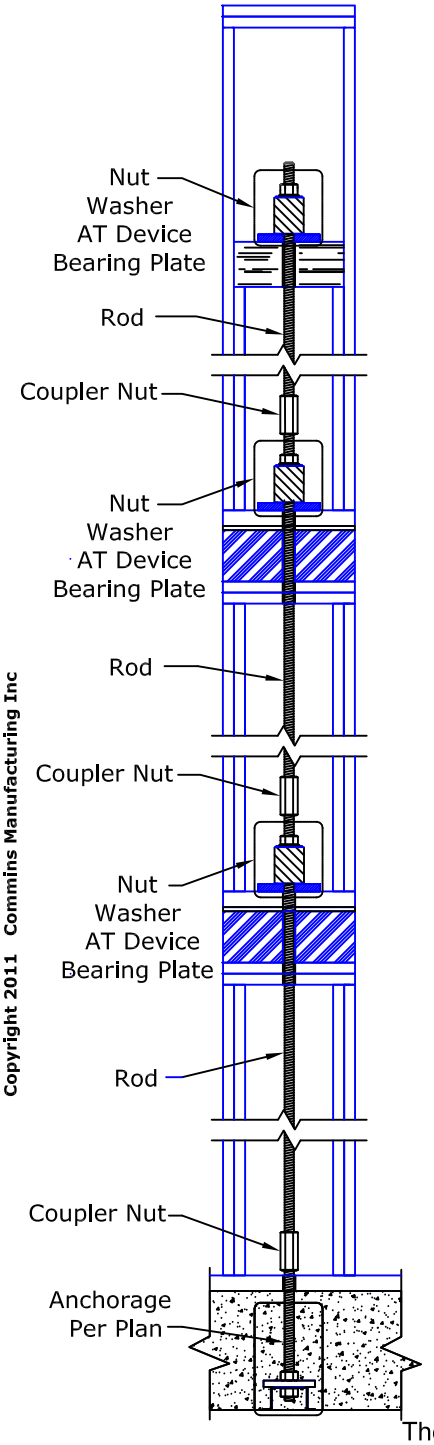
AutoTight Tie-Down Systems

Commins Manufacturing 360-378-9484

AutoTight Templates help speed tie-down design. Complete systems can be designed in 30 minutes. Our designs always begin with system strength. The designer then adjusts elongation to meet jurisdiction requirements. The demonstration package provides an overview of the software and the process.



Package	Description
Demonstration Sample Package (pdf)	The **Demonstration Sample** showcases a typical design process . The example includes: **Project information** (one page). Project and code requirements. **Load justification** (one page). Enter system loads. Adjust elongation. **Run Take-Off** a run-by-run materials list. **Run Materials list.** Every item need to build the system. **Calculation Package.** Review ready calculations, every floor, every run. **AT 10 Holdown Run Details.** (selected per code) **AT 11 Holdown Run Elevations.** Shop Drawings for field assembly. **AT 12 Anchor Bolt Embedments** Details every location
Run Sorter (Excel) (1)	The **Run Sorter** provides a method of combining loads floor-by-floor to create the "Best" balance of cost vs the number of runs. Loads are entered by location (X and Y) and then by floor level 1,2 3 etc. Using the excel data sort function allows the operator to optimize the number of different runs. **Run Sorter** Instructions 10 page PDF.
AutoDesign (2a) (Excel) **AutoDesign Quick Start (2b)**	**AutoDesign** generates a strength based design. The designer then adjusts elongation by changing rod or bearing plates. **Output includes:** a Load Justification Table and a hardware list. **Estimated Design Time:** 15-45 minutes **AutoDesign Quick Start** is a fully functional sample **AutoDesign Instructions** A PDF Power Point presentation (6.7) MB.
Calculation Pack (Excel) **(3)**	**AutoTight Calculation Package** uses AutoDesign information to provide ready-to-review job specific calculations. The calculations are floor-by-floor one page per run. **Instructions** see worksheet tab **Estimated Time:** 20 minutes
AT 10 Drawing Details (AutoCAD) **(4a - 4f)**	**AT 10: Drawing Details** includes Rod, Bearing Plate and AT Auto Take-Up information, code information and common details. Select the version required per your building code, make simple changes for the project. Instructions are on layout tab "Instructions". **Output:** Complete customized details. **Estimated Time:** 15 minutes
AT 11 Run Details (AutoCAD) **(5)**	**AT 11: Run Details** is a ready-to-modify drawing in a pick-and-place format. Runs from one to six stories are selected from a library. Couplers, rod, TUD's and plates are added based on AutoDesign. Instructions are on layout tab "Instructions". **Output:** Multistory Run Elevation Drawings ready for review. **Estimated Time:** 30 minutes per run.
AT 12 Embedments (AutoCAD) **(6)**	**AT 12: Embedments** provides a ready to modify embedment template compatible with most tie downs. Instructions are on layout tab "Instructions".

The numbers in **Green** are keyed to the thumb drive index. These are the most used for system design. See "***#12 Delta R Compared***" for a graphic Delta R illustration.

AutoTight Tie-Downs

Commins Manufacturing, Inc.

Tie-Down System Design

Designing tie-down systems that are tight and limit drift is difficult unless there is a **clear objective** and a **structured approach**. The AutoTight AutoDesign provides both the objective and the path. We design hundreds of tie-down systems every year. The following Model specification is designed per code requirements. Use it as a starting point and include it in your design specifications.

Model Tie-Down System Specifications.

To insure building performance and code compliance the following specification is recommended for wood framed buildings. Please copy and modify as desired.

Tie-Down System

"The Tie-Down (Holdown) system shall be the AutoTight Rod System with ICC ESR # 1344 and/or COLA RR 24580, as manufactured by Commins Manufacturing Inc., Friday Harbor Washington 98250 (www.comminsmfg.com)

System limits:

1. The system shall be designed for strength per the code.
2. The system shall provide a maximum of 0.200" (or 0.125" or 0.179") elongation between reaction points for all tension elements. Tension elements shall include rod, plate compression and shrinkage compensator deflections. Shrinkage compensator deflection shall include Δ_a plus Δ_r (Average Travel and Seating Increment)
3. The system shall provide a minimum out-of-plumb rating of 2 degrees.
4. The system shall provide a minimum of 1/4" (or 3/8", ½" or ¾") cumulative shrinkage compensation on every floor.
5. The system shall provide an independent (parallel) load path for each TUD at each reaction point."
6. When connected across a wood framed floor, engineered panels shall include a shrinkage compensating device. Each compensation device shall have a Δ_r of 0.005 or less.
7. Straps may **not** be used with vertical connections.

With the prior written approval of the Engineer of Record, other systems may be substituted **IF** the system meets the stated requirements. Items highlighted are the most commonly adjusted specification. Change as needed.

Code Limits

The code requires tie-down systems to have required strength, limit deflection and to accommodate shrinkage/settling. If systems are loose several problems may result. First a loose system will degrade the system. System may loose as much as 40% of their lateral strength with just 0.200" of looseness[1]. Jurisdictions have addressed this by limiting system stretch. (See appendix B TUCC requirements and ICC ES AC 391 for more information). System stretch limits vary but are as low as 0.125". System Stretch can include rod, shrinkage compensators, bearing plates and hold downs.[2] Commins

Manufacturing Inc. uses an automatic LJT (Load Justification Table) to design systems that meet all code requirements.

Example

This is an overview of computations Column needed to design Tie-Down systems. The example uses a **load justification table** (LJT) and explains how the numbers are generated. The LJT allows us to design a system as fast as uplift tension loads are entered. Complete systems can be designed in as little as 30 seconds per run. As loads are entered each run is inspected floor-by-floor for strength, elongation and shrinkage. The example shows a single run with loads and elongations associated with the first floor. Other floors are similar. The LJT table is generated on page 2 of the Auto Design software.

1		2	3	4	5
Run		1			
Count		846			
Cat Run Type		Cat-4 (T4321)			
Tension=	T	Required Loads per level (kips)	Allowable Load (k) Rod Ø - Type	Differential Load (k) AT Plate	Stretch Load (k) System (in) Limit (in)
Compression=	C				
Floor/Level					
5th floor	T	1.70	4.42 R4A307	1.70 AT4A-2.5	1.700 0.065
	C		1/2"-A307	S4	0.200
4th floor	T	6.40	6.90 R5A307	4.70 AT6A-1.5	6.400 0.155
	C		5/8"-A307	S5	0.200
3rd floor	T	11.20	13.53 R7A-A307	4.80 AT100	11.200 0.132
	C		7/8"-A307	S8	0.200
2nd floor	T	16.00	17.67 R8A307	4.80 AT100	16.000 0.141
	C		1" -A307	S8	0.200
Anchor Rod			1"-A307	Reset Run	

Example:

Column 1 defines the floor designation from the first page entries (see 51. Floor/Level).

Column 2 provides a location to enter tension (Uplift) loads level-by-level. The example shows 16, 11.2, 6.4 and 1.7 kips (1 kip = 1000 pounds) on floors 1 thru 4. As loads are entered the system automatically selects:

Column 3: The smallest rod that will carry the specified load. The example selected a 1" diameter A307 rod, rated capacity 17.67 kips for the first floor.

Column 4: The **differential load** (reaction load at each floor level) is calculated by subtracting the load from the floor above. The example selected a **differential load** of 4.80 kips.

[1] Cola Report 2001
[2] ICC-ES AC 391 July 2010

The program also selects a **bearing plate** to distribute the reaction load into the structure, and a **Shrinkage Compensator** that will: fit the rod, carry the load and expand the required amount.

Example: Bearing Plate = S8 (Suitable for 8 kips on dfl) and
Take-Up Device = AT 100. Fits 1" rod, rated at 25.3 kips and expands 1.1"

Column 5: The total rod tension load is listed in the last column and elongation is calculated.

Example: Total **rod tension** = 16 kips
Elongation Limit = 0.200" (change on AutoDesign, page one #32)
System stretch is shown in the middle (green) box.
Example: Elongation = 0.141".

Detailed Manual Calculations

Building Codes may specify **rod only or system stretch (elongation). T**he AutoTight system is switched from one to the other with toggle button (201 on the LJT, top left).

The Transparent Takeoff performs the following calculations automatically. (First floor example, other floors are similar).

Rod elongation is per AC391. Using $\mathbf{D_{rod} = PL/A_nE}$

Rod Stretch = 16000*121"/0.58198*29,000,000 = 0.110"
Where $A_n = 0.7854(1-0.9743/8)^{2 =}$ .606 sq in (AC 391 Eq.1)

Bearing Plate Compression is limited to 0.040" at 8,241 lbs.
Wood Compression = 0.040 * 4,800/8,241 = 0.0233"

TUD deflection consists of two components: load/deflection and $\mathbf{D_r}$

TUD Load/Deflection movement is adjusted based on actual load vs. capacity.
Defl. = 0.032 * 4,800/25,300 = 0.0061"

Delta R ($\mathbf{D_r}$) is TUD deflection based on cyclic loading. AC 316[3] section 1.4.7 calls this "Average travel and seating increment". This number ranges from 0.000 to 0.180" depending on the TUD. $\mathbf{D_r}$ is independent of load and is always added in full (AC391 section 3.1.1) For the AT100, $\mathbf{D_r}$ = 0.002"

Comparing Total Deflection for a system with a screw and Ratchet Tud is:

		Screw Tud	Ratchet Tud
Deflections:	Rod	0.110	0.110
	Bearing Plate (S8)	0.023	0.023
	TUD (Load/Deflection)	0.006	0.014
	$\mathbf{D_r}$	0.002	0.090
	Total Deflection	0.141 OK	0.249 Does not Comply

[3] ICC ES AC 316 August 2010

Note: if elongation exceeds system limits two changes may be made manually. Either increase the bearing plate or rod size. Drop down menus for rod, bearing plate or TUD are available to change sizes.

ALERT. Some systems don't calculate include all the items shown. If missed your system may not meet code.

Available Design Files

Designing systems step by step is fast with a clear path. The following files will aid you. The links to those files are shown below. Before you follow the path scroll down and read a brief review.

For assistance please call (360) 378-9484 and ask for Technical Assistance.

Example: **AutoDesign Demonstration Sample Package** (18 Page PDF)

1. **AutoTight Run Sorter** (Excel)
   Instructions: AutoTight Run Sorter Instructions (10 page PDF of Power Point)

2a. **AutoDesign** Working Program (Excel)
2b. **AutoDesign Quickstart** Working Program (Excel)
   Instructions AutoTight AutoDesign (PDF of Power Point Instructions 57 pages)

3. **Calculation Package** (Excel) Beta

Detail Templates (AutoCAD)
4a. **AT10 CBC2007 Holdown Run Details** (AutoCAD)
4b. **AT10 IBC2006 Holdown Run Details** (AutoCAD)
4c. **AT10 IBC2009 Holdown Run Details** (AutoCAD) (Most Common)
4d. **AT10 LABC2008 Holdown Run Details** (AutoCAD)
4e. **AT10 OSSC2007 Holdown Run Details** (AutoCAD)
4f. **AT10 NBCC2005 Holdown Run Details** (AutoCAD)

5. **AT11 Holdown Run Elevations Template** (AutoCAD)
   Sample Project. **AT11 Holdown Run Elevations** (AutoCAD)

6. **AT12 Anchor Bolt Details Sample** (AutoCAD)

AutoTight Templates

AutoTight Templates speed tie-down design. Complete systems can be designed for strength, elongation and shrinkage in 30 minutes. AutoTight designs always begin with system strength. The designer then adjusts elongation to meet jurisdiction requirements. To help you understand the process and software please open the **AutoDesign Demonstration Sample Package** (18 Page PDF) and review the steps. The Demonstration package showcases a typical project.

1. **AutoTight Run Sorter (Excel)**
Instructions: AutoTight Run Sorter Instructions (10 page PDF or Power Point)

The AutoTight Run Sorter provides a method of taking project uplift loads, arranging them in an Excel file and sorting them for easy specification. Loads are entered on a spread sheet in x, y and z coordinates. The sort function then groups the runs. The designer selects a cutoff point based on his engineering judgment and determines the number of different runs.

The AutoTight system accommodates up to 25 different runs, however most contractors and framers will do a better installation if the designer limits the number of runs. Commines Manufacturing suggests a practical limit of 6 to 10 runs.

2. **AutoDesign**

The **AutoDesign** is available in two options. They both work the same.
2a. **AutoDesign** Working Program (Excel). This requires you to fill in all required information. Typical offices create a template and modify it for each job.
2b. **AutoDesign Quickstart** (Excel) is a full working program with template information already entered. Use this to see if you like the program.

AutoDesign Instructions is a PDF of a Power Point presentation. It consists of 57 pages with one or two points per page. Open it the first time you do an AutoDesign and it will walk you through the process. After you use it once it will make a good reference.

AutoDesign (Typical Design Time 30 minutes)

Project information Collect the key project information, code requirements and limits on one page. Many cells on this page are linked to other pages. Enter the information once and it is automatically transferred as needed.

Load justification Table (LJT) Enter system loads run-by-run and floor-by-floor. As fast as information is entered the system selects the rod, bearing plates and shrinkage compensators. If the required elongation is exceeded (based on your stated limits) the program automatically flags the excess elongation and requests you to change components. Adjusting elongation requires you to hit a pull down menu for rod and/or bearing plates. Elongation adjustment only takes seconds.

The **CAT System Materials – By Run** is generated automatically. This materials list specifies every item required for each run. It requires, at a minimum, that you place a 1 in the count box.

The CAT Materials List – Total Lists every item need to build the project exclusive of embedments. The list reflects the total number of runs for each run as entered on the Load justification Table. Properly using this list greatly increases the accuracy of any bids, lowers the errors and lowers the cost.

3. **Calculation Package** (Excel) Beta

The **Calculation Package** is an excel program linked to the AutoDesign. Enter the required information (2 places) and the program automatically generates:

A review ready cover page,
a Key,
one page of calculations for every run.

Save it as a PDF and print as needed. Estimated time - 5 minutes.

Detail Drawing Templates (AutoCAD)

Detail Drawings are offered in Six Different Templates depending on the code currently used in the jurisdiction. Select the appropriate template modify it as needed and save it. Estimated Time 10 minutes.

4a. **AT10 CBC2007 Holdown Run Details** (AutoCAD)
4b. **AT10 IBC2006 Holdown Run Details** (AutoCAD)
4c. **AT10 IBC2009 Holdown Run Details** (AutoCAD) (Most Common)
4d. **AT10 LABC2008 Holdown Run Details** (AutoCAD)
4e. **AT10 OSSC2007 Holdown Run Details** (AutoCAD)
4f. **AT10 NBCC2005 Holdown Run Details** (AutoCAD)

5. **AT11 Holdown Run Elevations Template** (AutoCAD)
Sample Project. **AT11 Holdown Run Elevations** (AutoCAD)

AT 11 Holdown Run Elevations consists of an AutoCAD template and a library of runs from one to 6 stories. The designer selects and places each run on the template and modifies the material callout. Estimated drawing time - 2-4 hours.

6. **AT12 Anchor Bolt Details Sample** (AutoCAD)

Advanced Features

We have included some advanced features into the software. The advanced features allow you to insert “stretch rod” into a run to limit deflection. Please call the factory and we will walk you through this option.

AutoTight® Holdown System

www.comminsmfg.com

Project Information

1.Bid Date:*	12/10/10	2.Project ID#	75-19846	3.Revision #:	0	4.Takeoff By:	ME	5.Runs:	81

6.Project:*	The Sample Project			7.Distributor:			
Address:	960B Guard Street			Contact:			
City, ST, ZIP:	Friday Harbor, WA 98250			Address:			
9.Est. Start Date		11.#of Bldgs	1	City, ST, ZIP:			
10.Plan Set*	Bid Set	12.Plan Date	11/29/10	Phone:		Cell:	
Building / Site Plan Notes:				Fax:			
				e-mail:			
				13.Ship to City, ST, ZIP:			
15.Engineer Firm:	AutoTight Designer			16.Contractor:			
EOR/Contact:				Contact:			
Address:	P.O. Box 3338			Address:			
Suite/Unit:	Suite 2			Suite/Unit:			
City, ST, ZIP:	Friday Harbor, WA 98250			City, ST, ZIP:			
Phone:	360-378-9484	Cell:		Phone:		Cell:	
Fax:				Fax:			
e-mail:				e-mail:			

Structural Holdown System Information				18.Complete CAT System	No	21.Detail OK	22.DWG #	23.Detail/Note
19.Design Code:*	IBC_2009	per the State and Local jurisdiction				√	S1	
25.Reqd Loads per:	Schedule					√	S5.6	

30.Take-Up Device at Each Level	Yes	Add'l Run Notes	
31.Est. Wood Shrinkage*, in/floor	1/4		
32.Elongation Between Connection (in.)	0.200		

33.Run Termination Type*	Top Plate Termination	34.Wood Beam Starts	Yes	35.Steel Beam Starts	Yes		
Threaded Rod / Couplers		Wood Specifications	We assume			44.Detail OK	45.DWG #	46.Detail/Note
36.Standard Rod Type	A307	40.Shearwall Plates*	DFL			√	S2	
37.High Strength Rod Type	C1045	41.Studs per Plans	DFL			√	S2	
38.Higher Strength Rod Type	A193-B7	42.Post per Plans	DFL #1			√	S2	
39.Extra High Strength Rod	A354-BD	43.Floor Joist*	11 7/8" TJI			√	S2.3	

Story Heights (Carpet to Carpet):			Wall Plates		Joist+Floor Plywood		Comp Post Height		48.Elev.	√	A1.2	
51.Floor/Level*	52.ft.*	53.in.*	Sill (in.)	Top (in.)	Between	in.	ft.	in.	49.Additional Wood Notes:			
6th	10	0	1 1/2	3			9	7 1/2				
5th	10	0	1 1/2	3	4 & 5	12 5/8	8	6 7/8				
4th	10	0	1 1/2	3	3 & 4	12 5/8	8	6 7/8				
3rd	10	0	1 1/2	3	2 & 3	12 5/8	8	6 7/8				
2nd	10	0	2 1/2	3	1 & 2	12 5/8	8	5 7/8				

Anchor Rod Embedments		55.CAT Embeds	No	56.Original Plan Embed Details		√	S5.6	
Embed Type	57.PT Deck		58.Footing		59.Wall			
Depth/Width in	60.Thickness		61.Depth		62.Width			
63.Concrete PSI						Anchor Bolt Above Slab		
64.Hot Dipped Galvanized (HDG) Rod Required		No	65.Embedment Chairs Supplied			+ 6 inches		

Non-CAT System Embedment Rod Size, Thread Pitch and Material Type must be Verified Before Ordering

66.Additional Embed Notes:	

AutoTight® Holdown System

www.comminsmfg.com

AutoTight® Load Justification Table

The Sample Project
Friday Harbor, WA 98250

PROJECT ID #:
75-19846

201.Elongation Components
System Stretch

Run count:
81

Structural Engineer:
AutoTight Designer

P.O. Box 3338
Suite 2
Friday Harbor, WA 98250
360-378-9484

Date:
12/10/10

Rev #
0

By:
ME

Run		5A				5B				3A				1ASBS						
Count		64				8				5				4						
CAT Run Type		CAT-5 (T54321)				CAT-5 (T54321)				CAT-3 (T31)				CAT-1 (T1)						
Tension =	T	Required Loads per level	Allowable Load (k) Rod	Differential Load (k) AT	Stretch Load (k) System (in)	Required Loads per level	Allowable Load (k) Rod	Differential Load (k) AT	Stretch Load (k) System (in)	Required Loads per level	Allowable Load (k) Rod	Differential Load (k) AT	Stretch Load (k) System (in)	Required Loads per level	Allowable Load (k) Rod	Differential Load (k) AT	Stretch Load (k) System (in)	Story Heights (Carpet to Carpet)		Cumlative Est. Wood Shrinkage
Compression =	C																			
Floor / Level		(kips)	Ø - Type	Plate	Limit (in)	(kips)	Ø - Type	Plate	Limit (in)	(kips)	Ø - Type	Plate	Limit (in)	(kips)	Ø - Type	Plate	Limit (in)	ft	in	Total (in.)
6th	T	5.10	6.90 R5A307	5.10 AT6A-1.5	5.10 0.133	6.50	6.90 R5A307	6.50 AT6A-1.5	6.50 0.163									10	0	1 1/4
	C		5/8"-A307	S5	0.200		5/8"-A307	S6	0.200											
5th	T	5.90	6.90 R5A307	0.80 AT6A-1.5	5.90 0.117	10.75	13.53 R7A307	4.25 AT 100	10.75 0.124									10	0	1
	C		5/8"-A307	S4	0.200		7/8"-A307	S8	0.200											
4th	T	6.80	6.90 R5A307	0.90 AT6A-1.5	6.80 0.134	10.90	13.53 R7A307	0.15 AT 100	10.90 0.101	4.50	9.94 R6A307	8.50 AT6A-1.5	8.50 **0.241**					10	0	3/4
	C		5/8"-A307	S4	0.200		7/8"-A307	S8	0.200		3/4"-A307	S10	0.200							
3rd	T	7.50	9.94 R6A307	0.70 AT6A-1.5	7.50 0.100	16.00	28.19 R7B7	5.10 AT 100	16.00 0.176	8.50 *	9.94 R6A307			8.20	9.94 R6A307	8.20 AT6A-1.5	8.20 0.139	10	0	1/2
	C		3/4"-A307	S4	0.200		7/8"-B7	S8	0.200		3/4"-A307				3/4"-A307	S8	0.200			
2nd	T	9.20	9.94 R6A307	1.70 AT6A-1.5	9.20 0.132	27.80	46.59 R9B7	11.80 AT 125	27.80 0.197	16.00	17.67 R8A307	7.50 AT 100	16.00 0.157			***Stl Beam***		10	0	1/4
	C		3/4"-A307	S4	0.200		1 1/8"-B7	S12L	0.200		1 "-A307	S8	0.200							
Anchor Rod			**3/4"-A307**	Reset Run			**1 1/8"-B7**	Reset Run			**1 "-A307**	Reset Run				Reset Run				

Design Code: IBC_2009 per the State and Local jurisdiction
DWG: S1 Date: 11/29/10
Required Loads: Schedule
DWG: S5.6 Date: 11/29/10
Take-Up Devices AT75, AT100 and AT125 provide for 1.1" shrinkage, AT75-2.5 provides for 2.5" of shrinkage.
See Commins ICC-ESR-1344 and COLA RR 25480 for additional information.
S8 Bearing Plate shown by color and size (Plates Marked)
Plates with "S" Prefix fit 3-1/2" wall number signifies allowable load in kips and have 3/4" or 1" clearance holes.
Plates with "L" Preffix fit 5-1/2" wall and have a 1-1/4" Clearance hole for use with the AT125.
Plates with "L" Suffix have a 1-1/4" Clearance hole for use with the AT125.
Tension Load reflects the maximum capacity of the specified rod.
Differential Load is the load transferred into the building at that load transfer point.
Runs modified by combining runs and skipping floors. Subject to EOR acceptance.
Rod Elogation (Stretch) Calculations;
{Required Load (lbs.) per level for Rod x Stretch Length (in.)} / {Tensile Diameter (in.) of Rod x 29,000,000 (Young's Modulus)}
Stretch Length is the distance between a Termination Point, Anchor / Beam Start / Top Floor Termination and/or Differential Point.
System stretch includes Delta R. (the contribution due to reversal of direction of force applied to system)
Tie down systems now have an elongation limit or 0.180 for rod only and 0.200 fro the tie down system and 0.250 for the tie down system plus the top plate.
The note "Call Commins" in a cell means the load or another parameter exceeds standard capabilities.
Please call the factory at 360-378-9484 for solutions to extreme conditions.

T: 360.378.9484
F: 360.378.9485

Commins Manufacturing, Inc.
960B Guard St., Friday Harbor, WA 98250

AutoTight® Holdown System

www.comminsmfg.com

ME

CAT Holdown System Materials - All Levels

Project:			Run #	5A	5B	3A	1ASBS	Run Totals
Project ID #:			Stories	5	5	3	1	
Buyer:			Runs	64	8	5	4	81
Contact:			6					
Phone:			5	R5A307	R5A307			1 standard AT
Fax:			4	R5A307	R7A307			2.5" expansion AT
Distributor:			3	R5A307	R7A307	R6A307		2 Stacked AT's
Salesmen:			2	R6A307	R7B7	R6A307	R6A307	
Phone:			1	R6A307	R9B7	R8A307		Quantities

Items			Run #	5A	5B	3A	1ASBS	Item
Part #				Items per run				Total
Auto Take-Up Devices								
AT 100	(Pallet = 576)	1.1"			3	1		29
AT 125	(Pallet = 320)	1.1"			1			8
AT6A-1.5	(Pallet = 320)	1.5"		5	1	1	1	337
Bearing Plates								
S4	3/16 x 2½ x 2½	3/4"		4				256
S6	5/16 x 3¼ x 3¼	3/4"			1			8
S8	"3/8 x 4 x 3¼	1"			3	1	1	33
S10	1/2 x 5 x 3¼	1"				1		5
S12L	5/8 x 6 x 3¼	1¼"			1			8
Steel Beam Weld Plates								
EP-7A	5/8" x 3" x 3"						1	4
Threaded Rods								
R5A307 x 10'				3	1			200
R6A307 x 1'							1	4
R6A307 x 10'				2		2	1	142
R7A307 x 10'					2			16
R8A307 x 12'						1		5
R7B7 x 10'					1			8
R9B7 x 12'					1			8
Sighted Coupling Nuts								
CN-5	5/8" - 11 NC			2				128
CN-6	3/4" - 10 NC			2		1	1	137
CN-7	7/8" - 9 NC				2			16
CN-8	1" - 8 NC					1		5
CNHS-9	1 1/8" - 7 NC				1			8
Coupling Nut Reducers								
CNR-56	5/8" - 3/4"			1				64
CNR-57	5/8" - 7/8"				1			8
CNR-68	3/4" - 1 "					1		5
CNRHS-79	7/8" - 1 1/8"				1			8
Nuts								
N-5	5/8" - 11 NC			3	1			200
N-6	3/4" - 10 NC			2		1	1	137
N-7	7/8" - 9 NC				2			16
N-8	1" - 8 NC					1		5
NHS-5	5/8" - 11 NC						1	4
NHS-7	7/8" - 9 NC				1			8
NHS-9	1 1/8" - 7 NC				1			8
Washers								
W-5	5/8" SAE Flat			3	1		1	204
W-6	3/4" SAE Flat			2		1	1	137
W-7	7/8" SAE Flat				3			24
W-8	1" SAE Flat					1		5
W-9	1 1/8" SAE Flat				1			8
Engineering								
ENG RS-	Runs Stacked							1
ENG RB-	Runs Built							0
CAT Holdown System Materials Total:								

T: 360.378.9484
F: 360.378.9485

Commins Manufacturing, Inc.
960B Guard St., Friday Harbor, WA 98250

CAT Holdown System Material

Complete CAT Holdown System
(Embedments Not Included)

Date	**12/10/10**
By	**ME**
Rev #	**0**

Building Project:	**Distributor:**
The Sample Project **Friday Harbor, WA 98250**	

CAT ID # 75-19846

Auto Take-Up Devices			
29	AT 100	Auto Take-Up Device, 1 in.,1.1" shrinkage	
8	AT 125	Auto Take-Up Device, 1 in.,1.1" shrinkage	
337	AT6A-1.5	Aluminum Auto Take-Up Device, 3/4 in.,1.5" shrinkage	
Bearing Plates			
256	S4	Bearing Plate, 3/16 x 2½ x 2½, 3/4" hole	
8	S6	Bearing Plate, 5/16 x 3¼ x 3¼, 3/4" hole	
33	S8	Bearing Plate, "3/8 x 4 x 3¼, 1" hole	
5	S10	Bearing Plate, 1/2 x 5 x 3¼, 1" hole	
8	S12L	Bearing Plate, 5/8 x 6 x 3¼, 1¼" hole	
Steel Beam Weld Plates			
4	EP-7A	Steel Beam Start Plate, 5/8" x 3" x 3"	
Threaded Rods		Standard Rod Finish	Black
200	R5A307 x 10'	Threaded Rod, 5/8" - 11 NC - A307 x 10', Black	
4	R6A307 x 1'	Threaded Rod, 3/4" - 10 NC - A307 x 1', Black	
142	R6A307 x 10'	Threaded Rod, 3/4" - 10 NC - A307 x 10', Black	
16	R7A307 x 10'	Threaded Rod, 7/8" - 9 NC - A307 x 10', Black	
5	R8A307 x 12'	Threaded Rod, 1" - 8 NC - A307 x 12', Black	
8	R7B7 x 10'	Threaded Rod, 7/8" - 9 NC - B7 x 10', Black	
8	R9B7 x 12'	Threaded Rod, 1 1/8" - 7 NC - B7 x 12', Black	
Sighted Coupling Nuts			
128	CN-5	Sighted Coupler Nut, 5/8" - 11 NC , Grade 2	
137	CN-6	Sighted Coupler Nut, 3/4" - 10 NC , Grade 2	
16	CN-7	Sighted Coupler Nut, 7/8" - 9 NC , Grade 2	
5	CN-8	Sighted Coupler Nut, 1" - 8 NC , Grade 2	
8	CNHS-9	Sighted Coupler Nut, 1 1/8" - 7 NC , Grade 8	
Coupling Nut Reducers			
64	CNR-56	Coupler Nut Reducers, 5/8" - 3/4" , Grade 2	
8	CNR-57	Coupler Nut Reducers, 5/8" - 7/8" , Grade 2	
5	CNR-68	Coupler Nut Reducers, 3/4" - 1 " , Grade 2	
8	CNRHS-79	Coupler Nut Reducers, 7/8" - 1 1/8" , Grade 8	
Nuts			
200	N-5	Nut, 5/8" - 11 NC , Grade 2	
137	N-6	Nut, 3/4" - 10 NC , Grade 2	
16	N-7	Nut, 7/8" - 9 NC , Grade 2	
5	N-8	Nut, 1" - 8 NC , Grade 2	
4	NHS-5	Nut, 5/8" - 11 NC , Grade 8	
8	NHS-7	Nut, 7/8" - 9 NC , Grade 8	
8	NHS-9	Nut, 1 1/8" - 7 NC , Grade 8	
Washers			
204	W-5	Washer, 5/8" SAE Flat	
137	W-6	Washer, 3/4" SAE Flat	
24	W-7	Washer, 7/8" SAE Flat	
5	W-8	Washer, 1" SAE Flat	
8	W-9	Washer, 1 1/8" SAE Flat	

ENG RB- Runs Built

CAT Holdown System Materials Total:

T: 360.378.9484
F: 360.378.9485

Commins Manufacturing, Inc.
960B Guard St., Friday Harbor, WA 98250

AutoTight® Rod Holdown System

System Design for
The Sample Project

Prepared for
AutoTight Designer

Input by
Tom Boydston

Commins Project ID # 75-19846

**Includes ICC ES 1344 Code Report,
applicable catalog pages and COLA Report RR25480
as a separate PDF file: "AutoTight Materials and Reference.pdf".**

(1) Key to Calculation Table

AutoTight® System Run Design Calc Sheet: (2) **Example Project** (3) **Rev 0** (4) **Date 06/21/2010**

Project Number:	(6)				CAT ID #	10-0001	(5)
Run Name:	**1**	Run Qty:	4		Tensile Strength	Calc'd	

(7) (8) (9) (10) (11) (12) (13) (14)

Run Specifications Required Loads:		Component Commins AutoTight	Description	Capacity (kips)	Demand (kips)	D/C Ratio	Elong. (in.)	
(15) Level = 2		Component	Description	Capacity	Demand	D/C	Elong.	
(16) Differential Load:	4.00 (kips)	AT 125	Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.10**	**0.50**	**45.5%**	-	(22)
(17) Tension Load:	20.00 (kips)	AT 125	Shrinkage Device (1-1/4" I.D.) - Allowable Load	34.50	4.00	11.6%	-	(23)
(18) Compression:	20.00 (kips)	-	Shrinkage Device - Deflection at Load	-	-	-	0.002	(24)
(19) Story Height:	12.50 (ft.)	-	Shrinkage Device - Travel and Seating Increment ΔR	-	-	-	0.002	(25)
(20) Plate Height:	11.33 (ft.)	S8L	Bearing Plate at Reaction Point	7.96	4.00	50.2%	0.020	(26)
(21) Floor Depth:	14.00 (in.)	R9	1-1/8"-A307 Tension Rod	22.37	20.00	89.4%	0.125	(27)
		-	No Stretch Rod	#N/A	20.00	0.0%	n/a	(28)
		-	Wood Beam Start Bearing Plate	n/a	n/a	0.00	n/a	(29)
		-	Steel Beam Start in Tension	n/a	n/a	0.00	n/a	(30)
			Limiting Component Tension Load Capacity, Load and D/C Ratio	**22.37**	**20.00**	**89.4%**	-	(31)
			Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation	**0.200**	-	**74.5%**	**0.149**	(32)
Compression Wood	Outer Posts (1) 4x8 (3) 2x6	(1) 4x8 (3) 2x6	Inner Posts 4x Wall Post per Side of Rod-Enter by Hand as Needed	32.08	20.00	62.3%	-	(33)
			6x Wall Post per Side of Rod-Enter by Hand as Needed	30.93	20.00	64.7%	-	(34)
Level = Footing		Component	Description	Capacity	Demand	D/C	Elong.	
Tension Load:	20.00 (kips)	R9	1-1/8"-A307 Anchor Rod	22.37	20.00	89.4%	n/a	(35) (36)

Notes:

(1) All these cells are filled with data from the AutoTight Run Designer spreadsheet's Project Info page and Load Justification Table page.
(2) The Builder's Name of the project.
(3) The revision level of the plan set.
(4) The Bid Date.
(5) The Commins Mfg. project number.
(6) The Builder's number for the project.
(7) The name of this run.
(8) Commins AutoTight part number.
(9) The quantity of this type of run.
(10) This column is the description of the component shown on each row
(11) This column of the table is the Load Capacities of the various components.
(12) This column of the table is the Load placed on the various components.
(13) This column of the table is the Demand / Capacity ratio for each component.
(14) This column is the contribution of each componenent to the total elongation for this level, and the total elongation for the level.
Elongation numbers are in blue text.
(15) The name of this level.
(16) Differential Load applied by this level.
(17) Total tension in rod at this level.
(18) Compression load on the compression posts at this level.
(19) Story Height carpet to carpet.
(20) Plate to plate height of this level.
(21) Depth of floor beams.
(22) This row compares the total shrinkage at this level with the capacity of the AT's to take up this shrinkage.
(23) This row compares the load capacity of the AT device to the load applied to it. Per AC316 Sec. 1.4.5
(24) This row shows the deflection of the AT device(s) under the applied load. Per AC316 Sec. 1.4.8
(25) This row shows the ΔR=Travel and Seating increment of the AT Device(s). Per AC316 Sec. 1.4.7
(26) This row shows Bearing Plate Load Capacity and compares to its Load also its deflection's contribution to the total Elongation.
(unless the calcs call for rod stretch only.) (It sees only the differential load.) Per AF&PA NDS Tbl 4A, 4B incl Cf factor.
(27) This row shows Tension Rod Load Capacity and compares to its Load, also its deflection's contribution to the total Elongation. Per AISC 360-05
(28) This row shows Stretch Rod Load Capacity and compares to its Load, also its deflection's contribution to the total Elongation. Only if Stretch Rod is used.
(29) This row shows the Wood Beam Start's Bearing Plate Load Capacity and compares to its Load, also its deflection's contribution to the total Elongation.
(Only if a Wood Beam Start is used.) (It sees the tension load.) Per AF&PA-NDS Tbl 4A, 4B incl Cf factor.
(30) This row shows the Steel Beam Start's Load Capacity and compares to its Load, also its deflection's contribution to the total Elongation.
(Only if a Steel Beam Start is used.) (It sees the tension load.) The rod seats on the steel beam and the weld cross section is greater than the rod cross section so the Steel Beam Start elongation is included in rod elongation. Per ICC ES-1344 & 5889
(31) This row shows worst case component's Load and compares to its Load Capacity.
(32) This row shows the maximum allowed Elongation and the total Elongation calculated for this level.
(33) This row shows the inner and outer compression post required, their load capacities and loads if the wall is 4x.
It is used only if Commins Mfg specifies the Compression Posts and is filled in manually. If line is not shown posting is per structural drawing.
(34) This row shows the inner and outer compression post required, their load capacities and loads if the wall is 6x.
It is used only if Commins Mfg specifies the Compression Posts and is filled in manually. If line is not shown posting is per structural drawing.
(35) This row shows the load capacity of the Anchor Rod embedded in the concrete and compares to its load, if used. (Not the concrete strength)
(36) Anchor bolt elongation is included in the length of the tension rods.
(37) Nuts, Coupler Nuts and Reducing Coupler Nuts are not listed individually because they are grade compatible with the Tension Rod.
(38) Nuts, Coupler Nuts and Reducing Coupler Nuts calculated contribution to elongation is 0.0005 inch or less.

AutoTight® System Run Design Calc. Sheet for: **The Sample Project** **Rev 0** **Date 12/10/2010**

Project Number:					CAT ID #	75-19846	
Run Name:	**5A**	Run Qty:	64		Tensile Strength		Calc'd
Run Specifications Required Loads:		Component Commins AutoTight		Description	Capacity (kips)	Demand (kips)	D/C Ratio / Elong. (in.)
Level = 6th		Component		Description	Capacity	Demand	D/C / Elong.
Differential Load:	5.10 (kips)	AT6A-1.5		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.50"**	**1.25"**	**83.3%**
Tension Load:	5.10 (kips)	AT6A-1.5		Shrinkage Device - 1.5" (3/4" I.D.) - Allowable Load	13.58	5.10	37.6% / -
Compression:	5.10 (kips)	-		Shrinkage Device - Deflection at Load	-	-	- / 0.005
Story Height:	10.00 (ft.)	-		Shrinkage Device - Travel and Seating Increment ΔR	-	-	- / 0.002
Plate Height:	10.00 (ft.)	S5		Bearing Plate at Reaction Point	5.96	5.10	85.5% / 0.034
		R5A307		5/8"-A307 Tension Rod	6.90	5.10	73.9% / 0.093
				Limiting Component Tension Load Capacity, Load and D/C Ratio	**5.96**	**5.10**	**85.5%** / -
				Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation	**0.200**	-	**67.4%** / **0.135**

Level = 5th		Component	Description	Capacity	Demand	D/C / Elong.
Differential Load:	0.80 (kips)	AT6A-1.5	Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.50"**	**1.00"**	**66.7%**
Tension Load:	5.90 (kips)	AT6A-1.5	Shrinkage Device - 1.5" (3/4" I.D.) - Allowable Load	13.58	0.80	5.9% / -
Compression:	5.90 (kips)	-	Shrinkage Device - Deflection at Load	-	-	- / 0.001
Story Height:	10.00 (ft.)	-	Shrinkage Device - Travel and Seating Increment ΔR	-	-	- / 0.002
Plate Height:	8.95 (ft.)	S4	Bearing Plate at Reaction Point	4.12	0.80	19.4% / 0.008
Floor Depth:	12.63 (in.)	R5A307	5/8"-A307 Tension Rod	6.90	5.90	85.5% / 0.108
			Limiting Component Tension Load Capacity, Load and D/C Ratio	**6.90**	**5.90**	**85.5%** / -
			Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation	**0.200**	-	**59.3%** / **0.119**

Level = 4th		Component	Description	Capacity	Demand	D/C / Elong.
Differential Load:	0.90 (kips)	AT6A-1.5	Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.50"**	**0.75"**	**50.0%**
Tension Load:	6.80 (kips)	AT6A-1.5	Shrinkage Device - 1.5" (3/4" I.D.) - Allowable Load	13.58	0.90	6.6% / -
Compression:	6.80 (kips)	-	Shrinkage Device - Deflection at Load	-	-	- / 0.001
Story Height:	10.00 (ft.)	-	Shrinkage Device - Travel and Seating Increment ΔR	-	-	- / 0.002
Plate Height:	8.95 (ft.)	S4	Bearing Plate at Reaction Point	4.12	0.90	21.8% / 0.009
Floor Depth:	12.63 (in.)	R5A307	5/8"-A307 Tension Rod	6.90	6.80	98.6% / 0.125
			Limiting Component Tension Load Capacity, Load and D/C Ratio	**6.90**	**6.80**	**98.6%** / -
			Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation	**0.200**	-	**68.1%** / **0.136**

Level = 3rd		Component	Description	Capacity	Demand	D/C / Elong.
Differential Load:	0.70 (kips)	AT6A-1.5	Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.50"**	**0.50"**	**33.3%**
Tension Load:	7.50 (kips)	AT6A-1.5	Shrinkage Device - 1.5" (3/4" I.D.) - Allowable Load	13.58	0.70	5.2% / -
Compression:	7.50 (kips)	-	Shrinkage Device - Deflection at Load	-	-	- / 0.001
Story Height:	10.00 (ft.)	-	Shrinkage Device - Travel and Seating Increment ΔR	-	-	- / 0.002
Plate Height:	8.95 (ft.)	S4	Bearing Plate at Reaction Point	4.12	0.70	17.0% / 0.002
Floor Depth:	12.63 (in.)	R6A307	3/4"-A307 Tension Rod	9.94	7.50	75.5% / 0.093
			Limiting Component Tension Load Capacity, Load and D/C Ratio	**9.94**	**7.50**	**75.5%** / -
			Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation	**0.200**	-	**48.8%** / **0.098**

Level = 2nd		Component	Description	Capacity	Demand	D/C / Elong.
Differential Load:	1.70 (kips)	AT6A-1.5	Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.50"**	**0.25"**	**16.7%**
Tension Load:	9.20 (kips)	AT6A-1.5	Shrinkage Device - 1.5" (3/4" I.D.) - Allowable Load	13.58	1.70	12.5% / -
Compression:	9.20 (kips)	-	Shrinkage Device - Deflection at Load	-	-	- / 0.002
Story Height:	10.00 (ft.)	-	Shrinkage Device - Travel and Seating Increment ΔR	-	-	- / 0.002
Plate Height:	8.95 (ft.)	S4	Bearing Plate at Reaction Point	4.12	1.70	41.3% / 0.017
Floor Depth:	12.63 (in.)	R6A307	3/4"-A307 Tension Rod	9.94	9.20	92.6% / 0.114
			Limiting Component Tension Load Capacity, Load and D/C Ratio	**9.94**	**9.20**	**92.6%** / -
			Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation	**0.200**	-	**67.0%** / **0.134**

Level = Footing		Component	Description	Capacity	Demand	D/C / Elong.
Tension Load:	9.20 (kips)	R6A307	3/4"-A307 Anchor Rod	9.94	9.20	92.6% / n/a

Base Design Code: IBC_2009/2009 per the State and Local jurisdiction
Steel Stess Increase: No
Takeup Device at Each Level: Yes
Elongation Limit Required: Yes
Elongation Limit per Connection: 0.200 (inch) between load reaction points (Typical Range 0.125 to 0.200)
Elongation Components: System Stretch
Shrinkage: 0.250 inch per floor (Typical Range 0.250 to 0.500)
Shearwall Plates Wood Species: DFL Douglas Fir-Larch Shearwall Plates Wood Strength: 625 psi

AutoTight® System Run Design Calc. Sheet for: **The Sample Project** **Rev 0** **Date 12/10/2010**

Project Number:					CAT ID #	75-19846	
Run Name:	**5B**	Run Qty:	8		Tensile Strength		Calc'd
Run Specifications Required Loads:		Component Commins AutoTight		Description	Capacity (kips)	Demand (kips)	D/C Ratio / Elong. (in.)
Level = 6th		Component		Description	Capacity	Demand	D/C / Elong.
Differential Load:	6.50 (kips)	AT6A-1.5		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.50"**	**1.25"**	**83.3%**
Tension Load:	6.50 (kips)	AT6A-1.5		Shrinkage Device - 1.5" (3/4" I.D.) - Allowable Load	13.58	6.50	47.9% -
Compression:	6.50 (kips)	-		Shrinkage Device - Deflection at Load	-	-	- 0.007
Story Height:	10.00 (ft.)	-		Shrinkage Device - Travel and Seating Increment ΔR	-	-	- 0.002
Plate Height:	10.00 (ft.)	S6		Bearing Plate at Reaction Point	7.00	6.50	92.8% 0.037
		R5A307		5/8"-A307 Tension Rod	6.90	6.50	94.2% 0.119
				Limiting Component Tension Load Capacity, Load and D/C Ratio	**6.90**	**6.50**	**94.2%** -
				Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation	**0.200**	-	**82.4%** **0.165**
Level = 5th		Component		Description	Capacity	Demand	D/C / Elong.
Differential Load:	4.25 (kips)	AT 100		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.10"**	**1.00"**	**90.9%**
Tension Load:	10.75 (kips)	AT 100		Shrinkage Device (1" I.D.) - Allowable Load	25.30	4.25	16.8% -
Compression:	10.75 (kips)	-		Shrinkage Device - Deflection at Load	-	-	- 0.005
Story Height:	10.00 (ft.)	-		Shrinkage Device - Travel and Seating Increment ΔR	-	-	- 0.002
Plate Height:	8.95 (ft.)	S8		Bearing Plate at Reaction Point	8.28	4.25	51.3% 0.021
Floor Depth:	12.63 (in.)	R7A307		7/8"-A307 Tension Rod	13.53	10.75	79.5% 0.096
				Limiting Component Tension Load Capacity, Load and D/C Ratio	**13.53**	**10.75**	**79.5%** -
				Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation	**0.200**	-	**62.1%** **0.124**
Level = 4th		Component		Description	Capacity	Demand	D/C / Elong.
Differential Load:	0.15 (kips)	AT 100		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.10"**	**0.75"**	**68.2%** -
Tension Load:	10.90 (kips)	AT 100		Shrinkage Device (1" I.D.) - Allowable Load	25.30	0.15	0.6% -
Compression:	10.90 (kips)	-		Shrinkage Device - Deflection at Load	-	-	- 0.000
Story Height:	10.00 (ft.)	-		Shrinkage Device - Travel and Seating Increment ΔR	-	-	- 0.002
Plate Height:	8.95 (ft.)	S8		Bearing Plate at Reaction Point	8.28	0.15	1.8% 0.001
Floor Depth:	12.63 (in.)	R7A307		7/8"-A307 Tension Rod	13.53	10.90	80.6% 0.098
				Limiting Component Tension Load Capacity, Load and D/C Ratio	**13.53**	**10.90**	**80.6%** -
				Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation	**0.200**	-	**50.3%** **0.101**
Level = 3rd		Component		Description	Capacity	Demand	D/C / Elong.
Differential Load:	5.10 (kips)	AT 100		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.10"**	**0.50"**	**45.5%** -
Tension Load:	16.00 (kips)	AT 100		Shrinkage Device (1" I.D.) - Allowable Load	25.30	5.10	20.2% -
Compression:	16.00 (kips)	-		Shrinkage Device - Deflection at Load	-	-	- 0.006
Story Height:	10.00 (ft.)	-		Shrinkage Device - Travel and Seating Increment ΔR	-	-	- 0.002
Plate Height:	8.95 (ft.)	S8		Bearing Plate at Reaction Point	8.28	5.10	61.6% 0.002
Floor Depth:	12.63 (in.)	R7B7		7/8"-B7 Tension Rod	28.19	16.00	56.8% 0.143
				Limiting Component Tension Load Capacity, Load and D/C Ratio	**8.28**	**5.10**	**61.6%** -
				Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation	**0.200**	-	**76.9%** **0.154**
Level = 2nd		Component		Description	Capacity	Demand	D/C / Elong.
Differential Load:	11.80 (kips)	AT 125		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.10"**	**0.25"**	**22.7%** -
Tension Load:	27.80 (kips)	AT 125		Shrinkage Device (1-1/4" I.D.) - Allowable Load	34.50	11.80	34.2% -
Compression:	27.80 (kips)	-		Shrinkage Device - Deflection at Load	-	-	- 0.005
Story Height:	10.00 (ft.)	-		Shrinkage Device - Travel and Seating Increment ΔR	-	-	- 0.002
Plate Height:	8.95 (ft.)	S12L		Bearing Plate at Reaction Point	12.05	11.80	97.9% 0.039
Floor Depth:	12.63 (in.)	R9B7		1 1/8"-B7 Tension Rod	46.59	27.80	59.7% 0.151
				Limiting Component Tension Load Capacity, Load and D/C Ratio	**12.05**	**11.80**	**97.9%** -
				Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation	**0.200**	-	**98.7%** **0.197**
Level = Footing		Component		Description	Capacity	Demand	D/C / Elong.
Tension Load:	27.80 (kips)	R9B7		1 1/8"-B7 Anchor Rod	46.59	27.80	59.7% n/a

Base Design Code: IBC_2009/2009 per the State and Local jurisdiction
Steel Stess Increase: No
Takeup Device at Each Level: Yes
Elongation Limit Required: Yes
Elongation Limit per Connection: 0.200 (inch) between load reaction points (Typical Range 0.125 to 0.200)
Elongation Components: System Stretch
Shrinkage: 0.250 inch per floor (Typical Range 0.250 to 0.500)
Shearwall Plates Wood Species: DFL Douglas Fir-Larch Shearwall Plates Wood Strength: 625 psi

AutoTight® System Run Design Calc. Sheet for: **The Sample Project** **Rev 0** **Date 12/10/2010**

Project Number:					CAT ID #	75-19846	
Run Name:	**3A**	Run Qty:	5		Tensile Strength		Calc'd
Run Specifications Required Loads:		Component Commins AutoTight		Description	Capacity (kips)	Demand (kips)	D/C Ratio	Elong. (in.)
Level = 4th		Component		Description	Capacity	Demand	D/C	Elong.
Differential Load:	8.50 (kips)	AT6A-1.5		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.50"**	**0.75"**	**50.0%**	-
Tension Load:	4.50 (kips)	AT6A-1.5		Shrinkage Device - 1.5" (3/4" I.D.) - Allowable Load	13.58	8.50	62.6%	-
Compression:	4.50 (kips)	-		Shrinkage Device - Deflection at Load	-	-	-	0.009
Story Height:	10.00 (ft.)	-		Shrinkage Device - Travel and Seating Increment ΔR	-	-	-	0.002
Plate Height:	8.95 (ft.)	S10		Bearing Plate at Reaction Point	10.32	8.50	82.3%	0.033
Floor Depth:	12.63 (in.)	R6A307		3/4"-A307 Tension Rod	9.94	4.50	45.3%	0.199
		Limiting Component Tension Load Capacity, Load and D/C Ratio			**10.32**	**8.50**	**82.3%**	-
		Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation			**0.200**	-	**121.5%**	**0.243**

Level = 3rd		Component		Description	Capacity	Demand	D/C	Elong.
Differential Load:	0.00 (kips)	0		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**#N/A**	**0.50"**	**#N/A**	-
Tension Load:	8.50 (kips)	0		No Shrinkage Device - Reaction & Elongation on floor above	#N/A	0.00	0.0%	-
Compression:	8.50 (kips)	-		Shrinkage Device - Deflection at Load	-	-	-	n/a
Story Height:	10.00 (ft.)	-		Shrinkage Device - Travel and Seating Increment ΔR	-	-	-	n/a
Plate Height:	8.95 (ft.)	-		Bearing Plate at Reaction Point	#N/A	0.00	0.0%	0.002
Floor Depth:	12.63 (in.)	R6A307		3/4"-A307 Tension Rod	9.94	8.50	85.5%	0.000
		Limiting Component Tension Load Capacity, Load and D/C Ratio			**9.94**	**8.50**	**85.5%**	-
		Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation			**0.200**	-	**1.0%**	**0.002**

Level = 2nd		Component		Description	Capacity	Demand	D/C	Elong.
Differential Load:	7.50 (kips)	AT 100		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.10"**	**0.25"**	**22.7%**	-
Tension Load:	16.00 (kips)	AT 100		Shrinkage Device (1" I.D.) - Allowable Load	25.30	7.50	29.6%	-
Compression:	16.00 (kips)	-		Shrinkage Device - Deflection at Load	-	-	-	0.009
Story Height:	10.00 (ft.)	-		Shrinkage Device - Travel and Seating Increment ΔR	-	-	-	0.002
Plate Height:	8.95 (ft.)	S8		Bearing Plate at Reaction Point	8.28	7.50	90.6%	0.036
Floor Depth:	12.63 (in.)	R8A307		1 "-A307 Tension Rod	17.67	16.00	90.5%	0.109
		Limiting Component Tension Load Capacity, Load and D/C Ratio			**8.28**	**7.50**	**90.6%**	-
		Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation			**0.200**	-	**78.5%**	**0.157**

Level = Footing		Component		Description	Capacity	Demand	D/C	Elong.
Tension Load:	16.00 (kips)	R8A307		1 "-A307 Anchor Rod	17.67	16.00	90.5%	n/a

Base Design Code: IBC_2009/2009 per the State and Local jurisdiction
Steel Stess Increase: No
Takeup Device at Each Level: Yes
Elongation Limit Required: Yes
Elongation Limit per Connection: 0.200 (inch) between load reaction points (Typical Range 0.125 to 0.200)
Elongation Components: System Stretch
Shrinkage: 0.250 inch per floor (Typical Range 0.250 to 0.500)
Shearwall Plates Wood Species: DFL Douglas Fir-Larch Shearwall Plates Wood Strength: 625 psi

AutoTight® System Run Design Calc. Sheet for: **The Sample Project** **Rev 0** **Date 12/10/2010**

Project Number:					CAT ID #	75-19846	
Run Name:	**1ASBS**	Run Qty:	4		Tensile Strength		Calc'd
Run Specifications		Component		Description	Capacity (kips)	Demand (kips)	D/C Ratio	Elong. (in.)
Required Loads:		Commins AutoTight						
Level =	3rd	Component		Description	Capacity	Demand	D/C	Elong.
Differential Load:	8.20 (kips)	AT6A-1.5		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.50"**	**0.50"**	**33.3%**	-
Tension Load:	8.20 (kips)	AT6A-1.5		Shrinkage Device - 1.5" (3/4" I.D.) - Allowable Load	13.58	8.20	60.4%	-
Compression:	8.20 (kips)	-		Shrinkage Device - Deflection at Load	-	-	-	0.008
Story Height:	10.00 (ft.)	-		Shrinkage Device - Travel and Seating Increment ΔR	-	-	-	0.002
Plate Height:	8.95 (ft.)	S8		Bearing Plate at Reaction Point	8.28	8.20	99.0%	0.002
Floor Depth:	12.63 (in.)	R6A307		3/4"-A307 Tension Rod	9.94	8.20	82.5%	0.091
		Stl Beam		Steel Beam Start in Tension	9.94	8.20	82.5%	0.000 (3)
		Limiting Component Tension Load Capacity, Load and D/C Ratio			**8.28**	**8.20**	**99.0%**	-
		Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation			**0.200**	-	**51.6%**	**0.103**

Base Design Code: IBC_2009/2009 per the State and Local jurisdiction
Steel Stess Increase: No
Takeup Device at Each Level: Yes
Elongation Limit Required: Yes
Elongation Limit per Connection: 0.200 (inch) between load reaction points (Typical Range 0.125 to 0.200)
Elongation Components: System Stretch
Shrinkage: 0.250 inch per floor (Typical Range 0.250 to 0.500)
Shearwall Plates Wood Species: DFL Douglas Fir-Larch Shearwall Plates Wood Strength: 625 psi

1 AutoTight Rod Holdown System Notes

Holdown System Design:

1. Holdown system conforms to the International Building Code (IBC) 2009 per local jurisdiction.
2. Required loads and system requirements per structural plans, dated 11/29/2010.
3. Wood shrinkage is estimated at 1/4" per floor, based on structural plans wood specifications.
4. Drawings are not to scale. Holdown Run elevation (AT1.1) drawings are for location of run components only and may not reflect the correct number of compression posts. Check Compression Post call outs to the right of the run elevation.
5. Fabrication shall meet the requirements and specifications per structural plan general notes.
6. Engineer of Record is to review these drawings and upon approval the drawings will replace the holdown system per structural plans, unless noted otherwise (U.N.O.).

Compression Post Notes:

1. Compression post shall be species, grade and size per structural plans (U.N.O.).
2. Compression posts and headers shall have a maximum moisture content of 19%.
3. Compression post or loads not specified, shall be equal to or exceed the required loads on Structural plans.
4. Compression post call outs on AT1.1 are each side of the rod for 4x and 6x wall per holdown run and floor/level (U.N.O.).
5. Compression post are in addition to shearwall framing members. (U.N.O.)
6. Alternate compression post may be acceptable. Consult the factory for possible alternates.
7. Floor blocking stud lengths shall be 1/8" less than in-between floor height for shrinkage.
8. Compression post may be notched to exact thickness of steel bearing plate, if required. A plywood shim of the exact thickness of the steel bearing bearing plate may be used, instead of notching. Additional compression post with required nailing shall be added, if exact notching requirements are not possible.
9. Cutting or notching of compression post is permitted to a depth not to exceed 25% of its width per 2009 IBC – 2308.9.10. Boring of compression post is permitted for a hole not greater than 40% of the width and no nearer than 5/8" to the edge per 2009 IBC – 2308.9.11 See applicable code.

Anchor Bolt Embedments:

1. Contractor/Installer shall verify anchor bolt size, thread pitch and material for correct location per structural plans run call outs or AutoTight holdown run layout sheet(s).
2. Anchor bolt shall be 6" minimum above concrete slab (U.N.O.).
3. AutoTight Anchor Bolt Embedments, if used, are called out on AT1.2.

Shop Drawing Disclaimer

Holdown design is by Commins Manufacturing, Inc. for the holdown system described in these shop drawings only. This design uses the construction plans and calculations provided by the Engineer of Record. No attempt had been made on the part of Commins Manufacturing, Inc. to verify the values given in the calculations or design described by the construction drawings.

The Engineer of Record is responsible for the structural design of the building and the ability of the design to transfer loads imparted to the structure by the holdown system.

Abbreviations

A.B.	Anchor bolt per plan or schedule
AB	Alternate option
ATXX	AutoTight Take-Up Device (installed with) 75 & 75-2.5 (1/2", 5/8" or 3/4" rod) 100 (7/8" or 1" rod) 125 (1 1/8" or 1 1/4" rod)
CAT	Commins AutoTight
CN(HS)	Coupler nut (HS are notched)
CNR(HS)	Coupler nut reducer (HS are notched)
Dia	Diameter
DFL	Douglas Fir-Larch
HF	Hemlock Fir
HS	High strength
LXX	Bearing plate, 6x wall only
Min	Minimum
Max	Maximum
N(HS)-XX	Nut (HS have stamp grade ID)
O.C.	On center
R-XX(HS)	Threaded rod, (HS rod is black)
SPF	Spruce-Pine-Fir
STD	Standard strength (STD rod is zinc plated)
SYP	Southern Yellow Pine
SXX	Bearing plate, 4x or 6x wall
Typ	Typical
U.N.O.	Unless noted otherwise
W-XX	SAE Washer
	Rod, Nut & Washer Size
-4	1/2" -8 1-1/8"
-5	5/8" -10 1-1/4"
-6	3/4" -12 1-1/2"
-7	7/8" -14 1-3/4"
-8	1"

Structural Engineer of Record

AutoTight Designer
P.O. Box 3338
Suite 2
Friday Harbor, WA 98250
Tel: 360-378-9484

2 Threaded Rod and AT Take-Up Device Allowable Loads

Table 1g
2009 International Building Code (IBC)

Rod Size "Diameter (inches)"	Model	"Diameter & Thread"	Allowable Tension (lbs) "A36 or F1554 Gr 36"	A307	"A449 A325"	A108-C1045	"A193-B7 or F1554 Gr 105"	A354-BD
Rod Strength Type:			Standard	Standard	H	H	HS	XHS
3/8	R3	3/8"- 16 NC	2,400	2,490	4,970	4,970	5,180	6,215
1/2	R4	1/2"-13 NC	4,270	4,420	8,840	8,840	9,200	11,045
5/8	R5	5/8"-11 NC	6,670	6,900	13,810	13,810	14,380	17,255
3/4	R6	3/4"-10 NC	9,610	9,940	19,880	19,880	20,710	24,850
7/8	R7	7/8"-9 NC	13,080	13,530	27,060	27,060	28,190	33,825
1	R8	1"- 8 NC	17,080	17,670	35,340	35,340	36,820	44,180
1 1/8	R9	1-1/8" -7 NC	21,620	22,370	39,140	44,730	46,590	55,915
1 1/4	R10	1-1/4" -7 NC	26,690	27,610	48,320	55,220	57,520	69,030
1 1/2	R12	1-1/2" - 6 NC	38,440	39,760	69,580	79,520	82,830	99,400
1 3/4	R14	1-3/4"-5 NC	52,310	54,120	81,180	108,240	112,750	135,295

Model Number***	Rod Diameter (Max.)	Mat.	Dimensions (inches) Dia.	H	Rated Take-Up (inches)	Allowable Load Pounds	Average Ultimate Pounds	Δr (inches) Seating Increment	ΔA (inches) Deflection at Allowable Load
AT4A-1.5	1/2"	Aluminum	1-1/2"	3"	1-1/2"	7,273	24,857	0.000**	0.014
AT4A-2.5			1-1/2"	4-1/16"	2-1/2"				
AT6A-1.5	3/4"		2-1/8"	3-3/16"	1-1/2"	13,579	40,737		0.014
AT6A-2.5				4-3/16"	2-1/2"				
AT 75	3/4"	Steel	2"	3"	1.10"	16,450	50,533	0.002***	0.024
AT 75-2.5			2"	4"	2-1/2"	15,183	54,728		0.020
AT 100	1"		2-1/4"	3-1/8"	1.12"	25,300	78,067		0.032
AT 125	1-1/4"		2-3/4"	3-1/8"	1.12"	34,500	104,683		0.016

Threaded Rod, Couplers, Nuts and AT Shrinkage Device Notes:

Rod Materials:

1. Standard (S) threaded rod shall be ASTM A307 or A36 with Fu Min=60ksi, Fy Min=43ksi.
   Medium High Strength (H) threaded rod shall be ASTM A449 or ASTM A105-C1045 with Fu Min=120ksi, Fy Min=92ksi.
   High Strength (HS) shall be ASTM A193-B7 with Fu Min=125ksi, Fy Min=105ksi.
   Extra High Strength (XHS) shall be ASTM A354 Class BD with Fu Min=150ksi, Fy Min=130ksi.
2. All threaded rod is Uniform National Course (NC) threaded.
3. High Strength rod is usually marked with Red paint. Consult Factory for additional information.
4. Standard couplers conform to ASTM A-563 grade A (SAE Grade 2).
   High strength (HS) couplers conform to ASTM A563 Grade C (SAE Grade 8) and are notched for identification.
5. Standard nuts conform to ASTM A-563 grade A (SAE Grade 2).
   High strength (HS) nuts conform to ASTM A563 Grade C (SAE Grade 8) and are stamped for identification.
6. Automatic (AT) Take-Up Device by Commins Manufacturing Inc. per ICC ES report ESR-1344 issued November 1, 2007.

Fabrication:

1. Threaded rod lengths may be adjusted as required, but rod diameter and material type must be the same per the floor/level call out. Cutting of rod on lower levels may result in incorrect (short) top floor termination length.
2. Rod clearance holes between floors shall be 1/4" to 1/2" oversized. Silicone or caulking shall not be used at any time. A fire-rated fireinvert or a non-hardening FireStop (provided by others) shall be used, if required. Rod must move freely after assembly.
3. Recommended maximum out of plumb for rod is 2" per 10' floor height (Detail 13) with no permanent bending of installed threaded rod.
4. Coupler nuts shall have the threaded rod visible in the sight hole(s) per Detail 7.
5. The AT Take-Up Device shall be secured with a nut and flat washer snug plus 1/2 turn. At termination level the end of the rod shall be 1/8" minimum beyond the face of the nut. A final nut tightening just prior to closure of the wall is good practice, but not required. The AT Take-Up Device MUST be activated by removing the activation screw prior to wall enclosure per Detail 12.
6. Rod, couplers and AT device locations are per Holdown Run elevations on AT1.1.
7. Run locations are per structural plans run call outs or AutoTight holdown run layout sheet(s).

3 Bearing Plate Schedule and Allowable Loads

Table 2a
2009 International Building Code IBC
Bearing Plate Allowable Loads
(13th Ed. ASD, 2005 NDS)

"Bearing Plate Part #"	Plate Dimensions "Thickness (in)"	"Width (in)"	"Length (in)"	"Hole Dia. (bolt size) (in)"	"Capacity DFL (lbs)"	"Wall Size"
S4	3/16	2 1/2	2 1/2		4,120	
S5	1/4	3	3	3/4	5,964	
S6	5/16		3 1/4		7,002	
S8	3/8		4		8,281	
S10	1/2		5		10,322	
S12	5/8		6	1	12,360	
S14	3/4		7		13,665	
S16	1	3 1/4	8		15,696	
S8L	3/8		4		7,962	
S10L	1/2		5		10,009	"4x & 6x"
S12L	5/8		6		12,051	
S14L	3/4		7		13,373	
S16L	1		8		15,404	
S19			9		18,842	
S22	1 1/4		10		21,029	
S24			11		23,217	
S26			12		25,404	
S28		3 1/2	13	1 1/4	27,592	
S32	1 1/2		15		31,967	
S35			16		34,154	
S39			18		38,529	
S44			20		42,904	
L17	1/2	5	5 1/2		17,282	
L20	5/8	5 1/2	6		21,018	
L21	3/4	5	7		21,029	
L25		5 1/2	7 1/2		24,936	6x
L28	1	5	9		27,279	
L30		5 1/2	9		30,092	
L32		5	11		33,529	

AutoTight Bearing Plate Schedule Notes:

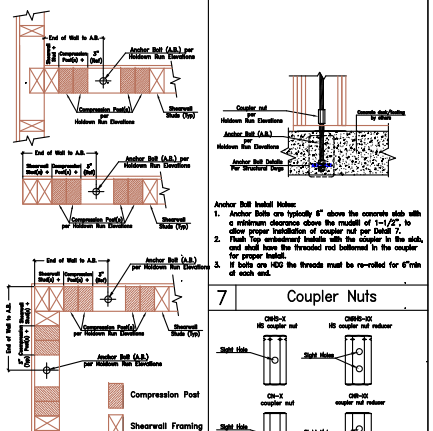
Material:

1. Steel bearing plates are ASTM A36 Steel.
2. Number signifies approximate allowable bearing capacities in kips for DFL (625 psi) parallel to grain.
3. The following multipliers is used to reduce allowable load for other wood species.
   Southern Pine (SYP, 565 psi) x 0.90
   Spruce-Pine-Fir (SPF, 425 psi) x 0.68
   Hemlock-Fir (HF, 405 psi) x 0.65
4. Additional bearing plates sizes may be used for special high load requirements

Fabrication:

1. The surface area of all bearing plates must have full contact on the supporting wood members.
2. S series plates fit 4x and 6x walls.
3. L series plates fit 6x walls only.
4. Plates S8 – S16 fit 1" diameter rod and smaller.
5. Plates S8L – S16L, S19 – S28 and L17 – L32 fit 1-1/4" diameter rod and smaller.
6. Bearing plate locations per Holdown Run elevations on AT1.1.

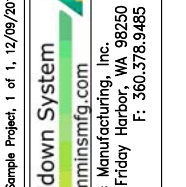
4 Typ. A. B. – Post Layout



Anchor Bolt – Compression Post(s) Layout Notes:

1. Anchor Bolt (A.B.) layouts above are typical, but may not apply to all locations. Check Structural Plans for other specific Anchor Bolt location details.
2. Typical clearance between the compression post, relative to the rod i., is 3" (6" total between post). Minimum clearance is 1-3/4" to the rod i. (3-1/2" total between post) for 1/4" clearance around AT Take-Up Device. Maximum distance between posts can be up to 10" or more at the discretion of the engineer.
3. Rod clearance hole shall be 1/4" to 1/2" oversized.
4. Upper levels may require a bearing plate wider than 6". Check upper floor/level compression post and bearing plates layout dimensions per Holdown Run Elevations to verify Anchor Bolt location.

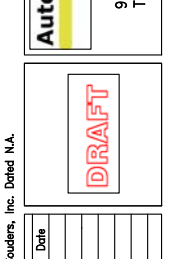
6 Typ. Anchor Bolt Coupler



Anchor Bolt Install Notes:

1. Anchor Bolts are typically 6" above the concrete slab with a minimum clearance above the mudsill of 1-1/2", to allow proper installation of coupler nut per Detail 7.
2. Thick Top embedment baskets with the coupler in the slab, and shall have the threaded rod bottomed in the coupler for proper install.
3. If bolts are HDG the threads must be re-rolled for 6"min at each end.

7 Coupler Nuts

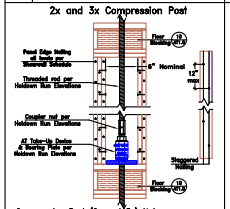


Coupler Nut Notes:

1. The rod shall be threaded in half way from each side and be visible in the sight hole(s).
2. "X" in part # is the size in 1/8's of an inch

8 Comp. Post Nailing

2x and 3x Compression Post

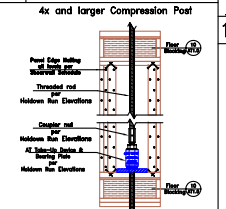


Compression Post (2x and 3x) Notes:

1. All full height 2x and 3x compression posts shall be staggered stitch nailed @ 12" O.C., except at termination header floor/level.
2. Panel (boundary) edge nailing shall be the same as the Shearwall Schedule on each compression post on each side of the rod.
3. Cavity width may vary depending on field conditions.
4. Consult factory for other conditions. Too little space makes bearing plate installation difficult.

9 Comp. Post Nailing

4x and larger Compression Post

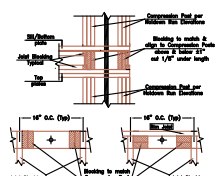


Compression Post (4x and larger) Notes:

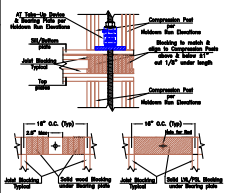
1. All full height 4x and 6x comp posts shall receive toe nailing to top and bottom plate and panel edge nailing per Shearwall Schedule with an additional row(s) of panel edge nailing located 3" O.C. on compression post ≥8 and larger.
2. Panel edge nailing shall be the same as the Shearwall Schedule with an additional row(s) of panel edge nailing located 3" O.C. on compression post ≥8 and larger.

10 Typ. Floor Blocking

Floor Blocking for Compression Post



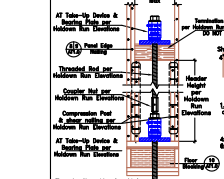
Solid Floor Blocking under Bearing Plate



Floor Blocking Notes:

1. All floor blocking shall have 1/8" vertical clearance between wall plates or floors.
2. All floor blocking shall be installed grain vertical.
3. Parallam may be substituted for solid sawn wood. Blocking must match compression post below or be solid blocked when under a bearing plate. Rod clearance hole for rod shall be rod size plus 1/4" – 1/2" oversized. Rod must move freely through holes after assembly.

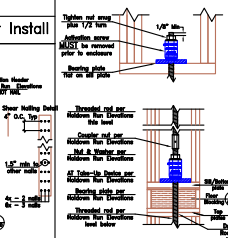
11 Typ. Term. Header Install



Termination Header Notes:

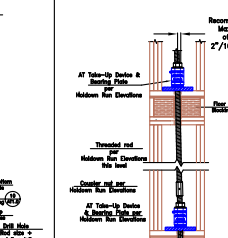
1. Shear nail compression post next to shear wall stud on each side per Holdown Run Elevations AT1.1 call out. Face (stitch) nailing per Shear Nailing Detail (4x or 6x) with 16d nails and no splitting of the wood.
2. Shear nailing shall be from the backside for 3x and larger compression post.
3. Contractor/installer shall verify nailing pattern.
4. Additional compression post/studs shall be stitch nailed per Detail 8.
5. Rod clearance hole shall be 1/4" to 1/2" oversized.

12 Typ. Take-Up Device Install



*Removal of activation set screw prior to wall closure is REQUIRED to activate the AT Take-Up Device.

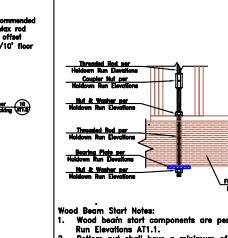
13 Allowable Rod Offset



Rod Offset Notes:

1. Rod must move freely through holes after assembly.

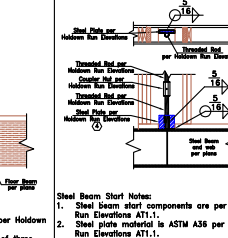
14 Wood Beam Start (WBS)



Wood Beam Start Notes:

1. Wood beam start components are per Holdown Run Elevations AT1.1.
2. Bottom nut shall have a minimum of three threads shown. Deform threads to fix nut.

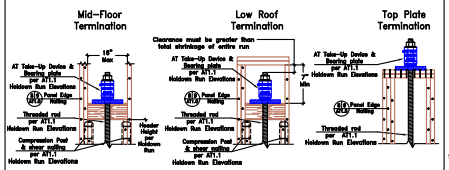
15 Steel Beam Start (SBS)



Steel Beam Start Notes:

1. Steel beam start components are per Holdown Run Elevations AT1.1.
2. Steel plate material is ASTM A36 per Holdown Run Elevations AT1.1.
3. Steel beam start threaded rod is standard grade ASTM A36 or A307 per Holdown Run Elevations AT1.1.
4. The hole in the plate & the welds have been included in the strength calculations.

16 Alternate Run Terminations



Alternate Run Termination Notes:

1. Refer to detail 11 for typical header installation.
2. Refer to Holdown Run Elevations AT1.1 for number of shear nails required.
3. Run terminations that are not mid-floor may require the threaded rod to be cut.
   Clearance above the top of the rod must be greater than wood shrinkage per floor (detail 1, note 3) times the levels of the run.
4. Change of termination type will change rod length requirements.
5. Rod clearance hole shall be 1/4" to 1/2" oversized.
6. Top Plate Terminations: Stitch Top Plates within 12" of rod 2 staggered rows 16d sinkers 4" O.C.

17

18

19

20

21

Sample Project, 1 of 1, 12/09/2010

See calculations prepared by Zbinden-Carter-Souders, Inc. Dated N.A.

No	Revision	Date

DRAFT

AutoTight Holdown System
www.comminsmfg.com
by Commins Manufacturing, Inc.
9608 Guard St., Friday Harbor, WA 98250
T: 360.378.9485
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75-19846
The Sample Project
960 Guard Street
Friday Harbor WA 98250

Drawn:	TB	Check:	NA	Date:	12/09/10

Holdown Run Details

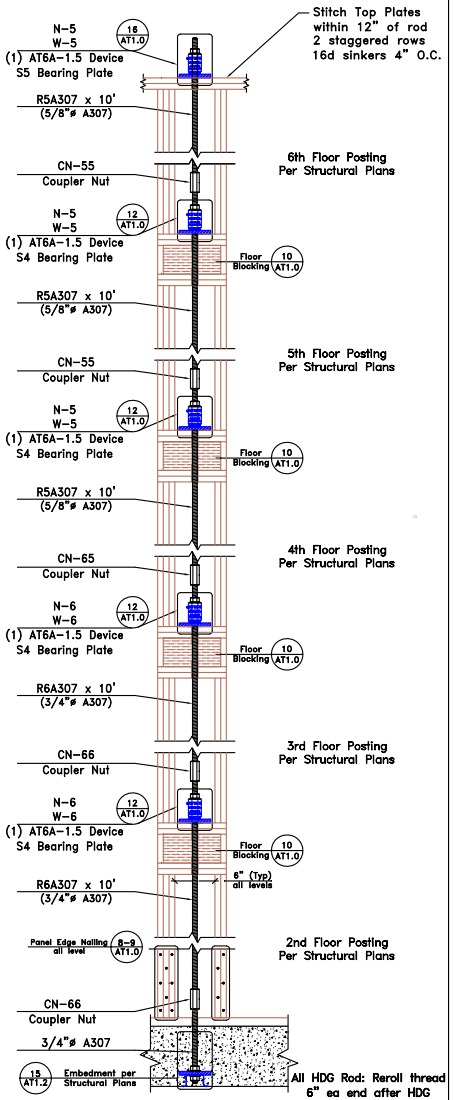
Not to Scale

AT1.0

Run 5A

Wood Floor/Level	Tension Load Spec	Differential Load Spec	Compression Load Spec
6th Floor	5.10	5.10	per Plan
5th Floor	5.90	0.80	per Plan
4th Floor	6.80	0.90	per Plan
3rd Floor	7.50	0.70	per Plan
2nd Floor	9.20	1.70	per Plan

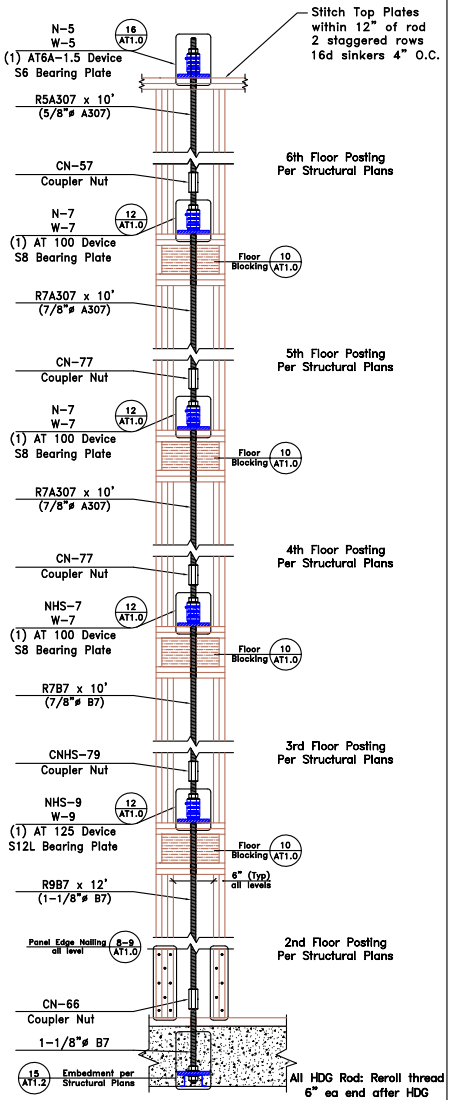
Loads shown in kips



Run 5B

Wood Floor/Level	Tension Load Spec	Differential Load Spec	Compression Load Spec
6th Floor	6.50	6.50	per Plan
5th Floor	10.75	4.25	per Plan
4th Floor	10.90	0.15	per Plan
3rd Floor	16.00	5.10	per Plan
2nd Floor	27.80	11.80	per Plan

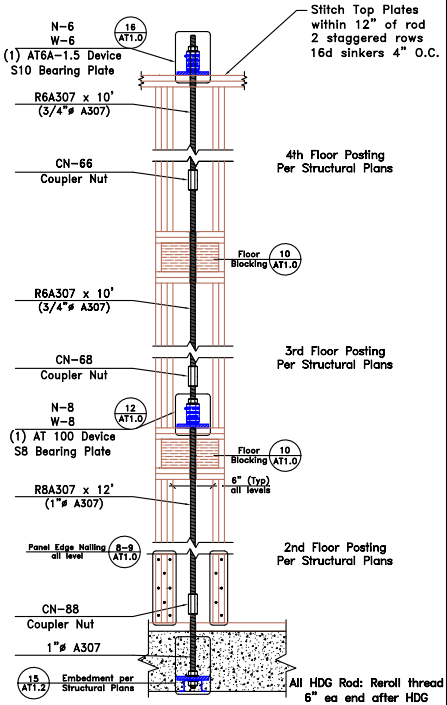
Loads shown in kips



3A

Wood Floor/Level	Tension Load Spec	Differential Load Spec	Compression Load Spec
4th Floor	4.50	8.50	per Plan
3rd Floor	8.50	0.00	per Plan
2nd Floor	16.00	7.50	per Plan

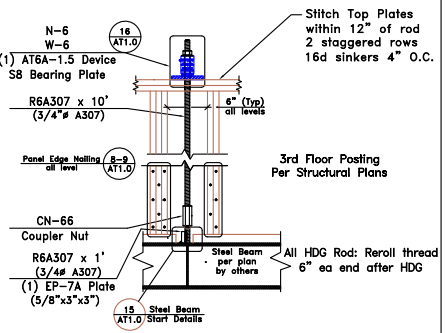
Loads shown in kips



1ASBS

Wood Floor/Level	Tension Load Spec	Differential Load Spec	Compression Load Spec
3rd Floor	8.20	8.20	per Plan

Loads shown in kips



The Sample Project, 1 of 1, 12/09/2010

See calculations prepared by Zbinden-Carter-Souders, Inc. Dated N. A.

No	Revision	Date

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Drawn:	TB	Check:	NA	Date: 12/09/10

75-19846
The Sample Project
960 Guard Street
Friday Harbor WA 98250

Holdown Run Elevations

Not to Scale

AT1.1

Anchor Bolt Embedment Notes

Anchor Bolt Embedment Design:

1. Anchor Bolt Embedment Design conforms to the 2007 California Building Code (CBC) and the 2009 International Building Code (IBC).
2. Required loads and system requirements per Final Shear Wall Layout Structural Plan Set, dated 07/17/2008.
3. Concrete Strength is 4,000 psi min. Drawings are not to scale.
4. Fabrication shall meet the requirements and specifications per structural plan general notes.

Anchor Bolt Installation:

1. Contractor/Installer shall verify anchor bolt size, thread pitch and material for correct location per structural plans and AutoTight holdown run layout sheet(s).
2. Anchor Bolt location relative to the end of the shear wall shall be per AT1.0 Details 4 and 6.
3. Anchor bolt shall be 6" minimum above concrete slab (U.N.O.). (Excess exposure will impact lift-over heights on floors above. Less exposure will not leave enough thread for coupler.)

Holdown System Design:

1. For system design see Holdown Run Details (AT1.0), Holdown Run Elevations (AT1.1) and Structural Drawing SD2.3
2. Fabrication shall meet the requirements and specifications per structural plan general notes.

Shop Drawing Disclaimer

Engineering has been provided by Zbinden-Carter-Souders Engineering and Commins Manufacturing, Inc. for the holdown system described in these shop drawings only. This design uses the construction plans and calculations provided by the Engineer of Record. No attempt had been made on the part of Zbinden-Carter-Souders Engineering and Commins Manufacturing, Inc. to verify the values given in the calculations or design described by the construction drawings.

The Engineer of Record is responsible for the structural design of the building and the ability of the design to transfer loads imparted to the structure by the holdown system.

Structural Engineer of Record

AutoTight Designer
P.O. Box 3338
Suite 2
Friday Harbor, WA 98250
Tel: 360-378-9484

Abbreviations

A.B.	Anchor bolt per plan or schedule
Alt	Alternate option
ATXX	AutoTight take-up device (installed with) 75 & 75-2.5 (5/8" or 3/4" rod) 100 (7/8" or 1" rod) 125 (1 1/8" or 1 1/4" rod)
CAT	Commins AutoTight
CN(HS)	Coupler nut (HS are notched)
CNR(HS)	Coupler nut reducer(HS are notched)
Dia	Diameter
DFL	Douglas Fir-Larch
HF	Hemlock Fir
HS	High strength
LXX	Bearing plate, 6x wall only
Min	Minimum
Max	Maximum
N(HS)-XX	Nut (HS have stamp grade ID)
O.C.	On center
R-XX(HS)	Threaded rod, (HS rod is black)
SPF	Spruce-Pine-Fir
STD	Standard strength (STD rod is zinc plated)
SYP	Southern Pine
SXX	Bearing plate, 4x or 6x wall
Typ	Typical
U.N.O.	Unless noted otherwise
W-XX	SAE Washer

Rod, Nut & Washer Size

-5	5/8"	-9	1-1/8"
-6	3/4"	-10	1-1/4"
-7	7/8"	-12	1-1/2"
-8	1"	-14	1-3/4"

Anchor Bolt Allowable Loads

Table 2b
2009 International Building Code (IBC)

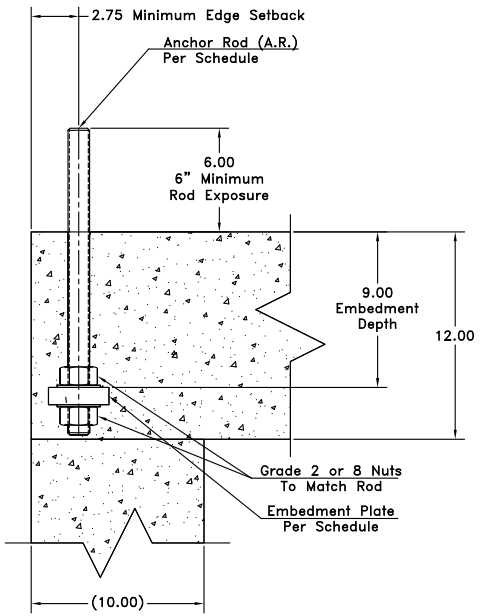
Allowable Loads 2009 IBC (lbs.)	Anchor Bolts		
	CAT Rod	Dia.-Thread	Material
6,903	R5A307	5/8"-11 NC	A307
9,940	R6A307	3/4"-10 NC	A307
13,530	R7A307	7/8"-9 NC	A307
17,671	R8A307	1"-8 NC	A307
22,365	R9A307	1-1/8"-7 NC	A307
27,612	R10A307	1-1/4"-7 NC	A307
14,381	R5B7	5/8"-11 NC	A193-B7
20,709	R6B7	3/4"-10 NC	A193-B7
28,187	R7B7	7/8"-9 NC	A193-B7
36,816	R8B7	1"-8 NC	A193-B7
46,595	R9B7	1-1/8"-7 NC	A193-B7
57,524	R10B7	1-1/4"-7 NC	A193-B7
69,029	R10A354	1-1/4"-7 NC	A354-BD

Threaded Rod, Couplers, Nuts and AT Shrinkage Device Notes:

Material:

1. Rod Alloy is incorporated in the rod part name. See AT1.0 Holdown Run Details for data on other rod alloys.
2. All threaded rod is Uniform National Coarse (NC) threaded.
3. High Strength rod is usually marked with Red paint. Consult Factory for additional information.
4. Standard couplers conform to ASTM A-563 grade A (SAE Grade 2). High strength (HS) couplers conform to ASTM A563 Grade C (SAE Grade 8) and are notched for identification.
5. Standard nuts conform to ASTM A-563 grade A (SAE Grade 2). High strength (HS) nuts conform to ASTM A563 Grade C (SAE Grade 8) and are stamped for identification.
6. Automatic (AT) Take-Up Device & Rod & Bearing Plates by Commins Manufacturing Inc. per ICC ES report ESR-1344 issued November 1, 2007.

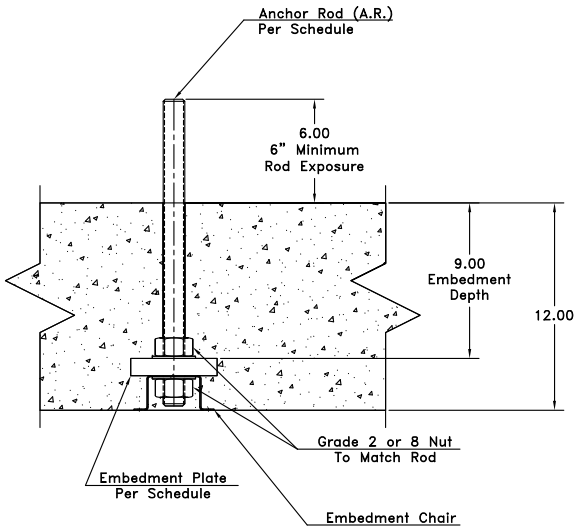
Slab Edge Anchor



Concrete and Rebar
per Structural Plans

AutoTight Anchor Bolt Embedment Schedule					
Run #	Location	Rod	Plate Size Slab Interior	Embedment Depth	Quantity
1-E	Slab Edge	R6A307	3½" x 7½" x 1"	9"	14
2-E	Slab Edge	R9B7	3½" x 7½" x 1"	9"	2
3-E	Slab Edge	R8A307	3½" x 7½" x 1"	9"	0
4-E	Slab Edge	N.A.	Steel Beam Start	N.A.	N.A.

Slab Interior Anchor



Concrete and Rebar
per Structural Plans

AutoTight Anchor Bolt Embedment Schedule					
Run #	Location	Rod	Plate Size Slab Interior	Embedment Depth	Quantity
1-I	Slab Interior	R6A307	5" x 5" x 1"	9"	50
2-I	Slab Interior	R9B7	5" x 5" x 1"	9"	6
3-I	Slab Interior	R8A307	5" x 5" x 1"	9"	5
4-I	Slab Interior	N.A.	5" x 5" x 1"	N.A.	N.A.

Run names are the same as structural drawing with the addition of -E for Slab Edge runs and -I for Slab Interior runs.

See calculations prepared by Zbinden-Carter-Souders, Inc. Dated N.A.

The Sample Project 1 of 1, 12/09/2010

AutoTight® Rod Holdown System
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DRAFT

No	Revision	Date

CAT ID 75-19846
The Sample Project
760 Guard Street
Friday Harbor WA 98250

Drawn: TB | Check: | Date: 10/28/10

Anchor Bolt Details

AT1.2