ATS product. Figures 2 & 3 illustrate the load path difference between horizontally bolted connections and the ATS product.

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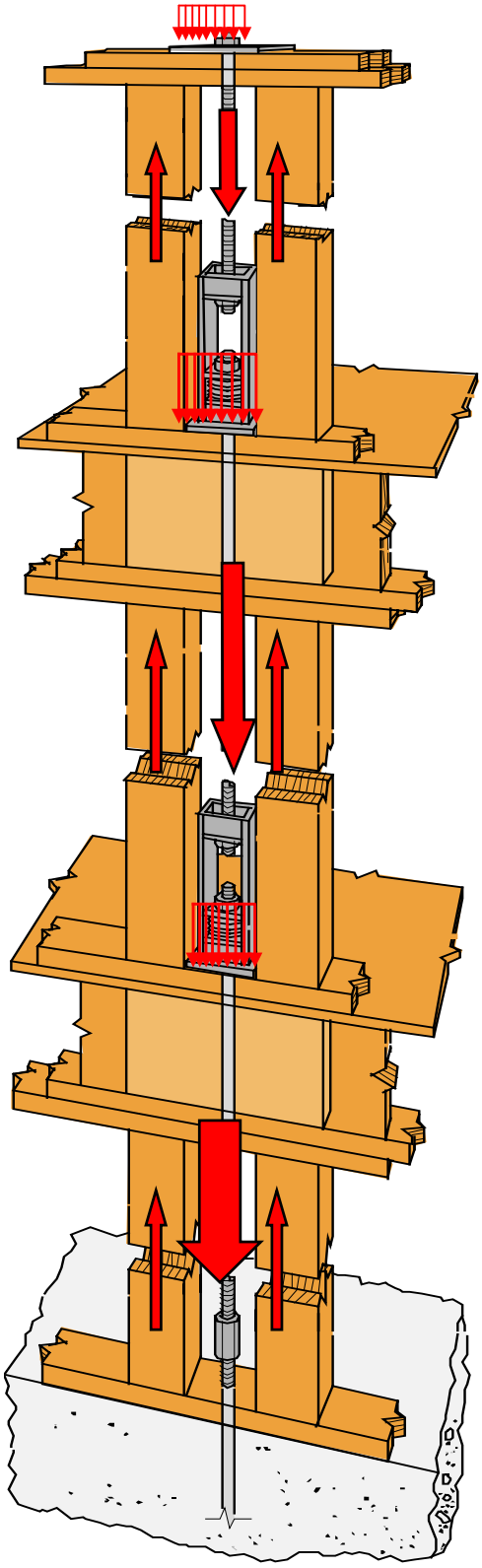

Figure 1
Load restraint path through typ. 3-story tiedown system

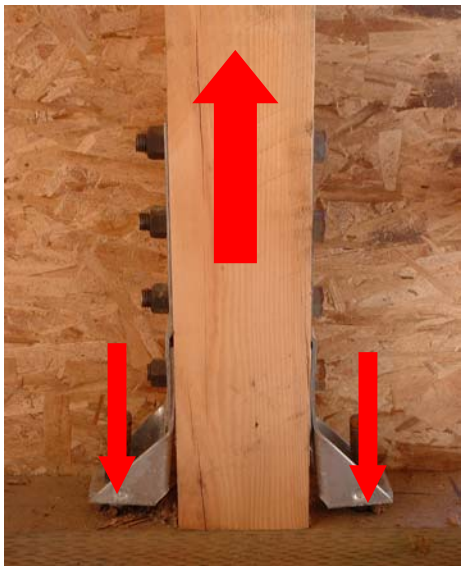

Figure 2
Net section of lumber must be designed for tensile forces

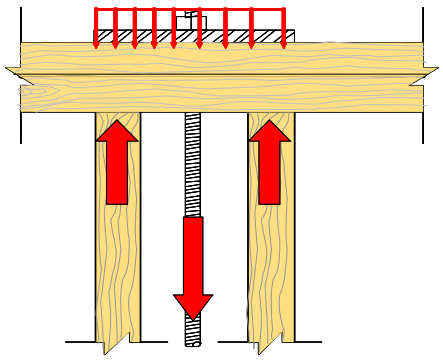

Figure 3
Load path of ATS product at Strong-Rod termination

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Introducing SSTATS Software:

Simpson Strong-Tie's Anchor Tiedown System selector software (*SSTATS*) is a free tool created by Simpson Strong-Tie to aid the design professional in selecting appropriate Simpson ATS products and compression members for anchoring shearwalls in wood frame construction. The software is user friendly and provides printable calculations for verifying the adequacy of the ATS product capacities against overturning forces calculated by the design professional. The SSTATS software also creates elevations of stock or custom tiedown systems in 'dwg' format by a click a button and provides a breakdown of the ATS component and lumber lists for the project. With the SSTATS software, its now as easy to specify the ATS product as it is to install.

Minimum system requirements:
PC with a Pentium 50 MHz or higher processor
Microsoft Windows 95 or later operating system
AutoCAD version 14.01 or later version

User Agreement:

As a user, you are responsible for assuring the accuracy of your input to the program. All output should be reviewed for accuracy by a qualified design professional before product use. The program's product selection must include a thorough review of the latest version of the software and Simpson ATS catalog to insure appropriate selection and product application. Simpson Strong-Tie is not responsible for any of the design, engineering, calculations or derivations of structural forces related to the building.

Installing SSTATS:

After you've agreed to the End User License Agreement, you're ready to install the software. By default, the SSTATS will be installed at c:\Program Files\SSTATS. If you had a previous version of SSTATS, the early versions will be removed while no previous saved job files are erased.
To install SSTATS:
1) Insert the CD-ATS04 Disc in the CD-ROM drive. Click the Install Now button.
2) Follow the instructions on your screen.

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Getting Started:

Open the SSTATS software, by clicking on the SSTATS icon and accept the End User License Agreements. Enter the required job name, number, location and user information at the top of the screen. The next step is to set the job options by selecting the 'options' tab at the bottom of the screen.

Tiedown System Options:

The design professional chooses options for each job based on selected design parameters and local code requirements. The following is a description of the SSTATS software options:

Steel Options

Rod Stress Increase – A one-third-stress increase may be permitted on the calculation of the Strong-Rod capacities depending on the load combination and building code used in design. Refer to Table 1.
Note: The one-third-stress increase does not apply to the ATS 2-series brackets in tension, as the ATS bracket tensile capacities are test limited.

Tension Component Multiplier – Some jurisdictions require a 0.75 multiplier on all tension components in a tiedown system. Refer to local Building Department product evaluation reports or policies for applicability.

Rod Elongation Limit Required – The SSTATS software can select Strong-Rod at each level based on a selected rod elongation limit. The rod length, for this limit, is calculated based on the sum of the plate height, floor depth and an additional 8-inch minimum rod length required extending through the ATS 2-series cage and sole plate.
Note: Some jurisdictions require that the steel rods meet certain elongation limits per floor. Refer to local Building Department product evaluation reports or policies for applicability.

Take-Up Devices Required – The Simpson Strong-Tie Take-Up Device (TUD) is an optional item specified by the design professional. The TUD compensates for wood shrinkage and settlement due to dead load. Simpson Strong-Tie recommends if TUD's are specified that they be installed at every level. Therefore, the TUD is provided at every level with this software when selected by the designer.
Note: Some jurisdictions require the use of Take-up devices with the tiedown system. Refer to local Building Department product evaluation reports or policies for applicability.

Lumber options

Load Duration Factor – The appropriate load duration factor (Cd) for the lumber shall be selected by the design professional. See Table 1 for further information.

Compression Member Species and Grade – The Compression member species and grade shall be selected by the design professional from the available options provided. The compression capacities for the lumber are calculated per the 2001 National Design Specification (NDS) for the plate heights and the wall plate and post species selected.

Wall Plates - The wall plate species and grade shall be selected by the design professional from the available options provided. The perpendicular to grain stress of the wall plates is based on values in the 2001 National Design Specification (NDS) for the species grade selected by the design professional.

Table 1 - Applicability of Load Duration factor and 1/3 Steel Stress Increase

Code	Load Combination	Cd (Wood) Allowed	1/3 Stress Increase (Steel) Allowed
ASCE 7-98, ASCE 7-02	Basic	Yes	No
1997 Uniform Building Code	Basic	Yes	No
	Alternate	Yes	Yes
2000 International Building Code	Basic	Yes	No
	Alternate	Yes	Yes
2003 International Building Code	Basic	Yes	No
	Alternate	Yes	No
NFPA 5000 ASCE 7-02	Basic	Yes	No
Florida Building Code ASCE 7-98	Basic	Yes	No

Saving Job Options:

Selecting 'OK' at the bottom of the options screen will save the chosen steel and lumber options.

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Tiedown System Design:

A tiedown system can be created by selecting 'ADD' at the bottom of the main- selector screen. A new dialog screen will appear with a single story tiedown system shown by default. The designer can create additional levels for the tiedown system by clicking the 'ATS Stories' drop down menu and selecting the correct number of stories. If an incorrect number of stories were chosen, selecting the correct number of stories again will delete the unwanted levels.

Plate Heights and Floor Depths:

The plate height and floor depth, at each level for the tiedown system, are set to 10'-0" and 1'-0" by default. The designer may select new dimensions for each level by selecting the drop down menus for each selection and choosing the desired dimension.

Non-Platform Framing
Selecting 0'-0" for the floor depth at any level will set all floor depths to this dimension and will be indicated in the drawings.

Base Connection:

The connection of the tiedown system is set by default to begin at the first level and to a concrete foundation. If the base connection of the tiedown system is to begin at a level other than the 1st level or if the tiedown system begins on a wood or steal beam, then the correct base connection and level to begin the tiedown system must also be selected by using the drop down menus provided at the top of the screen. When a wood or steel beam connection is chosen for the beginning of the tiedown system, the base level will default to the second level.

Stock vs. Custom:

The designer may also choose a 'stock' or 'custom' design tiedown system by selecting the TDS Style drop down menu located at the top of the screen. The software is set to custom style runs by default. The software will recommend the custom option if no stock tiedown system is available to meet the input design forces. Note that designing with the 'stock' run option may produce less cost efficient tiedown systems than the custom option.

INPUT:

There are two columns, located adjacent to the plate height option, to input the cumulative Allowable Stress Design (ASD) level tension and compression overturning forces, in kips, calculated by the design professional. (1kip = $1x10^3$ lbs)

System Recommendations:

Once the forces have been input at each level, the ATS Selector Software will recommend the most efficient ATS component and compression member, based on tensile or compressive capacities, in the 'Recommended' column. The designer may choose all of the selector software recommendations by clicking on the 'Select All' button. The recommendations will be loaded into the 'Selected' column and the calculated capacities of each component shown in the 'Allow.' Column.

A direct comparison of the design forces vs. the allowable capacities is provided for each component along with the demand vs. capacity (D/C) ratios and the calculated rod elongations at each level.

Multiple selections of lumber will be provided at each level for 4-inch and 6-inch thick framing walls and for solid sawn or multiple 2x lumber sizes. The multiple 2x size lumber selections will be shown as alternate lumber sizes on the tiedown system elevations. Multiple 2x and solid lumber selections may occur at levels where the ATS-PL2 or PL3 plates are requied. This multiple member selection is necessary to maintain the maximum 6-inch clear distance between the members without notching the lumber. Refer to detail 5 on the ATS Installation detail sheet (Studs over ATS-PL plates) for further information.

Overriding recommendations:

The designer may override each recommended component selection by clicking the drop down menu at each component in the selected column and selecting an alternate listed in the dropdown menu. (The software only lists components or compression members that meet or exceed the design forces) The font in the description for the alternate component chosen will turn blue for easy identification of components differing from the software recommendation.

Assigning Run Type ID:

A 'Run ID' (may be any combination of text or numeric characters) must be designated for the new tiedown system and saved by selecting 'OK' at the bottom of the screen. A running job list of the saved tiedown systems will be provided on the main screen. Selecting the 'ADD' icon and running through the previously listed steps will create additional tiedown system runs.

Printing:

To print the ATS job file calculation package, select the 'Print' icon at the bottom of the main screen. A new dialog box will appear and the following selections will be printed by default: A cover sheet, a job summary list of the tiedown systems with maximum capacities at each level, a detailed summary for each tiedown system and an expanded calculation detail. Each default print item may be deselected by clicking the check box next to each item shown on the printout dialog menu.

Draw function:

Once all tiedown systems have been designed, clicking the 'Draw' icon on the main screen will create drawing blocks of the tiedown elevation(s) in 'dwg' format. Individual elevation drawings can be created by selecting the desired 'Run ID' in the job list on the main screen and then selecting the 'Draw' icon or all elevations can be created simultaneously in one AutoCAD drawing by deselecting all Run ID's and then selecting the 'Draw' icon. To deselect all Run ID's, click anywhere in the job list screen below the last tiedown system in the list.

After selecting the 'Draw' icon, a dialog screen will appear and the correct version of AutoCAD on the users system and the desired drawing style must be selected. There are two drawing styles available for the tiedown elevations – orthogonal and perspective. Once these selections have been made, the ATS selector software will invoke the selected AutoCAD version and create drawing blocks of the tiedown system elevations, which can be inserted into structural details as necessary.

ATS Material List:

On the main screen the 'Material List' tab provides a breakdown of all ATS components for the entire project. Once a count of each tiedown systems have been input into the software program, the job file can be sent directly to Simpson for quoting. The material list from the software can simply be imported directly into Simpson's computer system to eliminate discrepancies with required ATS components and provide an accurate quote of the stock or custom design tiedown systems.

Lumber Detail:

On the main screen the 'Lumber Detail' tab provides a list of all possible compression member selections, as chosen by the professional user during the tiedown system design, for each tiedown system at every level. (refer to System Recommendations' section for further information) The installer can choose the preferred lumber at each level for each tiedown system based on the selections provided by clicking on the lumber size at each level. The font of each selection made will turn blue. Once all selections have been made, a summary of the selected lumber sizes cut to the nearest board length, quantity, member species and grade, board feet and extended cost per total board feet will be provided by selecting the next tab labeled 'Lumber Summary'.

Lumber Summary:

A summary table of the selected compression members for the tiedown systems is provided on the 'Lumber Summary' tab. A list of the selected lumber sizes cut to the nearest board length, total quantity, member species and grade, board feet and total board feet are provided and may be printed. The list may also be modified to provide the required lumber for each level of the ATS product for the entire job.