

QUALITY LIGHT STEEL FRAMING CONNECTIONS AND MEMBERS

LOAD BEARING WALL SYSTEMS

CONSTRUCTION GUIDE



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1.888.474.4876

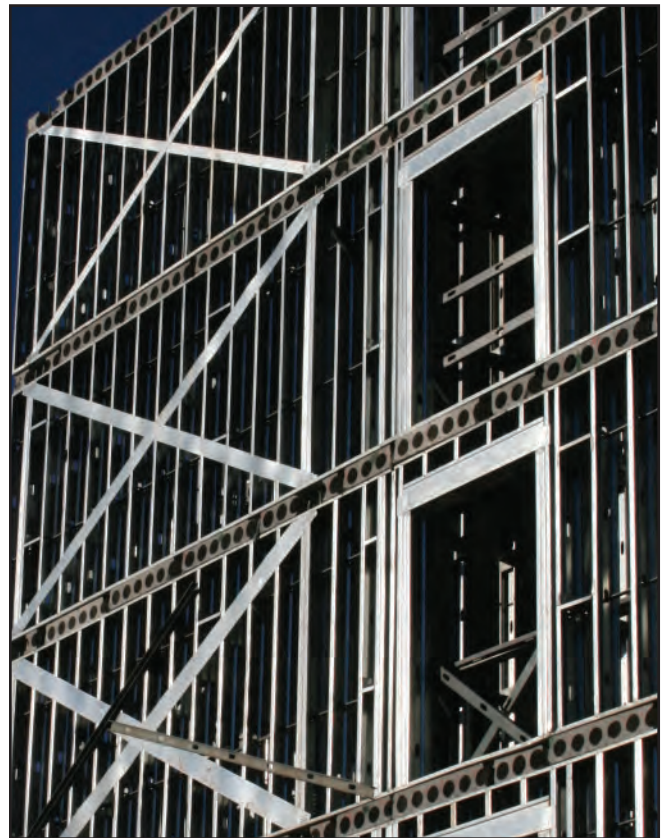
The purpose of this guide is to educate contractors, architects and engineers on the proper use of TSN's load bearing wall systems on the job site. The Steel Network wants to ensure that our customers fully understand these systems and are supplied with detailed information addressing installation issues.

This document contains information to prepare the installer for the construction of steel framed load bearing wall systems and their interaction primarily with Hollowcore concrete floor systems. TSN's load bearing wall systems may be used with other common floor systems, such as composite decking, bar joists, and light steel joists. As with any project, coordinate the installation with a licensed Engineer. This document is not all-inclusive of construction conditions that may be experienced on a project.



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SigmaStud®

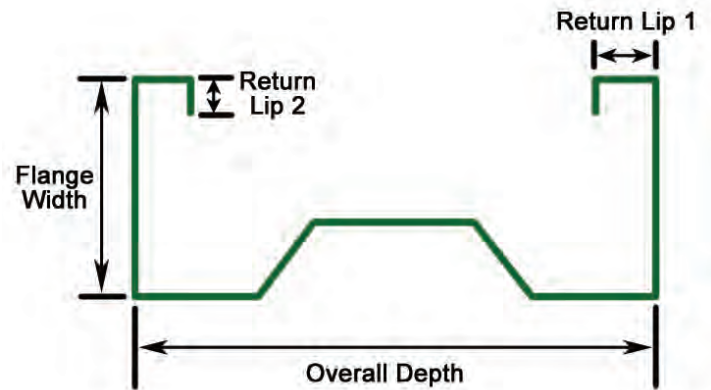
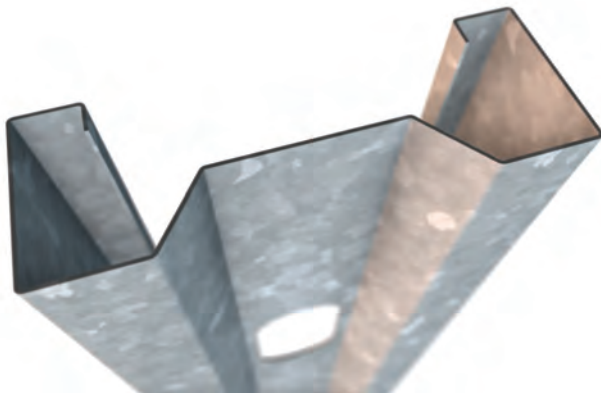
SigmaStud® installation is similar to that of standard “cee” studs. There are some key details that the contractor needs to be familiar with in order to ensure that these load-bearing studs are installed according to manufacturer recommendations.

- Each stud is cut to the specified length (each length must be specified at time of order)
- Standard punchouts begin no less than 10” from the end, with spacing every 24” thereafter
- Punchout spacing can be customized to project-specific requests
- Orders can be bundled per floor or for specific customer requests

Nomenclature

SigmaStud® is designated with the same standardized nomenclature set forth by the Steel Stud Manufacturers Association (SSMA):

600SG250-43, 50ksi



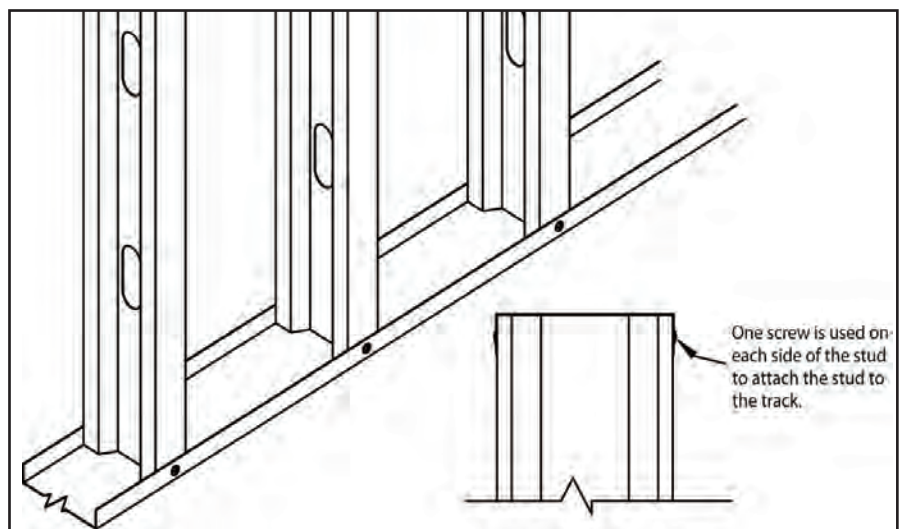
Installing SigmaStud to Track

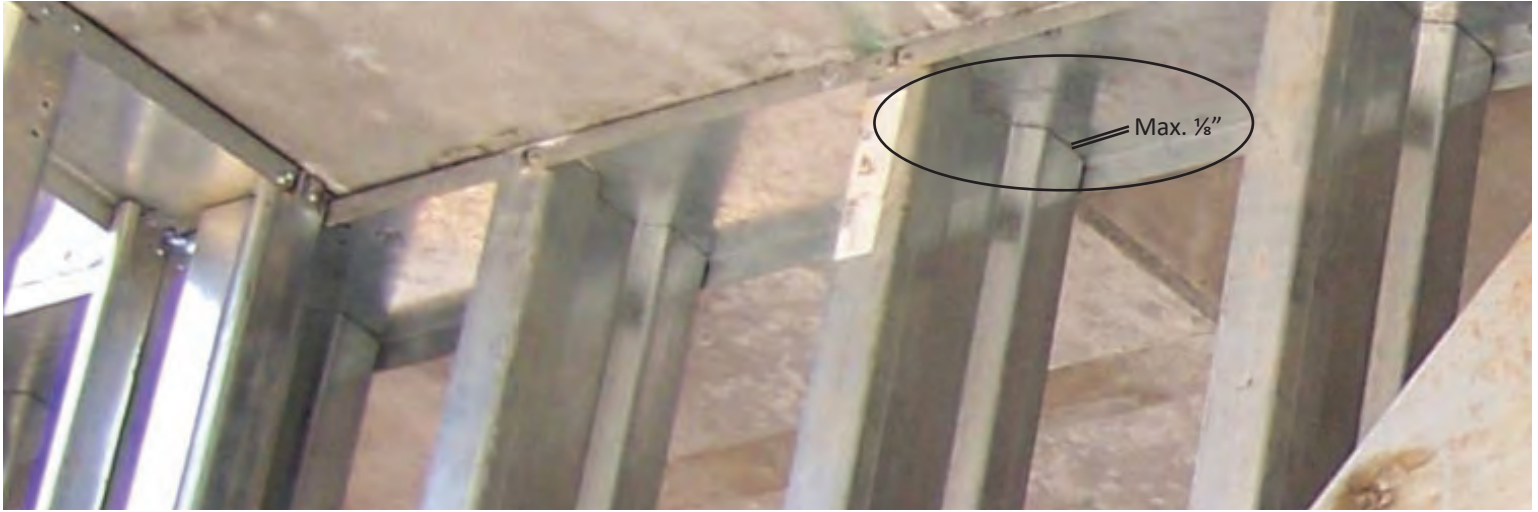
SigmaStud fits into standard sized SSMA (T) Section Track members. Typically, one screw is used on each side of the stud to attach the stud to the track. As with SSMA stud section framing, low profile screws are recommended in order to reduce any bulging or “bump-out” where the finishing material covers the screws.

- TSN manufactures SSMA (T) Section Tracks (all standard depths and thickness)
- Available in 10’ standard lengths
- Custom lengths are available

Track Recommendations

- The top and bottom track should match the stud thickness
- Minimum track thickness = 54mils
- When welding is required to the top track, it is recommended to use a 14ga (68mil) thickness. Welding may be used as a means of attaching light gauge components, and should be performed by an AWS certified welder.





Load bearing studs must be fully seated within the top and bottom track. Design standards recommend a maximum gap of $\frac{1}{8}$ " in order to obtain an effective bearing condition.

SigmaTrak®

TSN's SigmaTrak allows studs to seat fully within the track, providing full bearing at the top and bottom structural tracks. Visit www.steelnetwork.com for more information



Shims

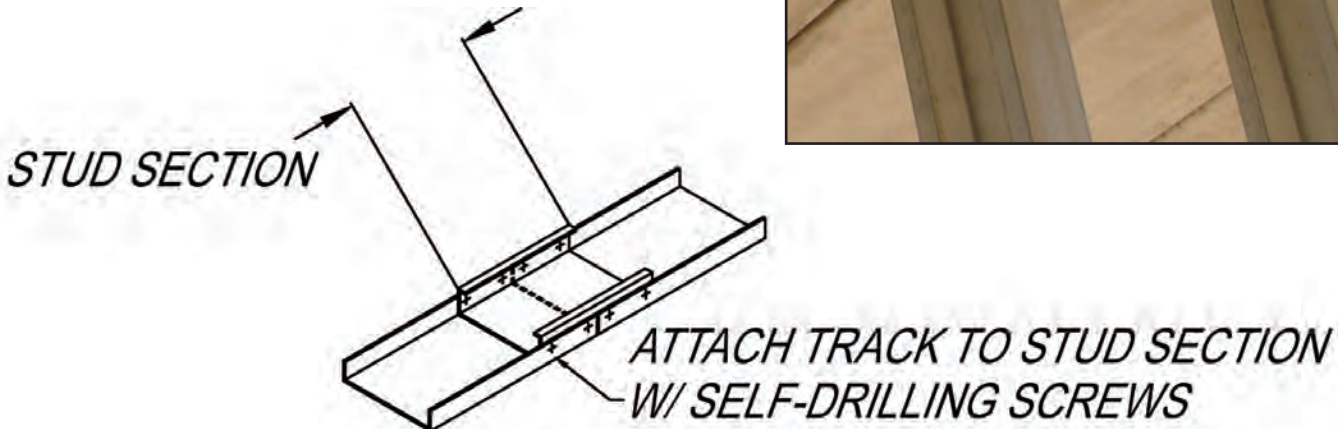
If shims are used to correct situations where gaps exist between the stud and the track:

- The gap between the track and the plank at load bearing stud locations **must not exceed $\frac{1}{8}$ "**.
- If the gap exceeds $\frac{1}{8}$ ", shim or grout this area with structural non-shrink grout – 4,000 psi minimum.
- Grout should be applied so it covers an area equivalent to twice the width of the stud.
- Coordinate this procedure with the plank manufacturer/installer or the general contractor.
- Place the order for shims at the same time as the SigmaStud order.

Track Splicing/Reinforcement

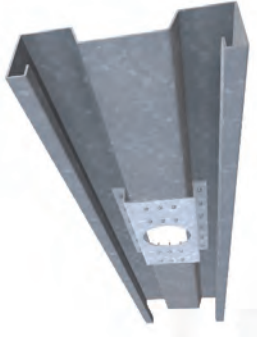
The top and bottom wall tracks in contact with the planks need to be continuous. The contractor must provide track splicing if the tracks are cut.

- To splice track in a load-bearing wall, an extra piece of stud must be used inside the track to sufficiently overlap each side of the joint. 2-3 screws are then installed through the flanges on each side of the joint, on both sides of the track (for a total of 8-12 screws per splice).
- In adjacent walls ending with edge studs, a plate may be screwed or welded across the flanges of the end studs of two adjacent walls. In addition to this, the studs must be screwed or welded together per standard column/screw guidelines.

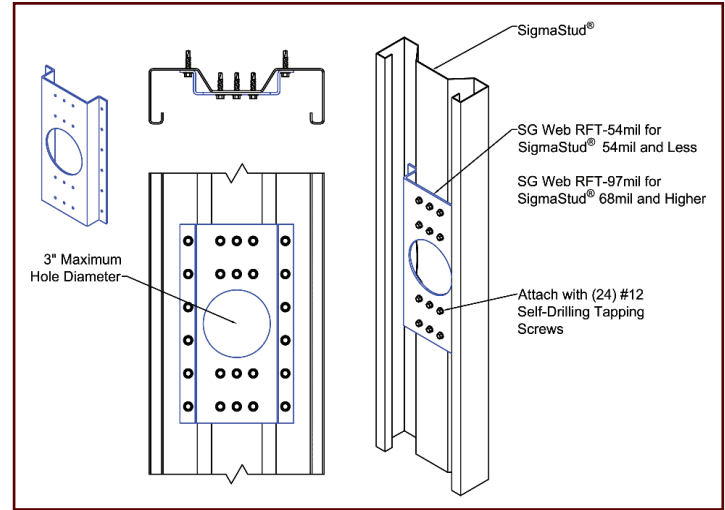


Reinforcing Non-Standard Holes in SigmaStud®

Each SigmaStud contains punchouts which are 1.5" wide and 4" tall, spaced every 24" o.c. vertically. Any larger holes cut into SigmaStud require a review by the engineer, as load capacity is based on the existence of standard punchouts. With the realization that additional holes do manage to appear in studs, TSN provides the following recommendations:



- Reinforce any holes added during the project construction.
- Review the detail at right for a possible solution recommended by TSN (all modifications to SigmaStud must be reviewed by a structural engineer).
- For 33-54mil SigmaStud, use 54mil RFT. For 68mil and higher, use 97mil RFT.
- Contact TSN's Project Management Team at (888) 474-4876 for more recommendations.



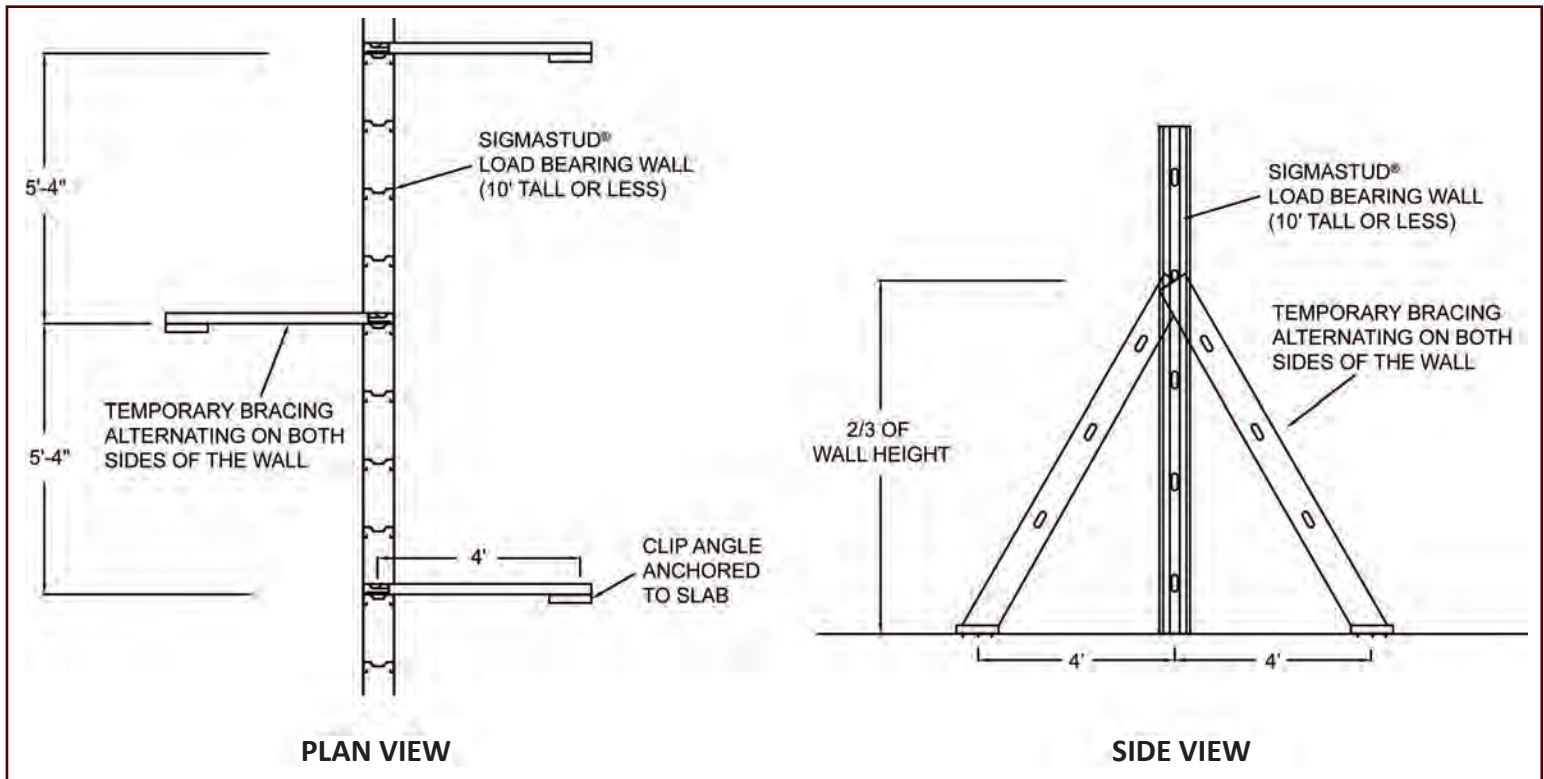
Temporary Construction Bracing

Temporary construction bracing is necessary in order to install steel framed load bearing wall systems. Coordinate temporary bracing with the Specialty Engineer and/or the General Contractor. Safe and proper installation and "loading" of the walls can only be achieved if the adequate temporary bracing is installed. **Failure to do this can result in wall failure and/or the risk of serious injury.** Two types of construction bracing are required:

- In the plane of the wall (may employ the X-bracing of the shear wall panels and/or by adding diagonal kickers at the two ends of the wall).
- Out of the plane of the wall.

Temporary bracing should be designed by a design professional.

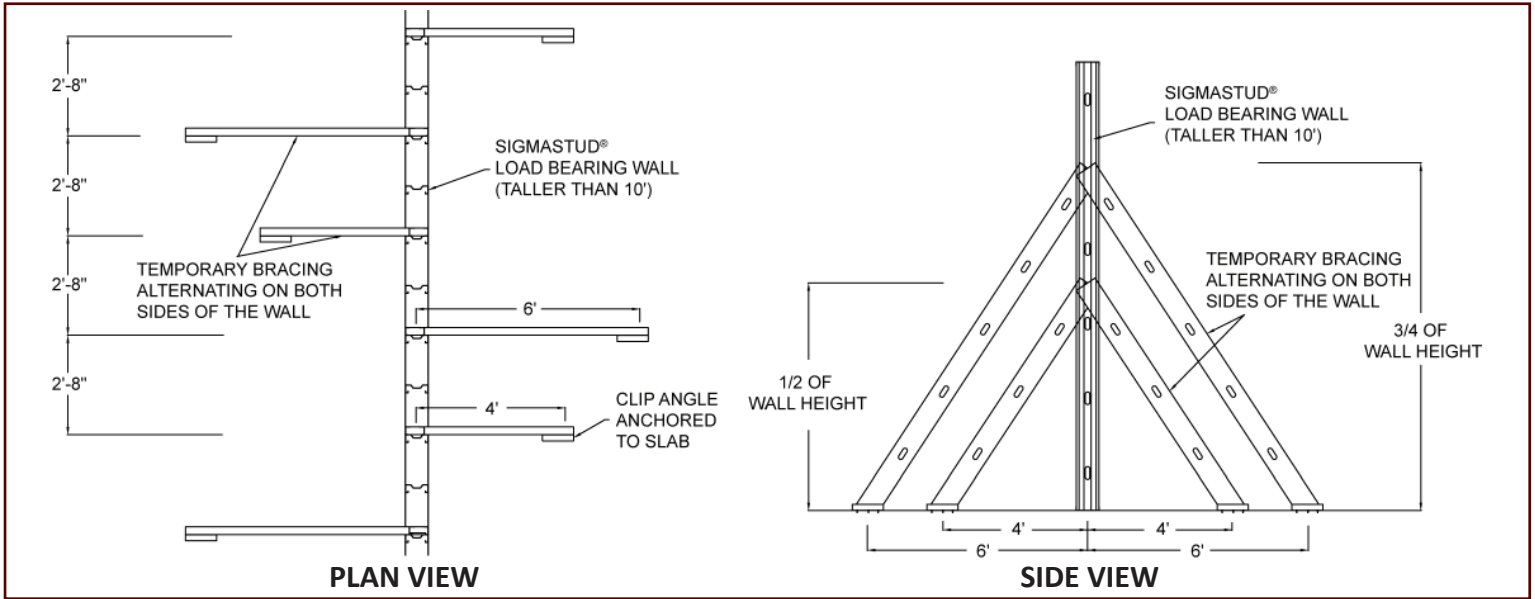
Suggested Minimum Construction Bracing for Load Bearing Wall 10' or Less, Out-of-Plane



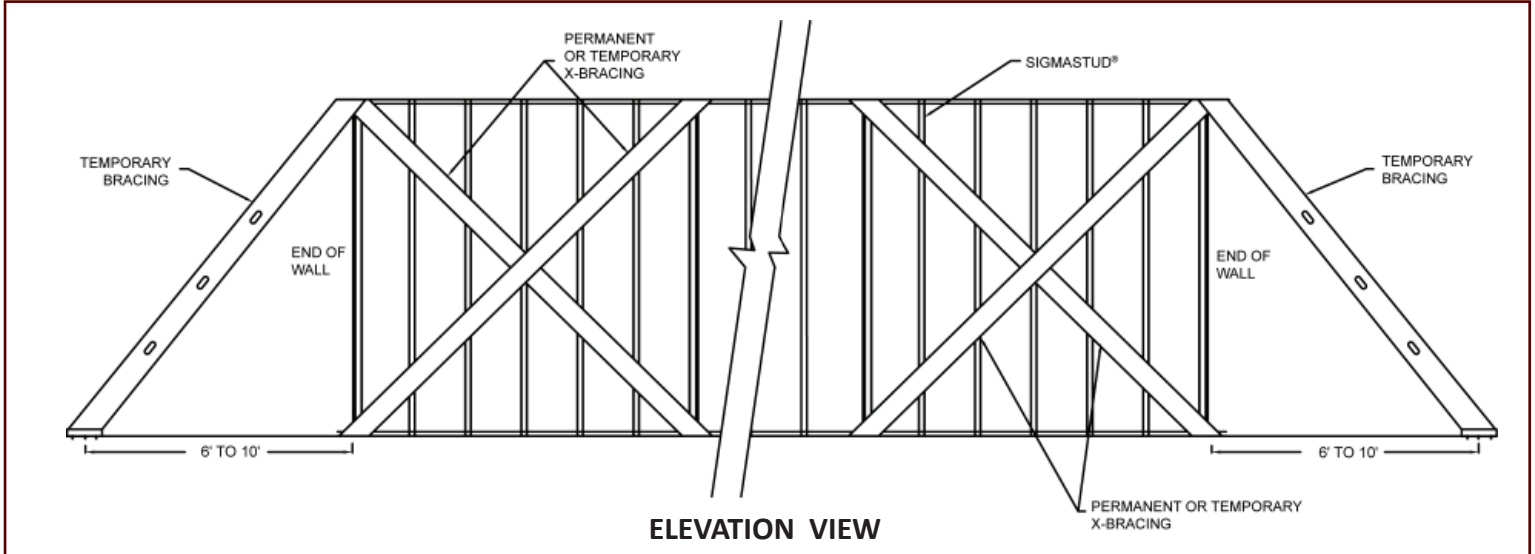
When should temporary construction bracing be removed?

- After at least 2 floors above the temporarily braced wall are installed, allowing the walls to "seat".
- After all permanent shear wall bracing is installed and tightened.
- After all of the perpendicular walls are connected.

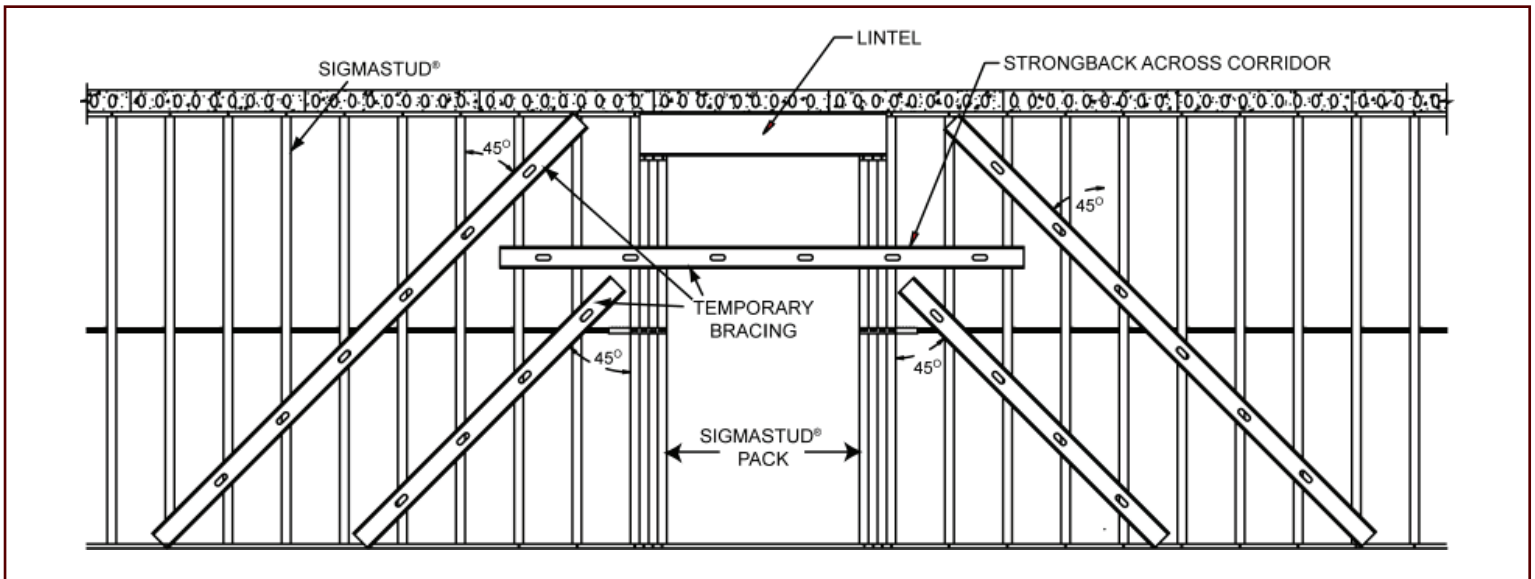
Suggested Minimum Construction Bracing for Load Bearing Wall Taller Than 10', Out-of-Plane



Suggested Minimum Construction Bracing for Load Bearing Wall: In-Plane



Suggested Minimum Construction Bracing for Load Bearing Wall: In-Plane @ Corridor

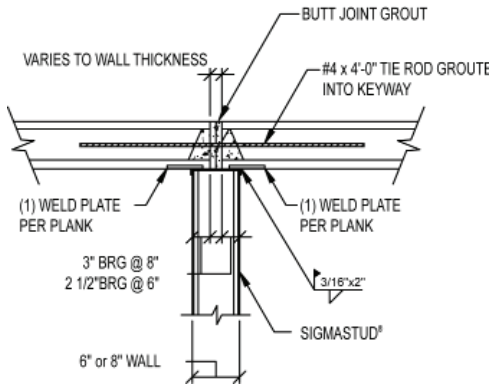


Hollow Core Plank Connections

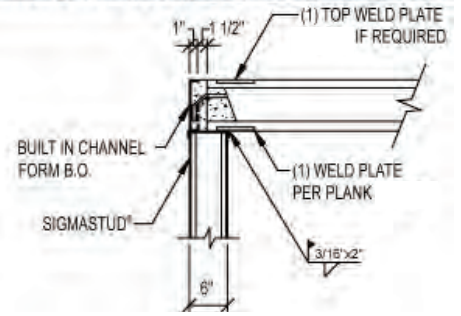
If the floor system consists of hollow core planks:

- Typically attach the top track to the floor above by welding the bottom of a key plate (Splice Plate) to the track.
- The key is then grouted in between the two planks, connecting the floor system to the rest of the structure.
- Embedded bolts/anchors and power-actuated fasteners can also serve to connect the load bearing walls with various floor diaphragms, per the structural engineer's specifications.
- Be sure to clarify specific methods of attachment with the engineer.

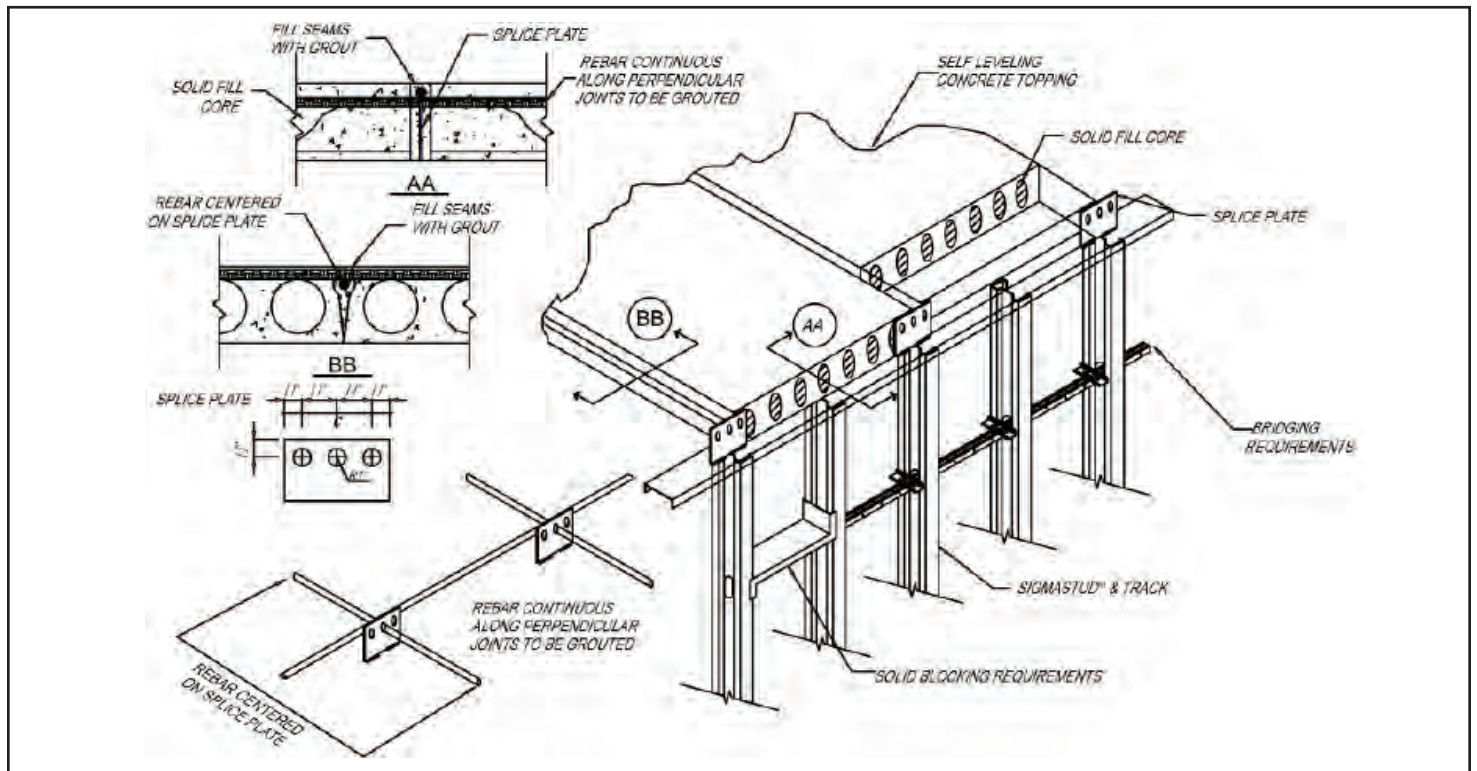
EMBEDDED PLATE DETAIL - INTERIOR BEARING WALL



EMBEDDED PLATE DETAIL - EXTERIOR BEARING WALL



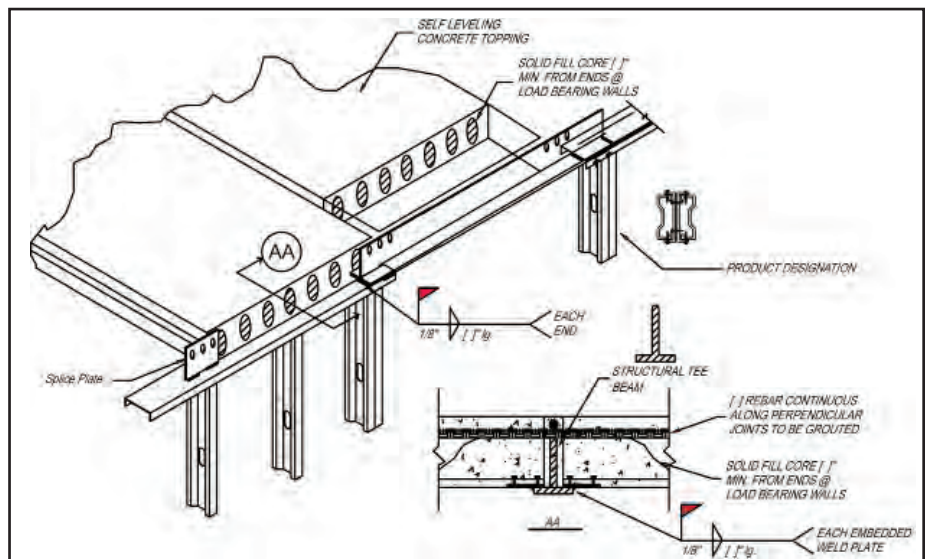
Key Plate Detail



Corridor Framing

In applications where the plank spans bays that are parallel to the corridor, plank direction can be maintained in the corridor through the use of a load distribution lintel. Structural steel is commonly used to act as the lintel to support the opening, resulting in increased point loads acting on the columns. Bearing requirements for various types of structural steel vary and must be satisfied.

- Typically, multiple studs of the same thickness are used in “stud-packs” to provide bearing points for structural steel lintels.
- Coordinate the use of “stud packs” with the structural engineer.



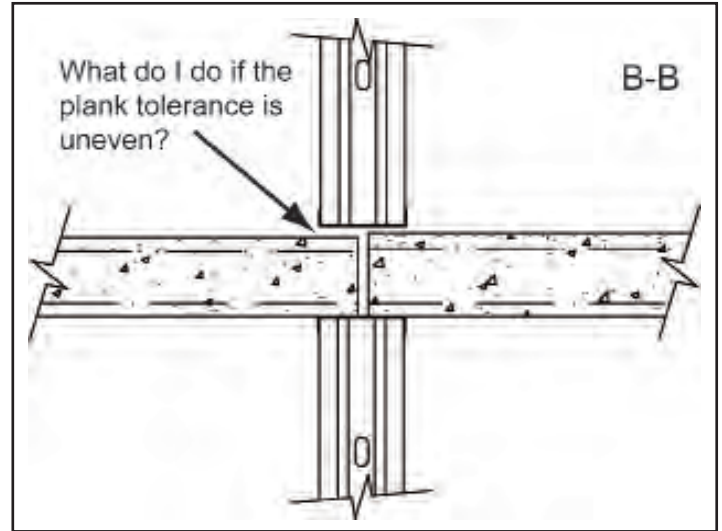
Uneven Plank

Having a solid, level surface is critical for load bearing metal framing. Typical plank tolerances are up to $\pm \frac{1}{4}$ ". This tolerance between planks can cause metal framing to not be level across the planks.

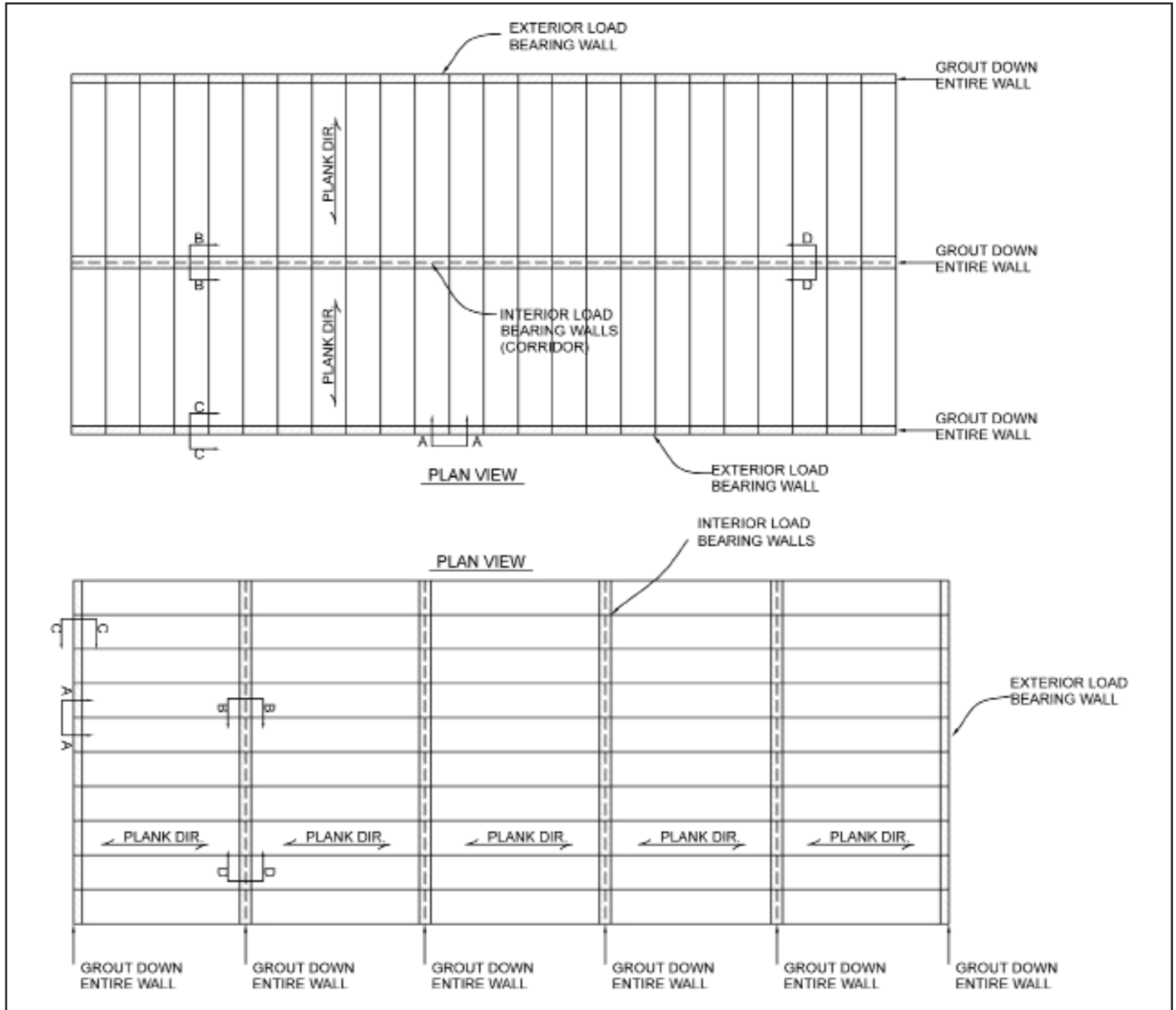
The tolerance from the plank is more critical with load bearing stud systems vs. other structural systems. Each floor level is built off of the floor and studs below, so a building can increase or decrease in height across the same floor due to the plank tolerance. In other structural systems, the height can be controlled within the system, i.e. within the mortar.

The responsibility of providing the level surface is a gray area. Project success requires that the framing start from each floor from a level surface. Proper coordination between the design team, general contractor, plank erector and light steel framer is required to ensure the building is built level and that each story is of the proper dimension.

The scenarios on the following pages refer to the "Plank Direction - Interior & Exterior Walls - Plan View" drawing below.

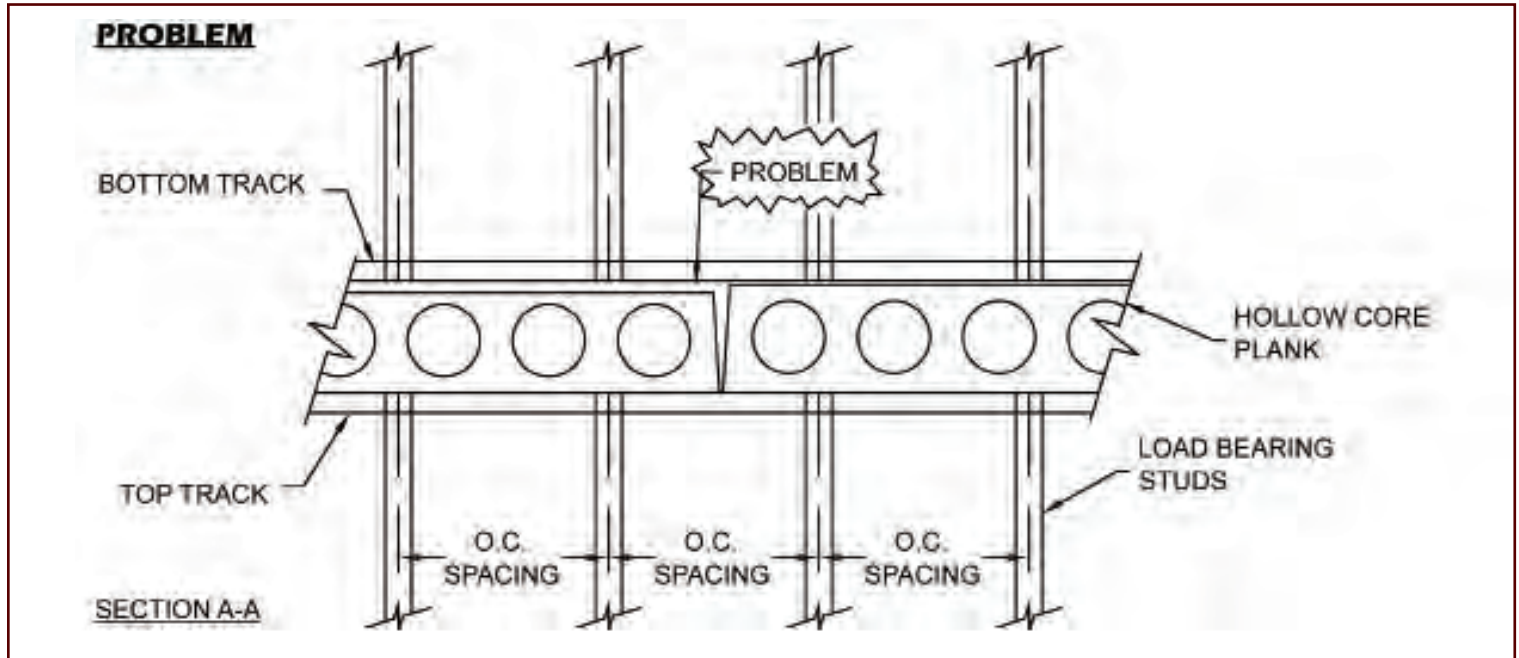


Plank Direction - Interior & Exterior Walls, Plan View

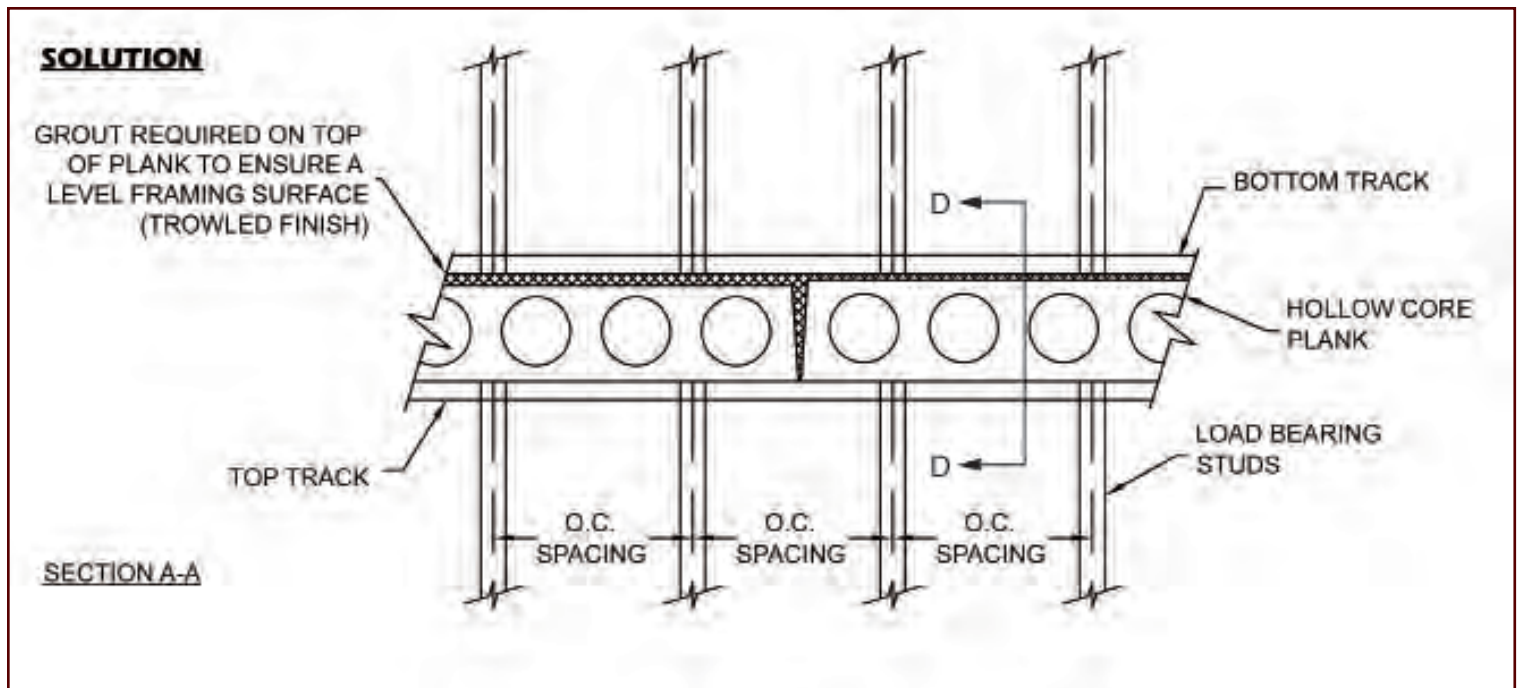


Scenario One: Load Bearing Wall - Uneven Planks Parallel To The Wall Frame

Scenario One is a wall application where two planks meet end to end, each bearing on a single stud. An uneven gap exists between the planks, and one of the planks is slightly lower than the adjacent plank. The grouted area is not only between the planks but also across the top surface of the planks where the next floor framing will intersect the planks as shown. A typical grout width is 16" for this scenario. Be sure to require a trowled finish.



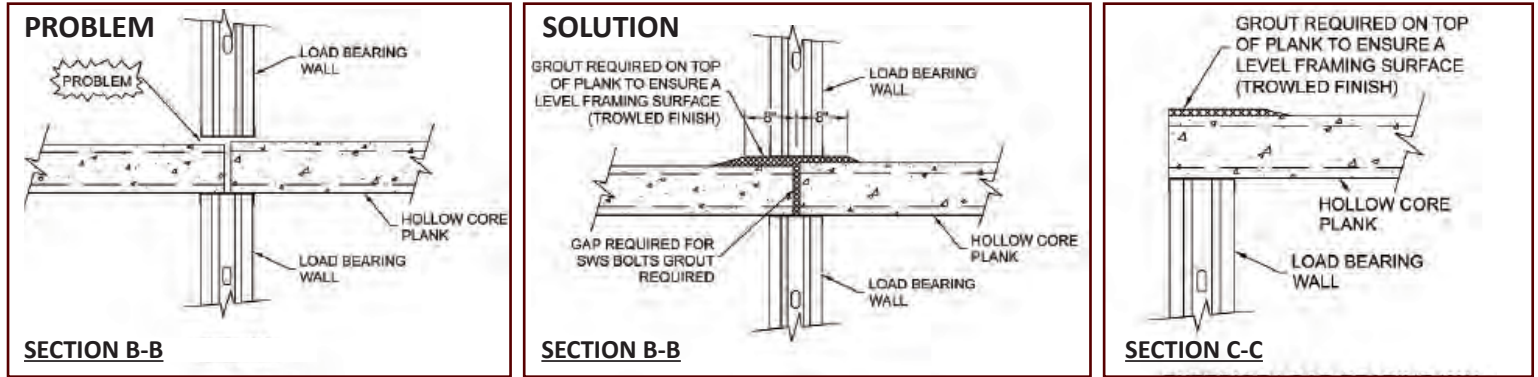
Studs and track within load bearing walls must have full bearing (level) to the floor diaphragm at the bottom and the top of the wall. Uneven hollow core plank as a result of various thicknesses therefore requires attention.



Grout across planks where load bearing walls exist & not just between planks at every floor, to ensure a level framing surface.

Scenario Two: Interior Load Bearing Wall - Uneven Plank Perpendicular To The Wall Plane

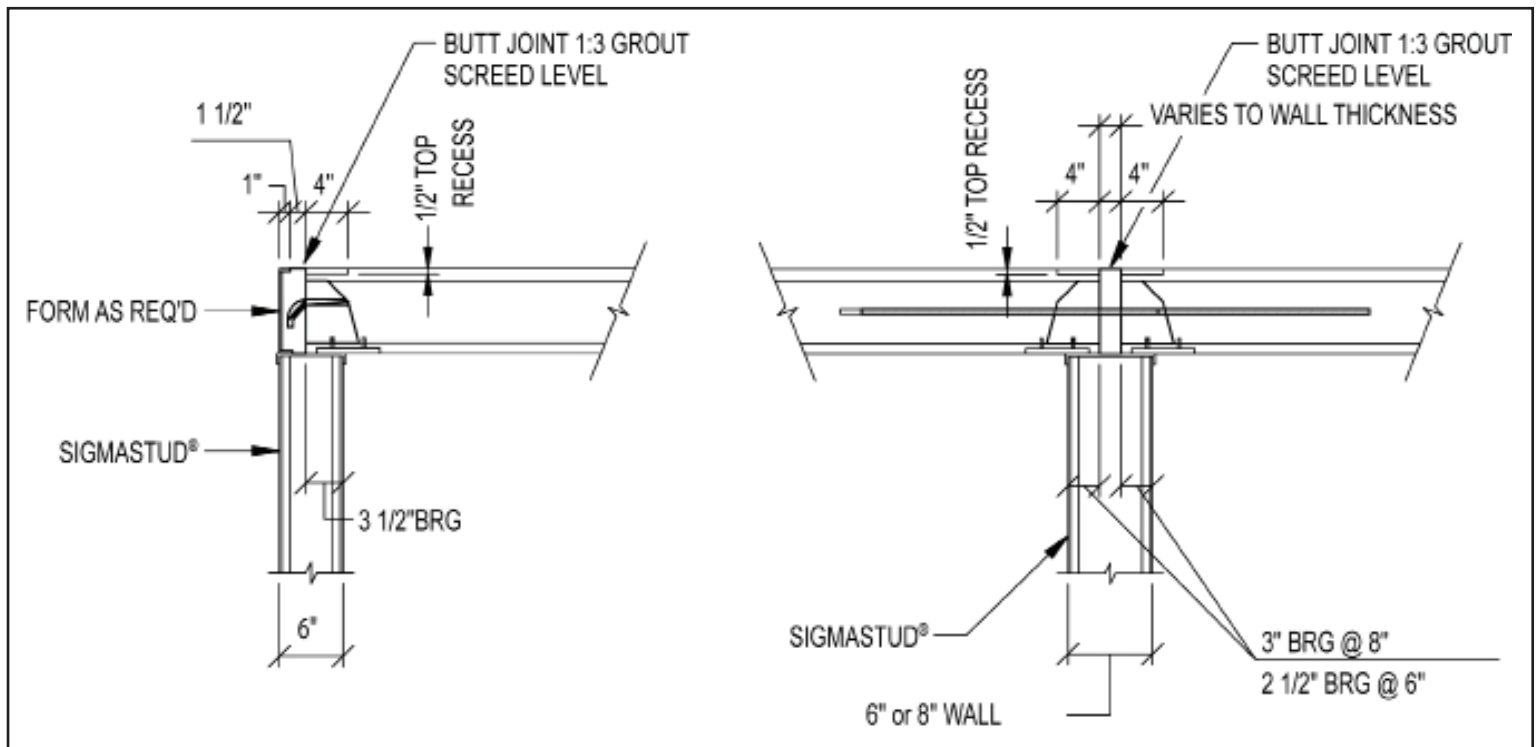
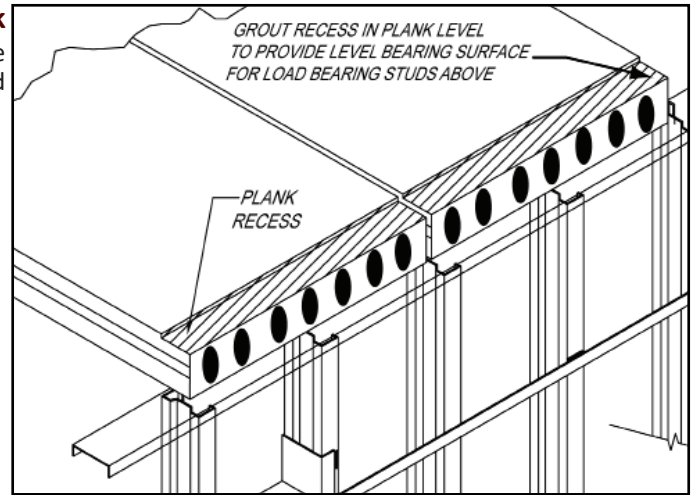
Scenario Two shows an interior application where two planks fully bear on a single stud. In this case, the top (from the floor above) and bottom (from the floor below) tracks must span across both of the planks. The area below the tracks must be grouted. Typically a grout width of 1.5 x the stud depth is recommended. Be sure to require a trowled finish.

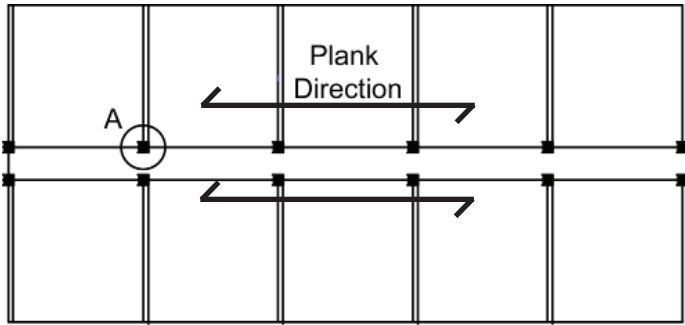


Grout across planks where load bearing walls exist & not just between planks at every floor, to ensure a level framing surface.

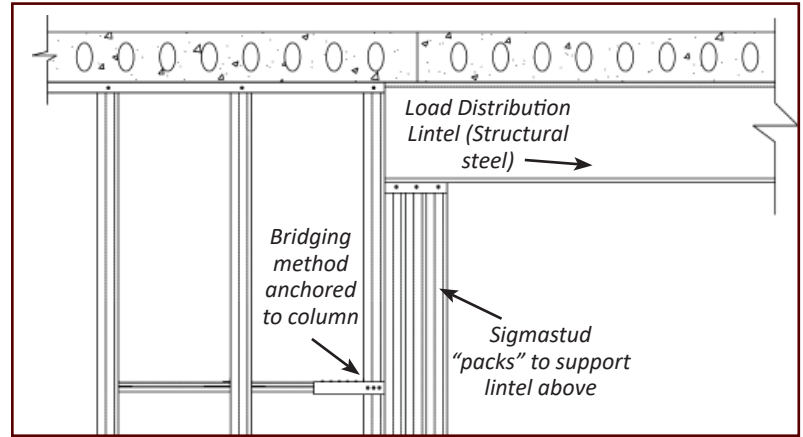
Alternative Solution to Scenarios One and Two: Recessed Plank

Where available, planks may be manufactured with a recess in the top of the plank to provide a key way within the plank where the grout can be inserted and leveled for the floor above.

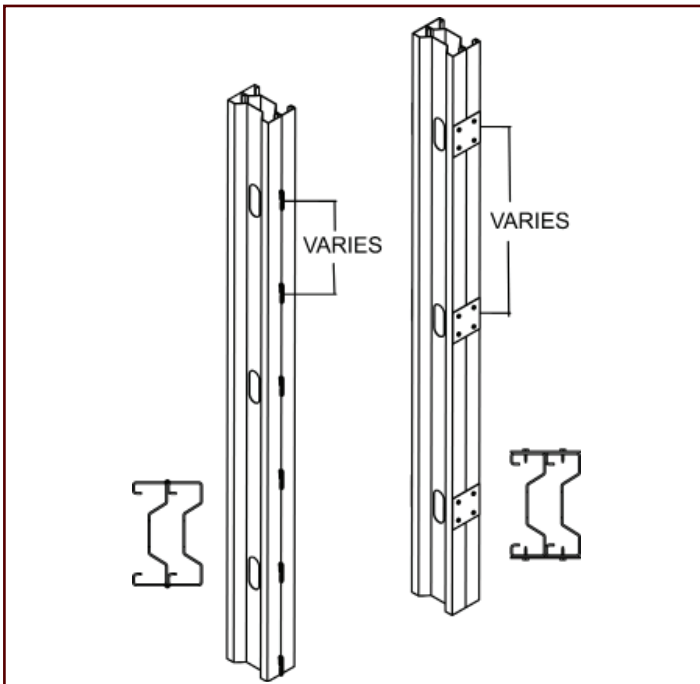




Floor plan indicating direction of plank and callout example of corridor framing.



Built-up corridor framing with bridging anchorage.



SigmaStuds connected together with weld (at left) or flat plate (at right).

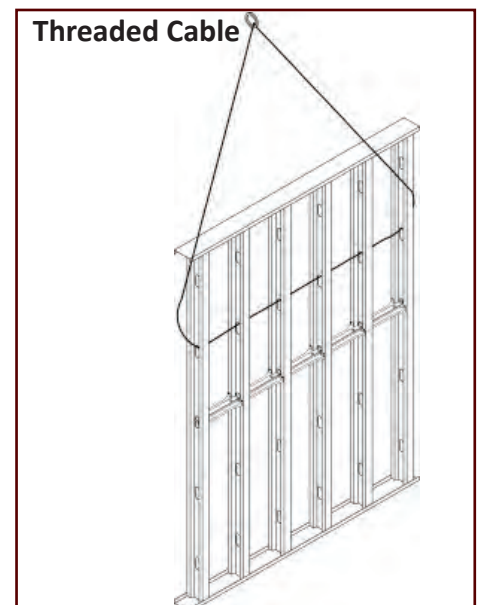
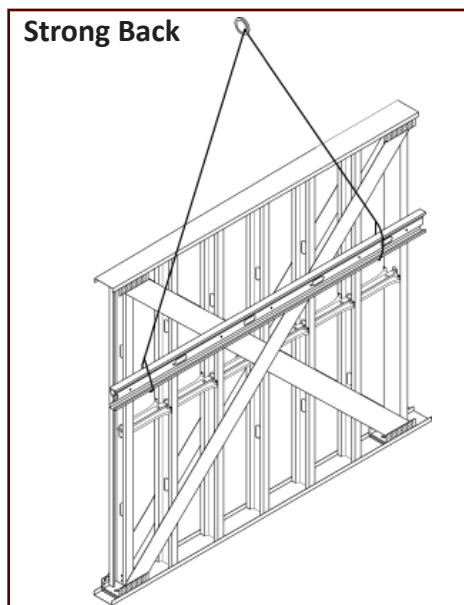


Picture of corridor framing, with SigmaStuds supporting the distribution lintel.

Panelized Walls

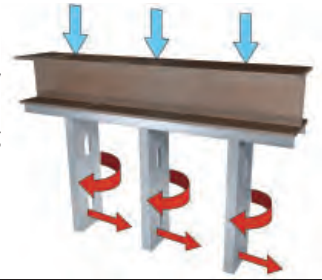
When lifting wall panels into place, **avoid using the bridging as a lift point**. This could bend the bridging members, rendering them ineffective. Here are two suggestions that have worked well in existing installations:

- Attach a temporary stud or other bracing member ("strong back") horizontally across the wall panel and use it to lift the wall sections into place.
- Thread the cables through the stud punchouts at either end to lift the panel.

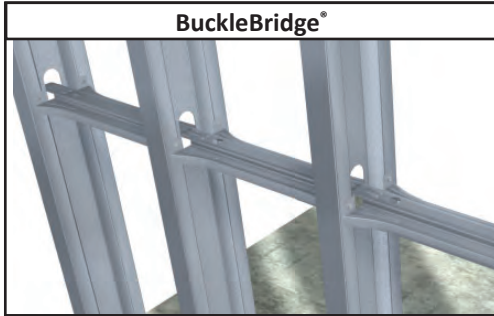


Background

Bridging is a critical element of a properly constructed load bearing wall system and is designed to resist horizontal and/or lateral loads developing in the wall system. As axial (vertical) load is applied to a wall stud, it will react by buckling and twisting about its weak axis. Wall bridging methods resist this tendency to buckle. The loads will accumulate in the wall through the bridging method, and need to be transferred to the structure via a bridging anchorage point. Some anchorage examples are shown below. Consult your structural engineer for the full bridging design. TSN's Engineering Team is available to make recommendations for specific project conditions.



Wall Bridging Methods:



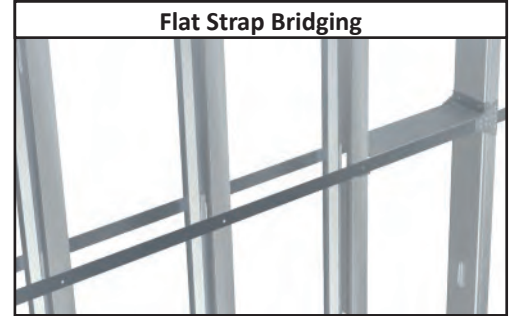
BuckleBridge®

- Spaces studs at 16" o.c.
- Typically used in higher-load applications.



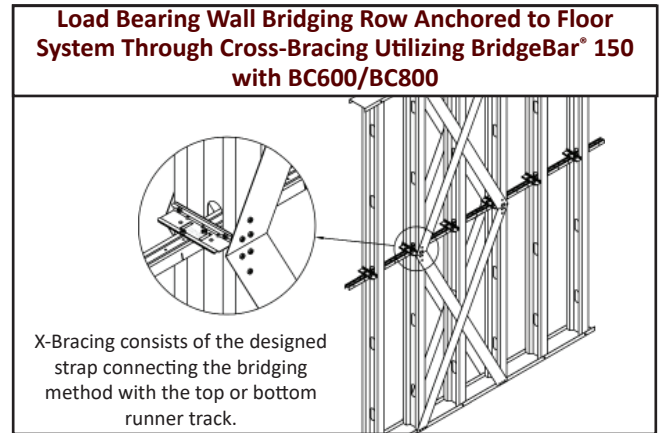
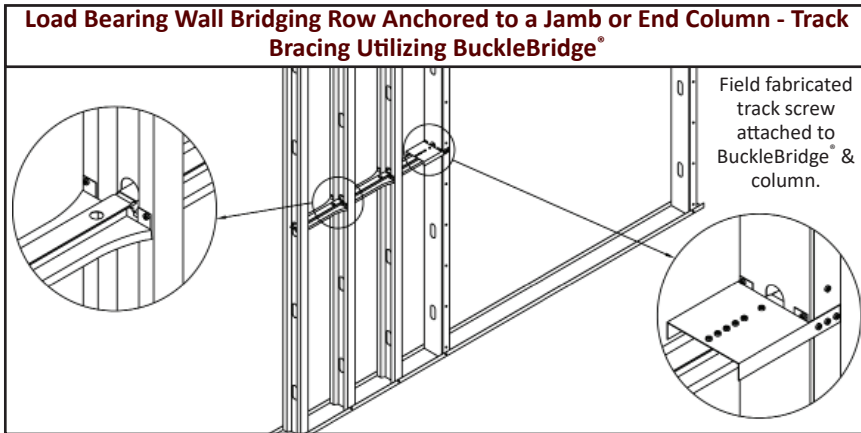
BridgeBar® with BC600/800

- Notches every 4" accommodate stud spacings.
- Fast attachments with TSN's bridging clips.



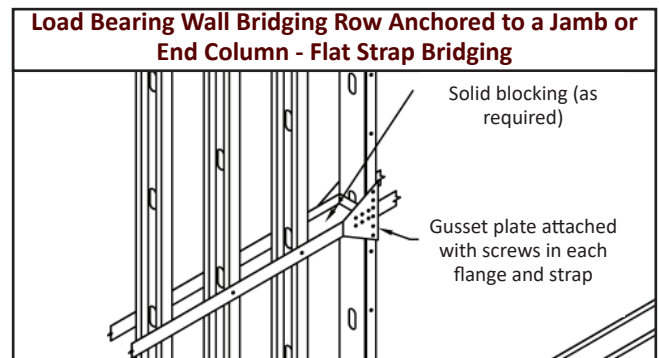
Flat Strap Bridging

- Straps are installed on both sides of the wall.
- Solid blocking as required.

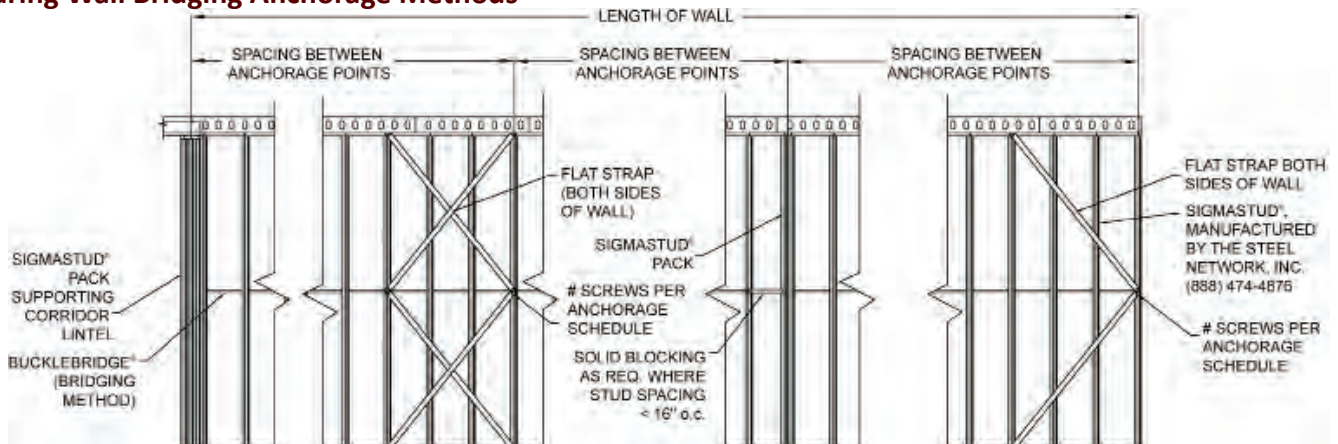


Key Bridging Issues:

- What is the bridging method?
- How many rows of bridging exist on each wall?
- If there is more than one row of bridging per wall – what is the vertical distance (spacing) between the bridging rows?
- What is the bridging anchorage method?
- What is the spacing for bridging anchorage?



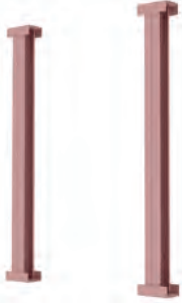
Load Bearing Wall Bridging Anchorage Methods



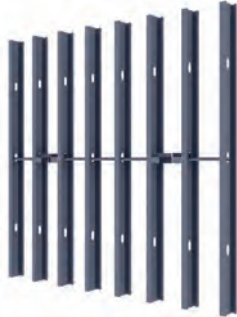
StiffWall® is a simplified shear wall system consisting of two Column/Boot assemblies (one at each end post) and Flat Strap (each side of X-bracing). The StiffWall is embedded into the load bearing and non-load bearing walls. Perform your stud take off as normal, then order the Column/Boot Assembly and the Flat Strap as separate items. **Each Column is delivered fully assembled with boots attached and ready for installation to the wall panels per project requirements.**

TSN's StiffWall allows for an efficient verification of load paths through a structure. StiffWall is usually not designed as a gravity load bearing element. However, its boundary end columns can see compression loads from the floor weight above. For the purpose of this document it will be assumed that all StiffWall elements are non-gravity-load-bearing.

StiffWall® Components



Column/Boot Assembly
(1) at each end post
(same height as studs)



SigmaStud® & BuckleBridge®
Load bearing wall studs & bridging
are not a part of the StiffWall System*



Flat Strap
(2) at each side of X-bracing




StiffWall® System
Embedded within load bearing wall studs

* StiffWall® is embedded between studs and does not replace infill studs, as they act independantly of the shear wall.


** The floor slabs are part of the lateral load resisting system, but are not part of TSN's StiffWall system.

*** Anchor bolts are not included with Column/Boot Assembly. 1¼" anchor is required for LG and TR boots, & ¾" is required for ME, SM, PL and LT boots.




StiffWall® Column Boot Assembly (C/STW)

- End posts for the shear wall - Columns come pre-assembled with boots & strap track for easy installation into the wall
- Wider flange & additional return lips provide an increased load capacity over standard steel studs




Flat Strap (FS)

- X-braced straps arrive at the jobsite cut to length eliminating splicing
- Runs diagonally as a single piece and attaches to the strap track on each side of the wall
- Made to your specifications, always using 50 ksi steel



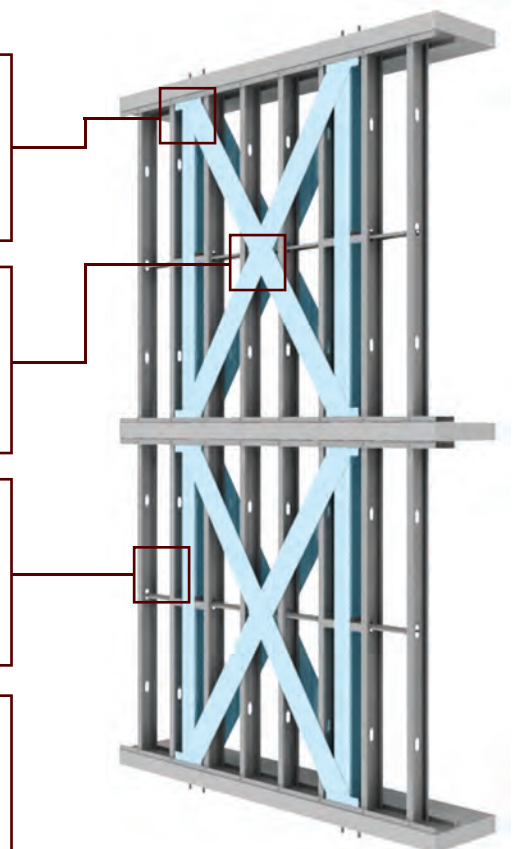
SigmaStud® (SG)

- Can be used as infill studs in loadbearing applications to reduce material & time required installing finishes
- StiffWall is embedded between studs and does not replace load bearing studs



TightStrap® Tension Tool

- Device used to tighten flat strap in the field, removing "waviness" or "bowing" prior to fastening
- Ensures optimal system performance



Load Bearing Wall Systems Construction Guide

StiffWall® Components

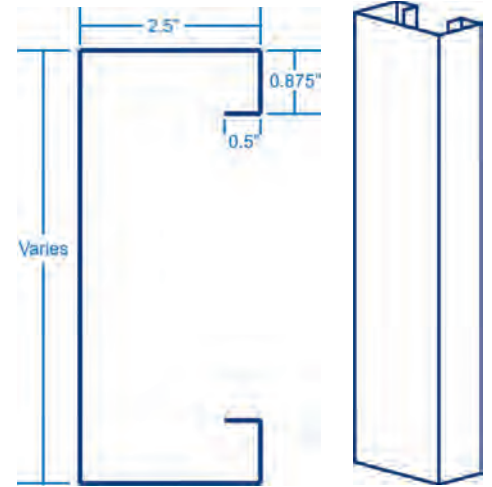
Columns

The StiffWall® Columns (C/STW) are the end posts for the shear wall. The unique Columns contain a wider flange and additional return lips to provide an increased load capacity over regular steel stud sections. The Column web is narrower than a standard (S) section to allow for the placement of the flat straps within the Strap Track, which then fits into a standard (T) Section track. Because of this, **the (S) section can not be used with the StiffWall Boot.**

Example:

600S250-68 Stud Depth is exactly 6"

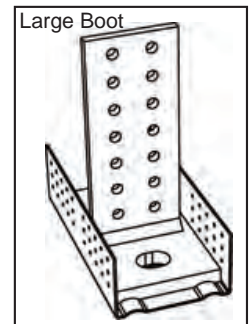
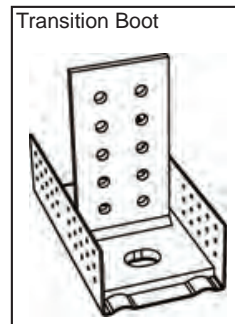
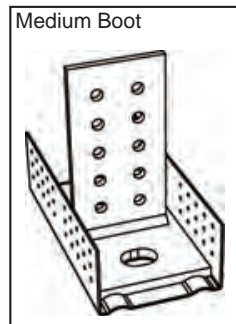
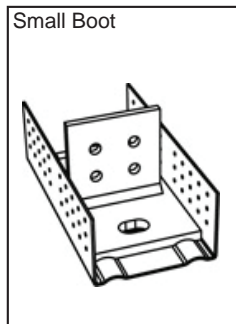
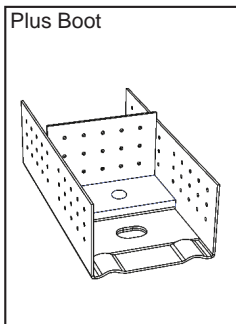
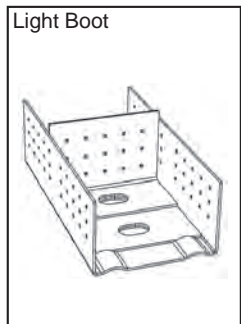
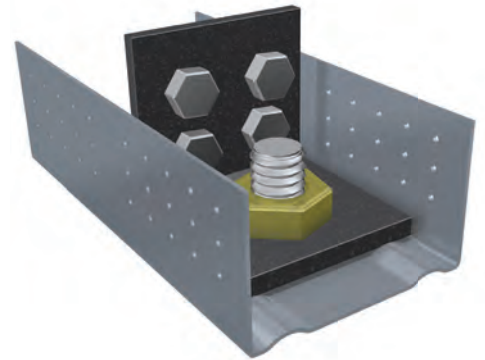
600C/STW250-68 Column Depth is 5.639"



Boots

StiffWall® Boots are designed to efficiently transfer the loads from the straps and columns through the floor system down to the foundation. Through-floor bolts are not provided with the StiffWall.

- The StiffWall Boot is made up of a Strap Track and a Base Plate ("T" shaped structural steel), specified bolts for connection to Column, and is designed to fit into a standard size track.
- The Strap Track is a piece of track 12" long with pre-punched screw pilot holes. The purpose of the Strap Track is to attach the strap to the Boot assembly.
- The Boots are designed to match the Column width and are designated Light-Large (Refer to StiffWall Boot Dimensions for more information).
- StiffWall Boots are pre-installed to the top and bottom of each Column. The attachment to the Column is made via the required number of A325 bolts.
- Each Column is shipped with the appropriate Boot attached at the top and bottom.



Flat Strap

- Runs diagonally (corner to corner) as a single piece and attaches to the strap track in an "X" pattern
- Flat Strap is to be installed on both sides of the StiffWall shear wall, and is not to be spliced unless approved by the design engineer.
- Flat Strap is available in a variety of widths and is always manufactured from 50 ksi steel.
- Four (4) pieces of flat strap are used in each StiffWall.



Ordering Information

TSN's StiffWall shear wall system consists of two Column assemblies (at each end post) and Flat Strap (2 sides of X-bracing). The StiffWall fits into or is embedded into the load bearing and non-load bearing walls (refer to Placement of the StiffWall® Column and Boot system in a load bearing wall). Do your stud take off as normal and order the Column/Boot Assembly and the Flat Strap as separate items. This page will take you through the process of ordering the Column/Boot Assembly, and the next page will address the Flat Strap.

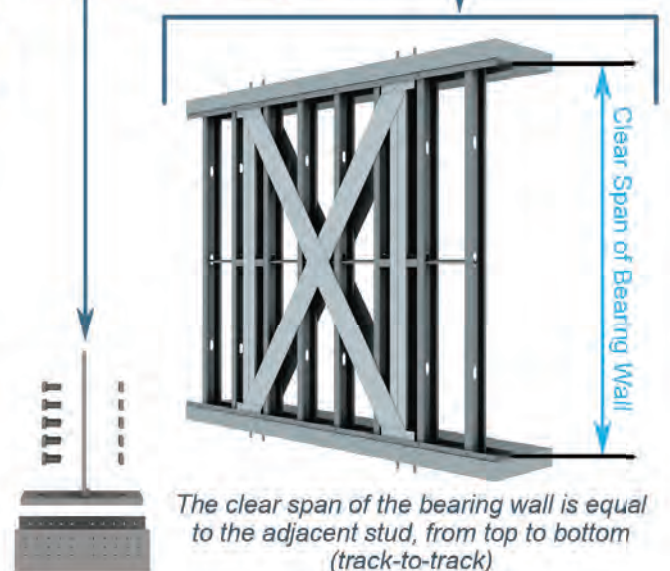
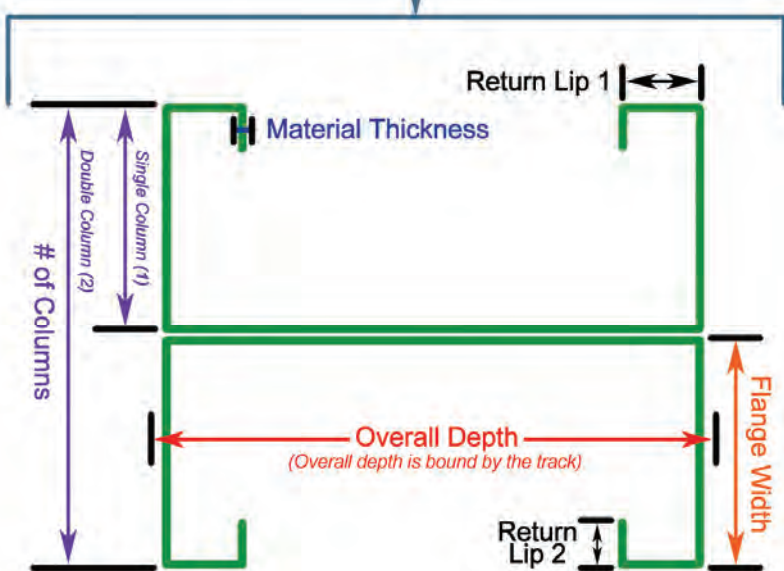
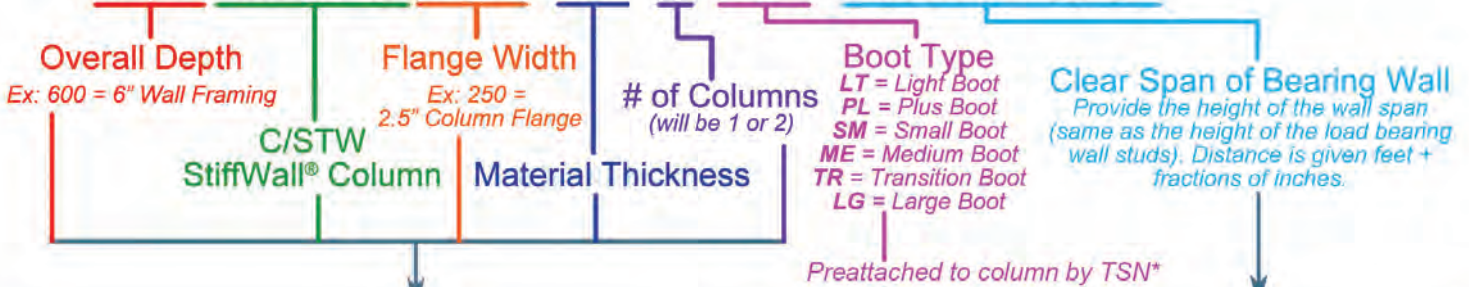
Columns

Each StiffWall Column is delivered to the job site with the Boots pre-installed at the top and bottom. The added value of the pre-installed boots minimizes tolerance issues during erection. Simply specify the clear span of the bearing wall system and TSN will ship the Column/Boot assembly to meet the given wall height at a tolerance of +0/-1/8".



Nomenclature

600C/STW250-68-1-SM-10ft-9-1/4"

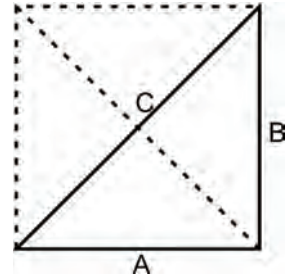


Flat Strap

Flat Strap is cut to length with square ends, and will need to be cut to final length in the field. To determine the length of the flat straps, follow these simple steps:

1. Find the width (A) and the height (B) of the StiffWall.
2. Then, use the following formula to determine the length of the strap: $A^2 + B^2 = C^2$
3. Next, take the square root of C, round up to the nearest whole number and add 1.

This will result in a length in feet that you can work with. If C equals a whole number, you may want to add 2 to make sure the length is enough.



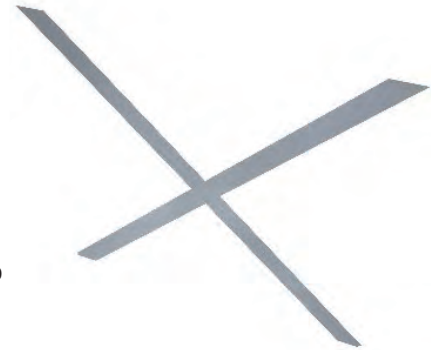
Example: 8' wall height with a width of 16' would look like this:

$$(8 \times 8) + (16 \times 16) = 320. \quad \sqrt{320} = 17.88$$

Then round up to 18' and add 1' for a strap length of 19'.

Some points to remember concerning Flat Strap:

- Strap must be pulled tight after a gravity load above has been applied. TightStrap® tool can be used to flatten the strap and put minor tension force into it.
- Flat strap cannot be installed, then un-installed by releasing the screws to the strap track, and then re-installed with screws again in the same screw holes. Either a new piece of strap is required, or the exposed edge of the strap needs to be welded to the strap track with an approved weld design.
- It is recommended not to fasten the strap to the infill studs between the columns. However, typical or occasional attachment of sheathing and/or resilient channel to the infill studs through the strap is acceptable.
- Straps should not be spliced without an approved design.
- Four (4) pieces of strap are required in each StiffWall (If there are 10 StiffWall shear walls, 40 pieces of flat strap will be necessary).



Nomenclature

FS400-54, 50ksi



Available Sections for StiffWall®

- FS400-54, 50ksi 4" Flat Strap 54 Mil (16ga), 50ksi Strap
- FS600-54, 50ksi 6" Flat Strap 54 Mil (16ga), 50ksi Strap
- FS800-54, 50ksi 8" Flat Strap 54 Mil (16ga), 50ksi Strap
- FS800-68, 50ksi 8" Flat Strap 68 Mil (14ga), 50ksi Strap
- FS1000-68, 50ksi 10" Flat Strap 68 Mil (14ga), 50ksi Strap

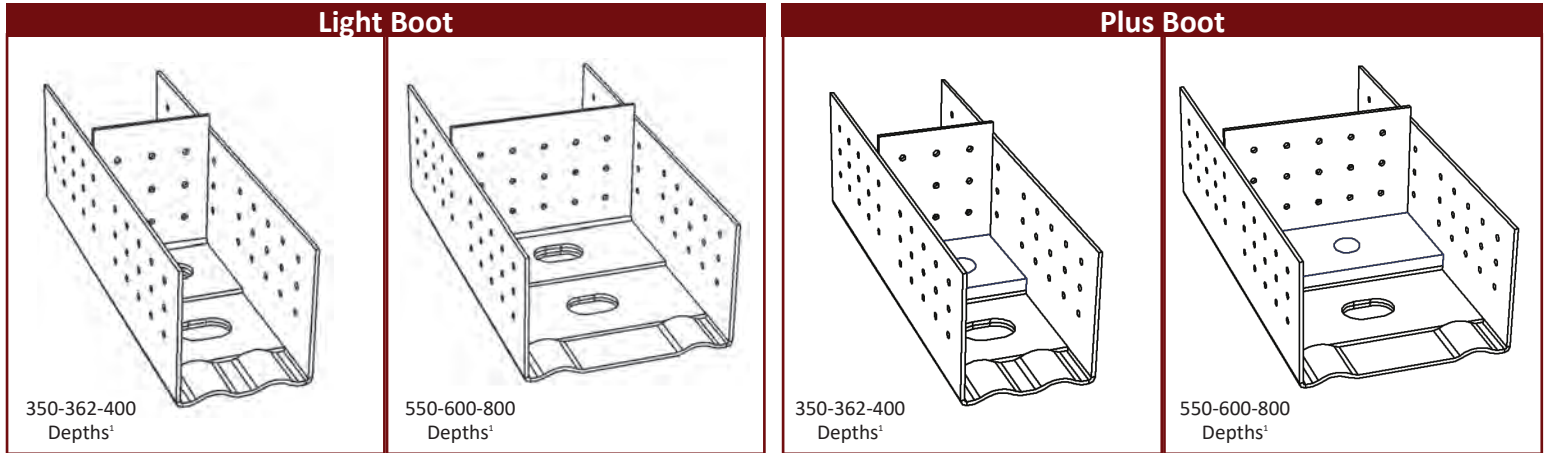
Substituting TSN Flat Strap with 33ksi material will alter the performance and allowable loads of the StiffWall®, and is not recommended.



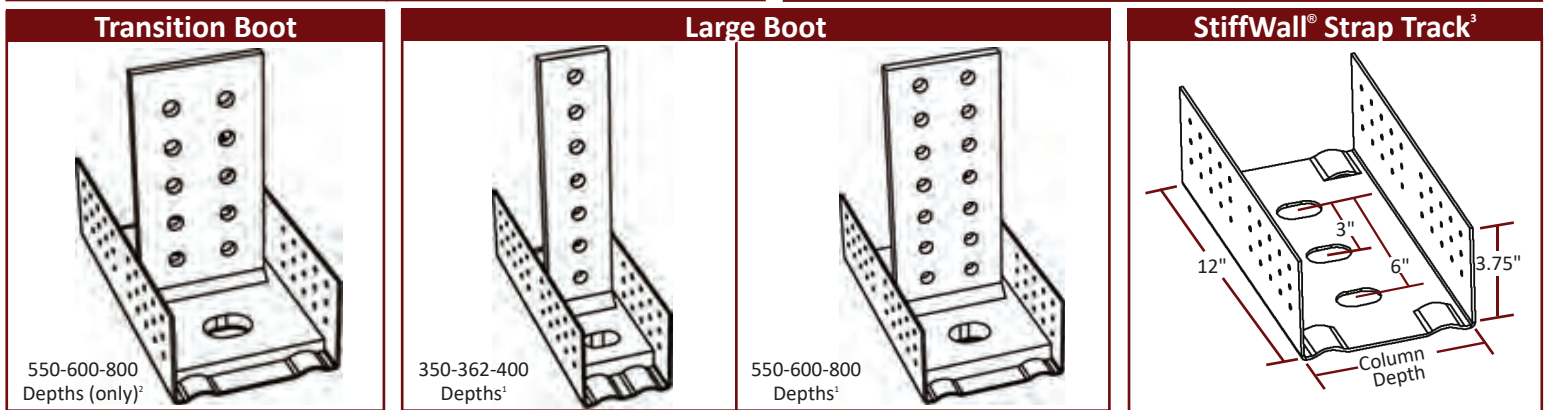
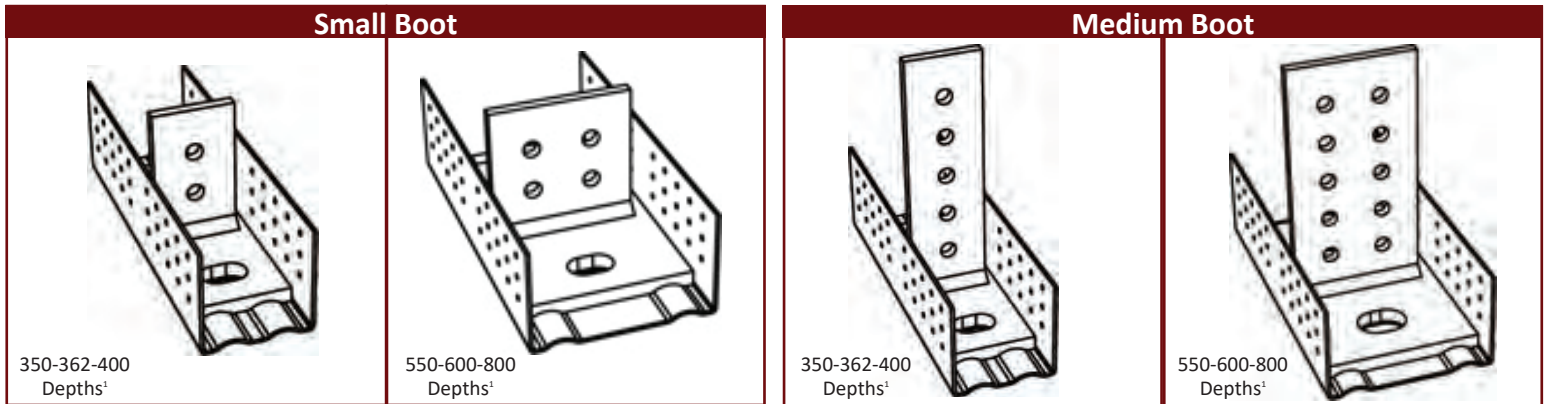
Use TightStrap® for a quick and proven method to field tighten flat straps.

Boot Dimensions And Thickness

StiffWall® Boots are designed to provide the optimal cost-effective solution for shear wall connections. Six configurations are available to meet project requirements (Light, Plus, Small, Medium, Transition and Large). StiffWall Boots are sized to fit inside standard track and are available for 3.5", 3.625", 4", 5.5", 6" and 8" Depths. **During installation of StiffWall Boots, standard or plate washer shall be used with a size sufficient to cover the Boots' slots after installation.** The Steel Network will determine the actual bearing height the StiffWall Columns, which are delivered to the job site with Boots pre-attached at the top and bottom for fast installation.



The Light and Plus Boots are a cold-formed steel base connectors. Placement of the Light Boot in the strap track is determined by the boot type used at the bottom of the existing floor or the top of the wall below. The Plus Boot utilizes a Plus Plate for increased strength.



¹ Boots less than or equal to 4" and Light, Plus and Medium Boots greater than 4" contain guide holes for 7/8" anchors. Transition and Large Boots greater than 4" contain guide holes for 1 1/4" anchors.

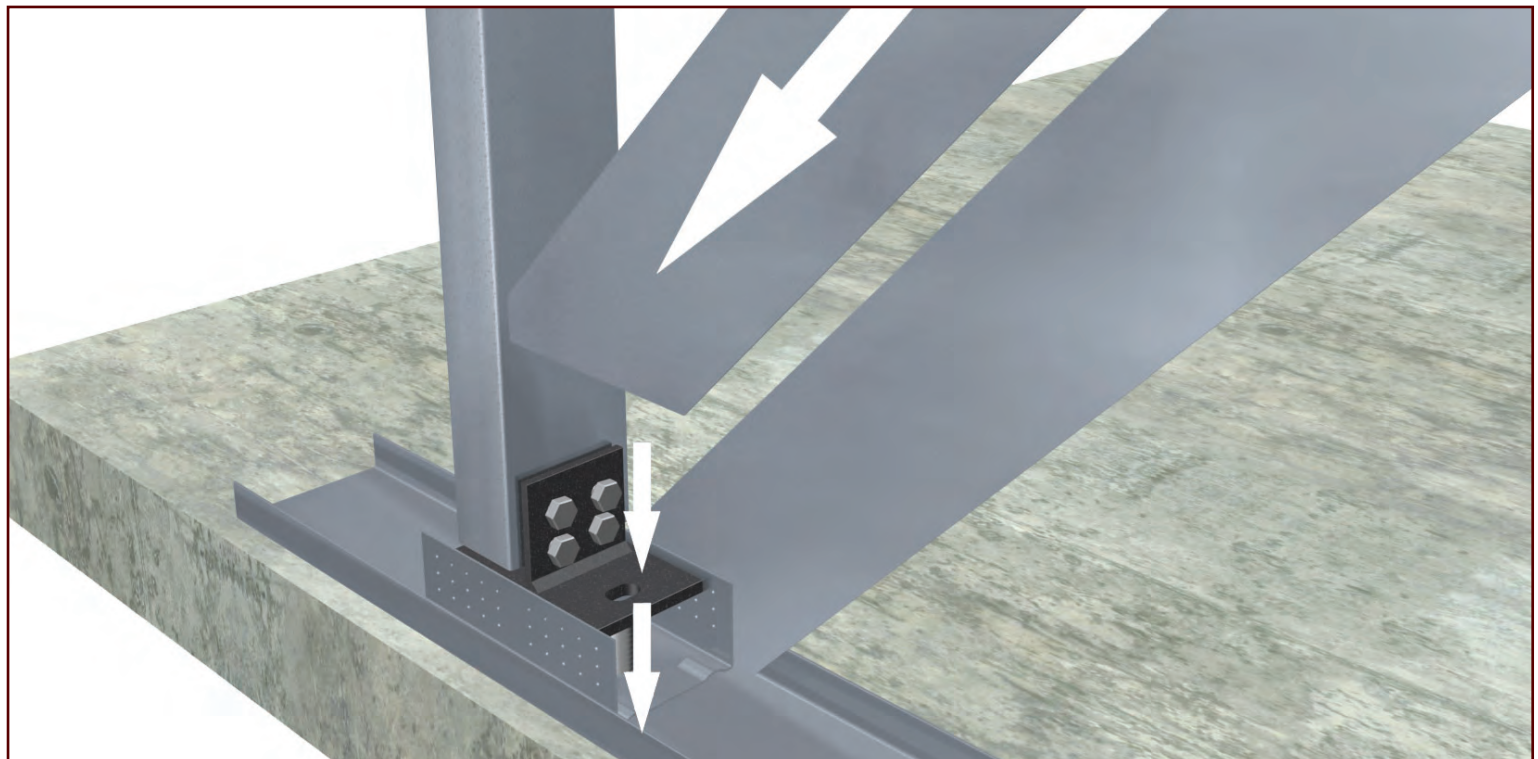
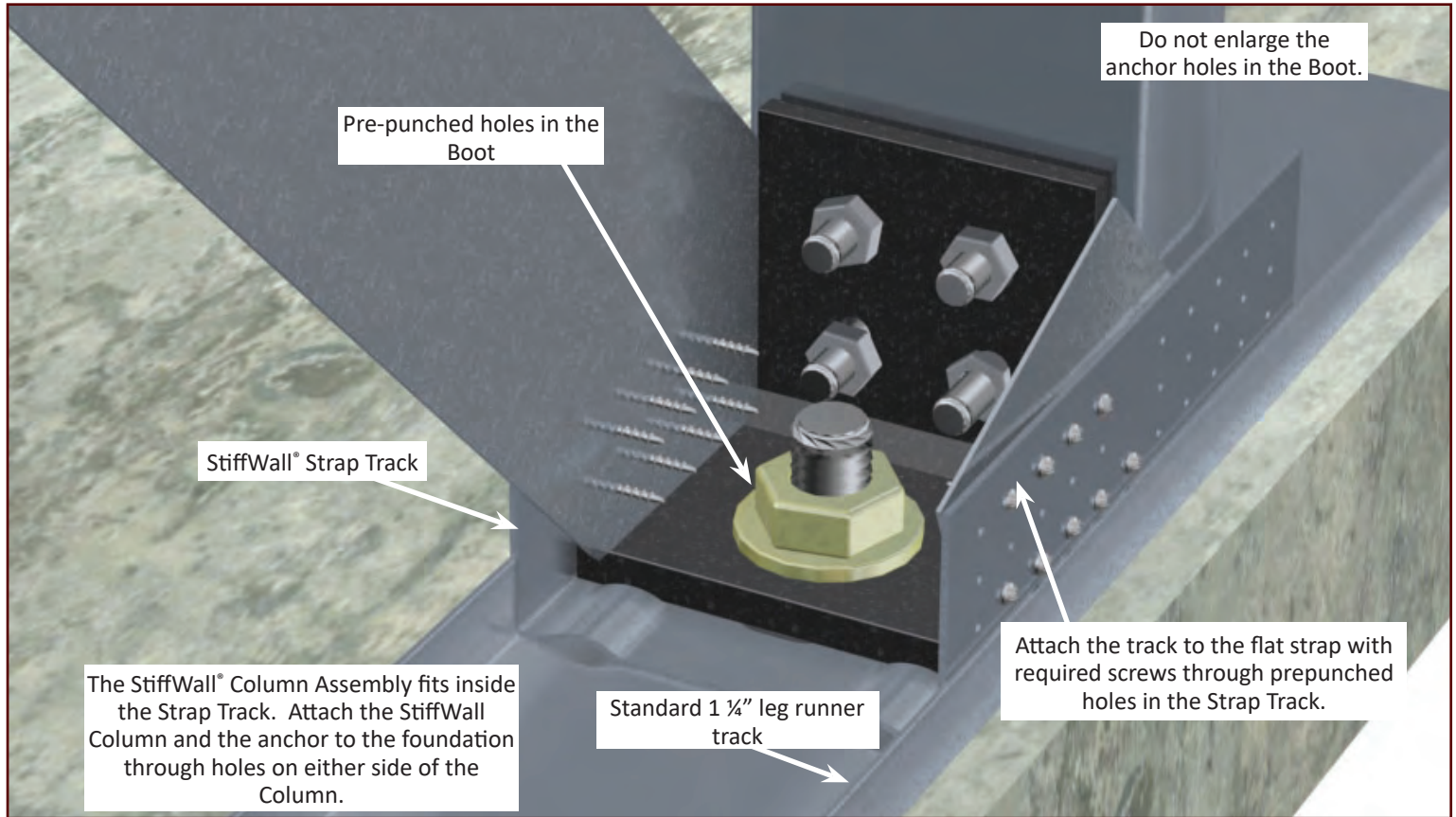
² The StiffWall Transition Boot is used when the floor above uses a Small or Medium Boot and the floor below uses a Large Boot (for depths greater than 4" only). The anchor hole of the Transition Boot at the base of the wall couples with that of the Large Boot at the underside of the floor below to maintain the continuity of the through-floor fasteners (1 1/4" threaded rods or anchors).

³ StiffWall Strap Track is available in 12ga (97mils) thickness. Center hole is for conditions where only one anchor is necessary

How to install the StiffWall® Shear Wall

StiffWall is usually not designed as a gravity load bearing element. However, its boundary end columns can see compression loads from the floor weight above. This system is designed to sit in between load bearing studs and address all of the lateral loads acting on that building due to wind or earthquakes.

The StiffWall is designed to stack vertically and attach through the floor system to the level above. The Columns for one floor must line up with the columns on the floors above and below. This will allow for the bolts from one floor to be bolted through the floor system to the boots above and/or below. It is important that these bolts are properly aligned through each floor for the walls to be able to work together as one unit from top to bottom. Do not enlarge the anchor holes in the StiffWall Boots.

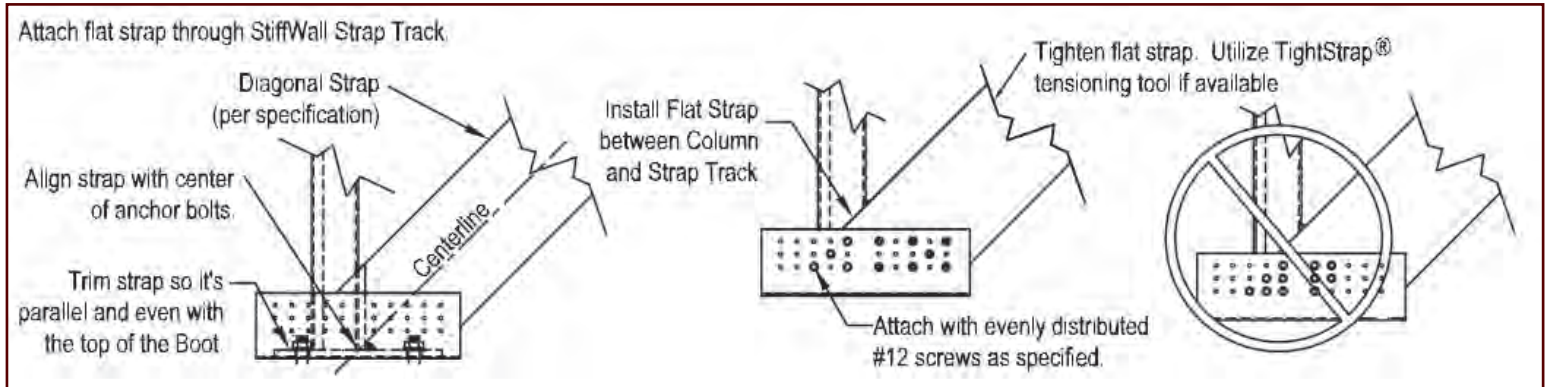


How to Install the StiffWall® Shear Wall:

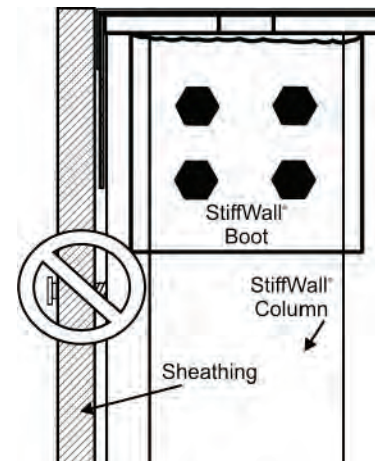
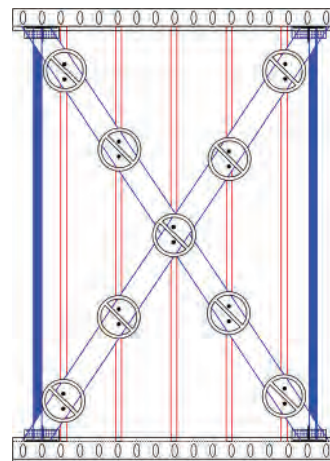
The Boots are attached to the foundation or floor and the roof or ceiling with approved anchors or bolts as determined and approved by the Engineer (Boots are made up of the Strap Track and the "T" shaped Base Plate)



- Light, Plus, Small & Medium Boots utilize a 3/8" anchor bolt or threaded rod.
- Transition and Large Boots utilize a 1 1/4" anchor bolt or threaded rod.
- Attach the Flat Strap to the Strap Track, corner to corner, on both sides (4 straps needed) with the specified amount of #12 screws (or weld). The use of low profile screws help to reduce a "bump out" of finished sheet-rock. To achieve the designed loads, the strap should be tight from corner to corner (with no slack). This is done by tightening the strap after the wall is loaded with a TightStrap® tool.
- Ensure full bearing between through-floor bolts and the floor slab. Enlarged or notched bolt holes in the slab must be filled with grout.

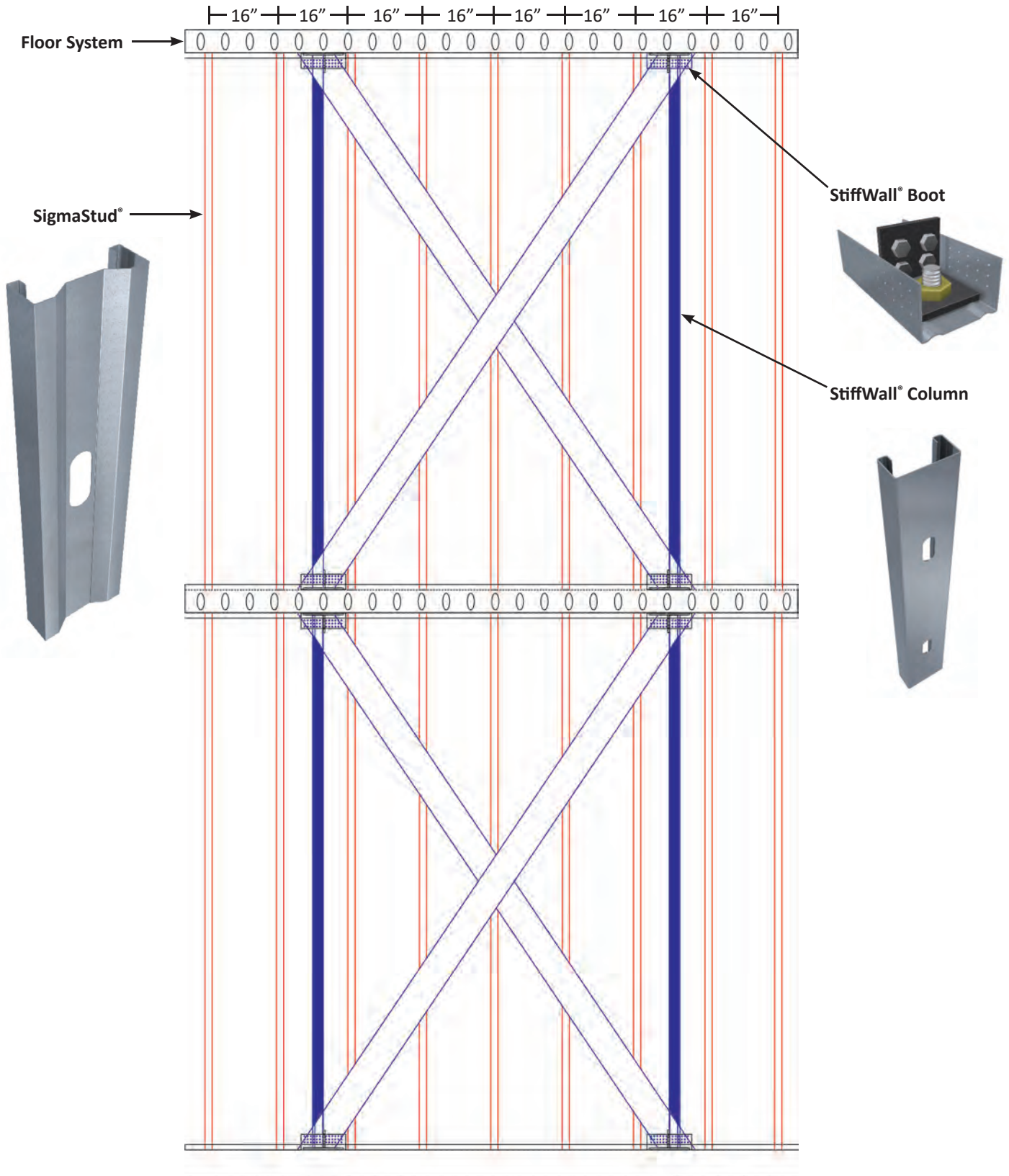


- Before any straps are tightened there must be a gravity load applied to the wall system. An example is when the plank for the floor above is set in place.
- Cut the ends of the straps horizontally and extended into the Strap Track, with the strap reaching to the boot's base plate. Install the straps between the Strap Track and Column (not outside of the Strap Track), centered between the anchor bolts. The centerline of the strap must line up with the centerline of the boot anchors. Screws must be uniformly distributed over the Strap Track.
- Do not attach the flat straps to the intermediate wall studs between the end columns.
- After each floor slab is installed, go back and re-tighten the through bolts. Once all floors and the roof have been installed, secure and tighten all Boot connections.
- All bolts shall be "snug-tight" with a wrench. No torque is required to tighten the bolts or create a pre-tensioning condition.
- Do not attach the drywall to the StiffWall Columns at any time. Because the Column is narrower than the stud in the same wall section, attaching the sheetrock to a Column will pull the sheetrock in and cause a dip in the wall. The Column and Boot are placed between the load bearing studs to allow your load bearing studs to line up with the sheetrock installation.

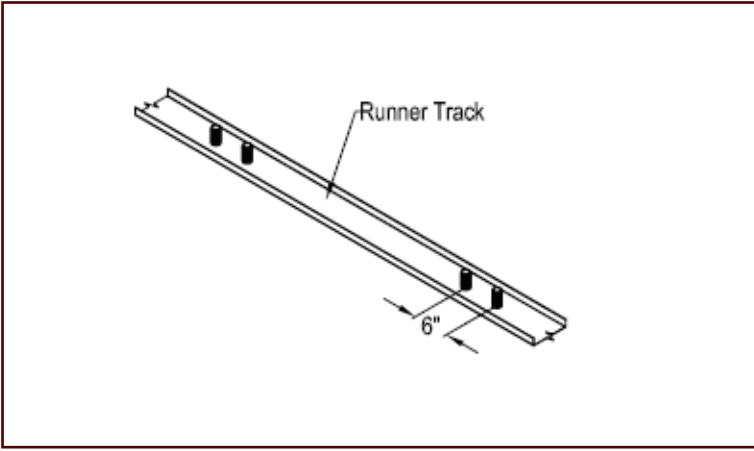


Placement of the StiffWall® Column and Boot system in a load bearing wall.

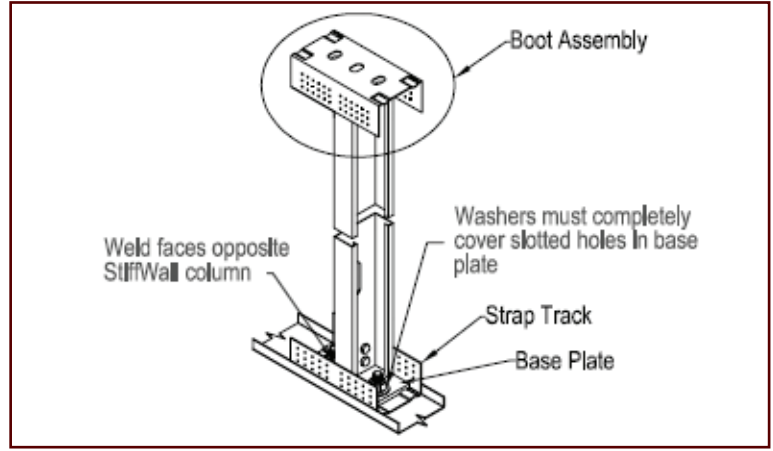
The StiffWall Columns are designed to sit in between load bearing studs and address all of the lateral loads acting on that building due to wind or earthquakes. The illustration below is an example representation of the Column placement. Common stud spacing is either 16" or 24" on center.



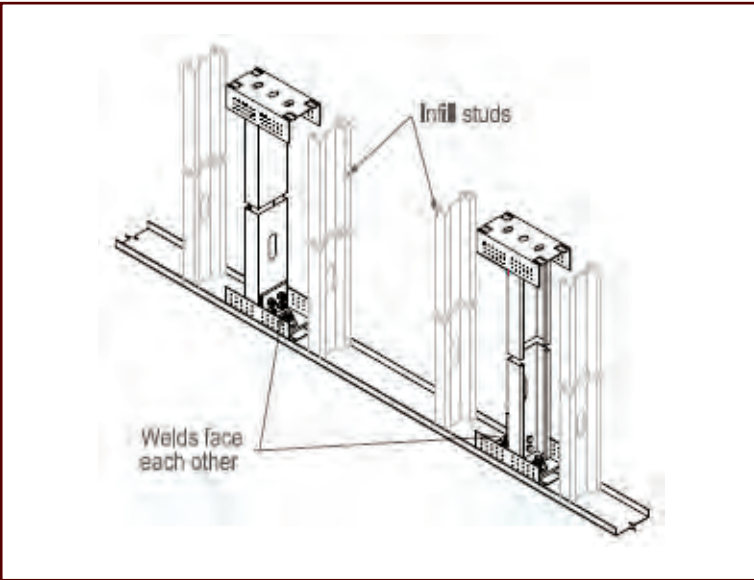
Load Bearing Wall Systems Construction Guide StiffWall® Column Installation



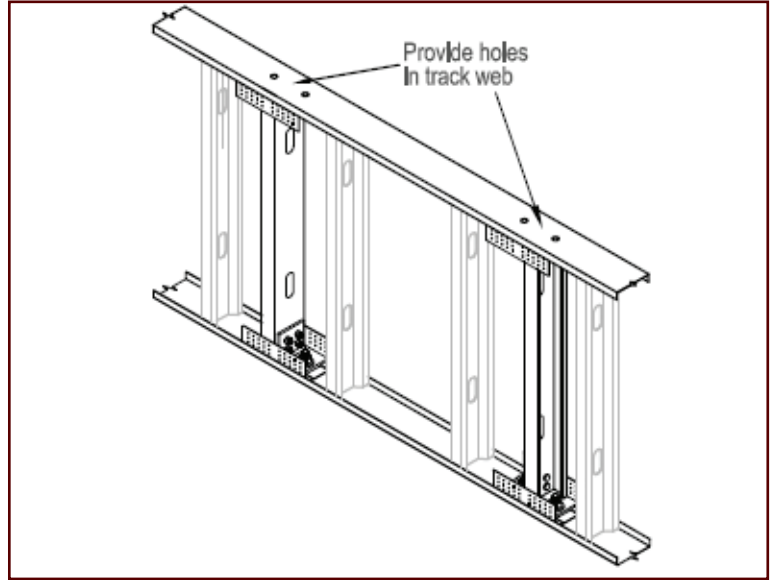
1. Position bottom track on slab and provide holes in track web for anchor bolts.



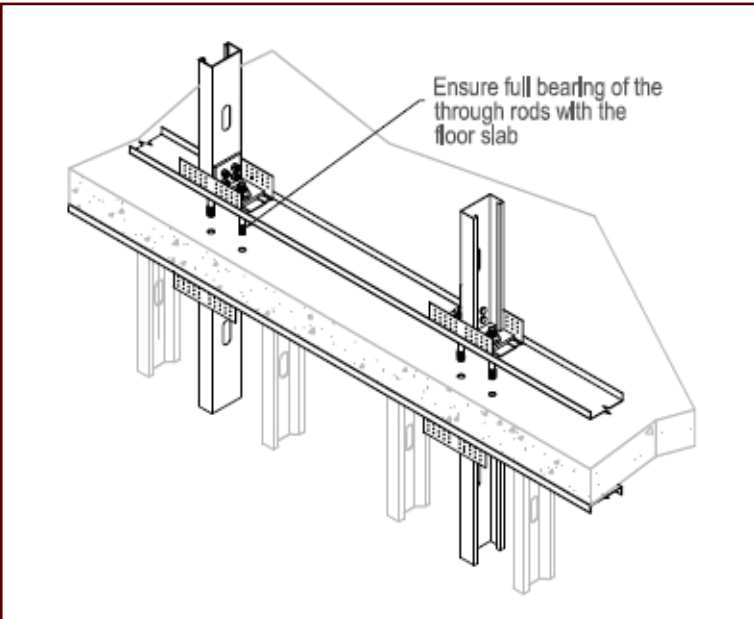
2. Nest a StiffWall Column assembly into the track over the anchors. Install washers and tighten nuts per manufacturer's recommendations.



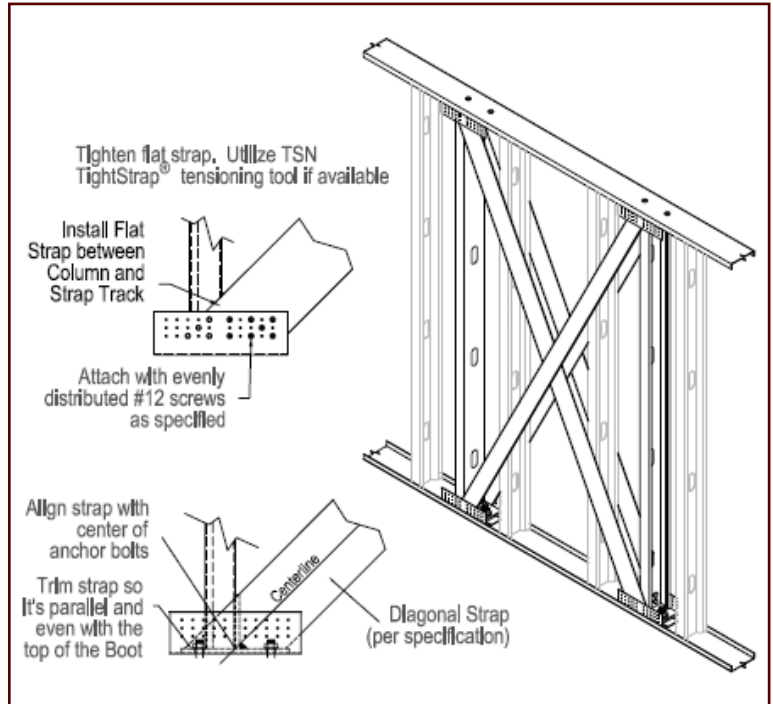
3. Install required infill studs until the next StiffWall Column is encountered. Install StiffWall Column assembly as shown in step 2.



4. Install top track. Track web holes must be provided at boot assembly locations for upper floor anchors to pass through.



5. Install anchors or through rods into the top base plates. If another floor is to be added, and through rods are used, they will extend through the floor and into the lower StiffWall boot assembly of the next floor.



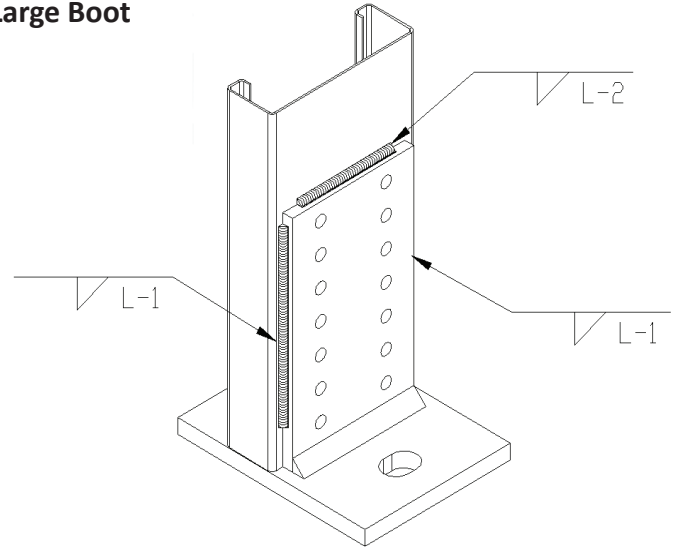
6. Install Flat Strap X-Bracing.

Load Bearing Wall Systems Construction Guide

Welded Corner Connections

The Steel Network, Inc provides information on the welds required to obtain full capacity of the StiffWall® SWS system. The option to weld the SWS columns to the boots or to bolt the SWS columns to the boot offers the same capacity for both T1 and T2 values listed on page 48 of TSN's Load Bearing Wall Systems Catalog. Since welding is common for many applications, reference pages 22 (Single Column) & 23 (Double Column) for guidance on weld size, locations, and specifications to ensure that full capacity is obtained when welding the various boot sizes to the various columns sizes. If additional information is required please contact The Steel Network's Technical Services department at (888) 474-4876. CAD Details indicating the various welds are available if needed.

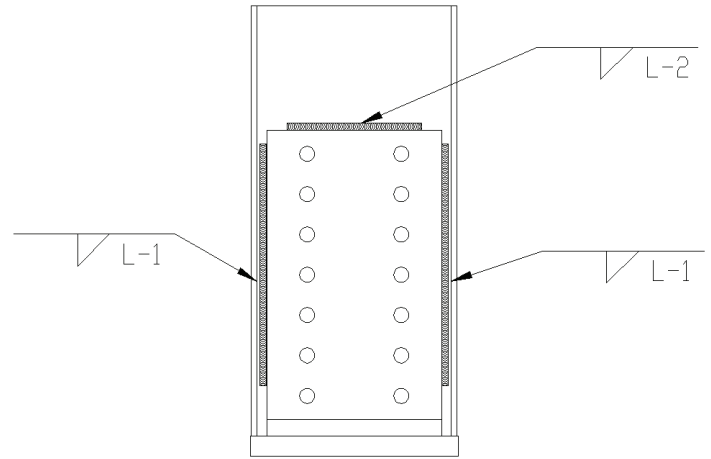
Large Boot



Weld Requirements

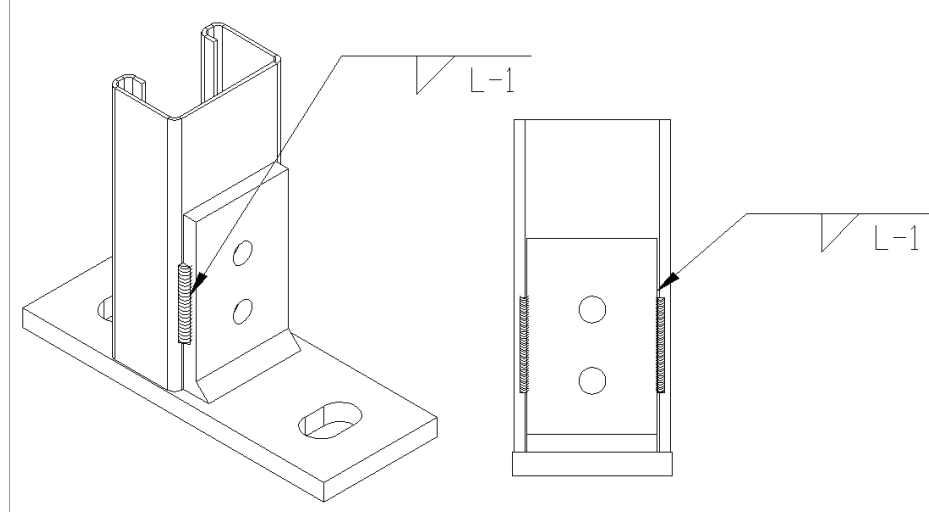
Single Column			
Column Size	Boot Type	Longitudinal Welds	Transverse Weld
		L-1 (each side) (in)	L-2 (in)
350/362/ 400	Small	2.0	0.0
	Medium/Trans.	5.0	
	Large	7.0	
550/600	Small	2.0	2.0
	Medium/Trans.	5.0	4.0
	Large	9.0	4.0
725/800	Small	2.0	2.0
	Medium/Trans.	5.0	5.0
	Large	9.0	5.0

Large Boot

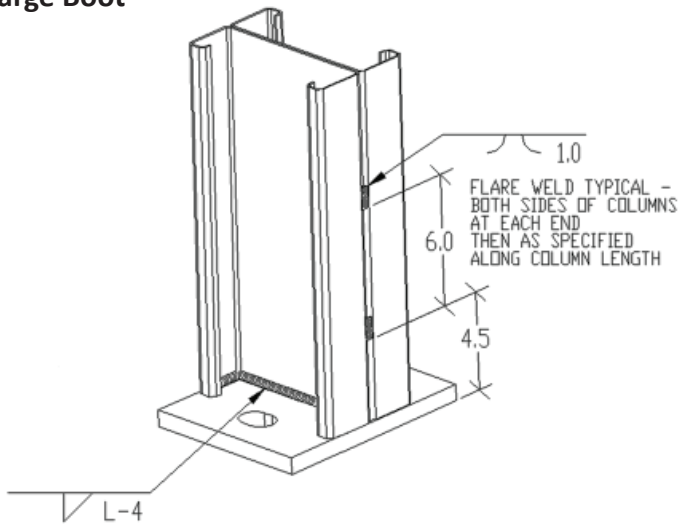


- Welded column-boot option allies to columns of thickness 54mil to 118mil only.
- See details for locations of weld lines L-1 and L-2.
- Weld size is minimum two times thickness of column and maximum ¼".
- Fillet Weld designation is E70XX Metal Arc or Equivalent.
- All welds shall be touched-up using zinc rich paint.

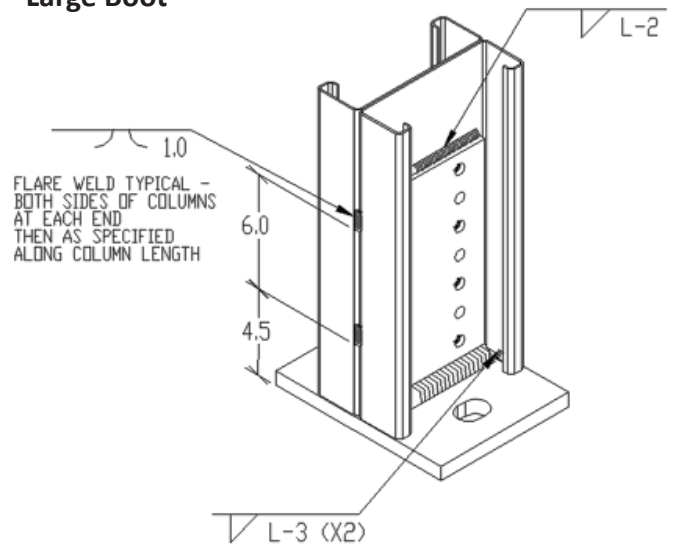
Small Boot



Large Boot



Large Boot

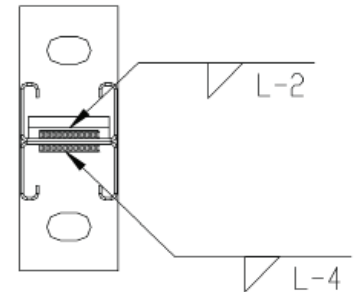


Weld Requirements

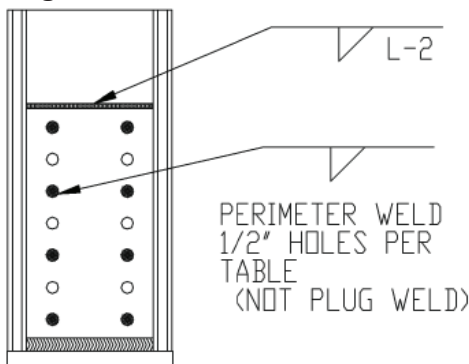
Double Column					
Column Size	Boot Type	Transverse Weld			
		Top L-2 (in.)	Bottom L-3 (each side) (in.)	Bottom L-4 (in.)	# of Inside 1/2" Holes
350/362/ 400	Small	2.0	0.0	2.0	0
	Medium/Trans.	2.5		4.0	
	Large	2.5		4.0	5
550/600	Small	4.0	0.0	4.0	0
	Medium/Trans.	4.5		5.5	
	Large	4.5		1.0	6.5
725/800	Small	2.0	0.0	4.0	0
	Medium/Trans.	5.0		7.0	
	Large	9.0		1.0	7.0

- Welded column-boot option allies to columns of thickness 54mil to 118mil only.
- See details for locations of weld lines L-1 and L-2.
- Weld size is minimum two times thickness of column and maximum 1/4".
- Fillet Weld designation is E70XX Metal Arc or Equivalent.
- All welds shall be touched-up using zinc rich paint.

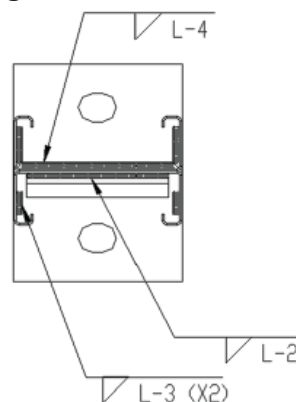
Small Boot



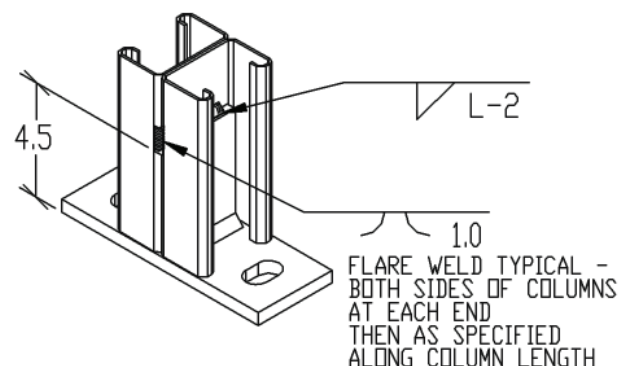
Large Boot



Large Boot

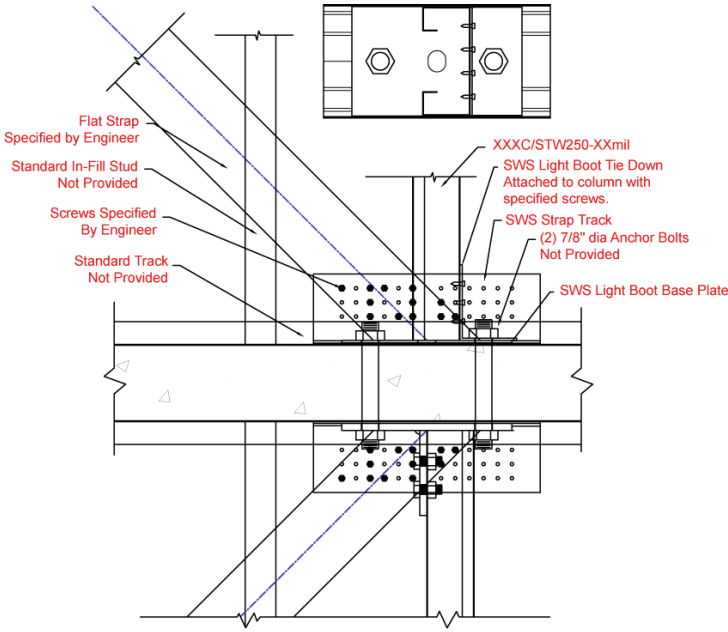


Small Boot

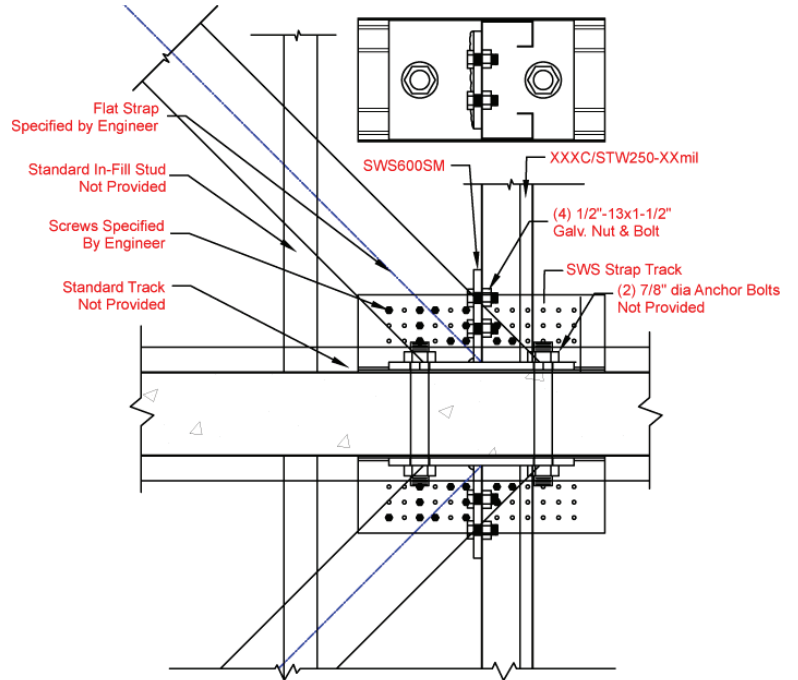


Load Bearing Wall Systems Construction Guide StiffWall® Connection Details

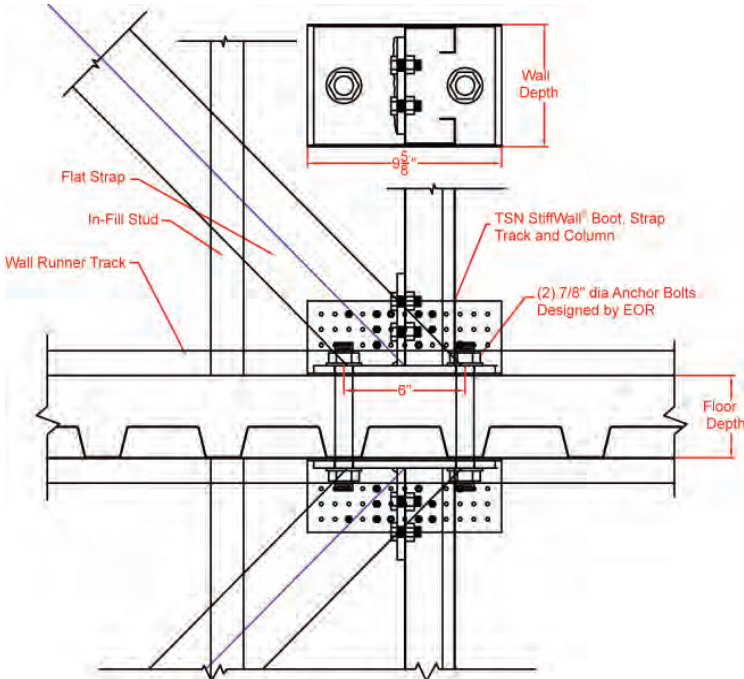
Typical Through-Floor Connection Between Light-Plus Boot (Top) & Small-Large (Bottom)



Typical Through-Floor Connection Between SM-ME-LG (Top) & SM-ME-LG Boot (Bottom)



Typical Through-Floor Connection Between SM-ME-LG Boot (Top) & SM-ME-LG Boot (Bottom) - Composite Decking



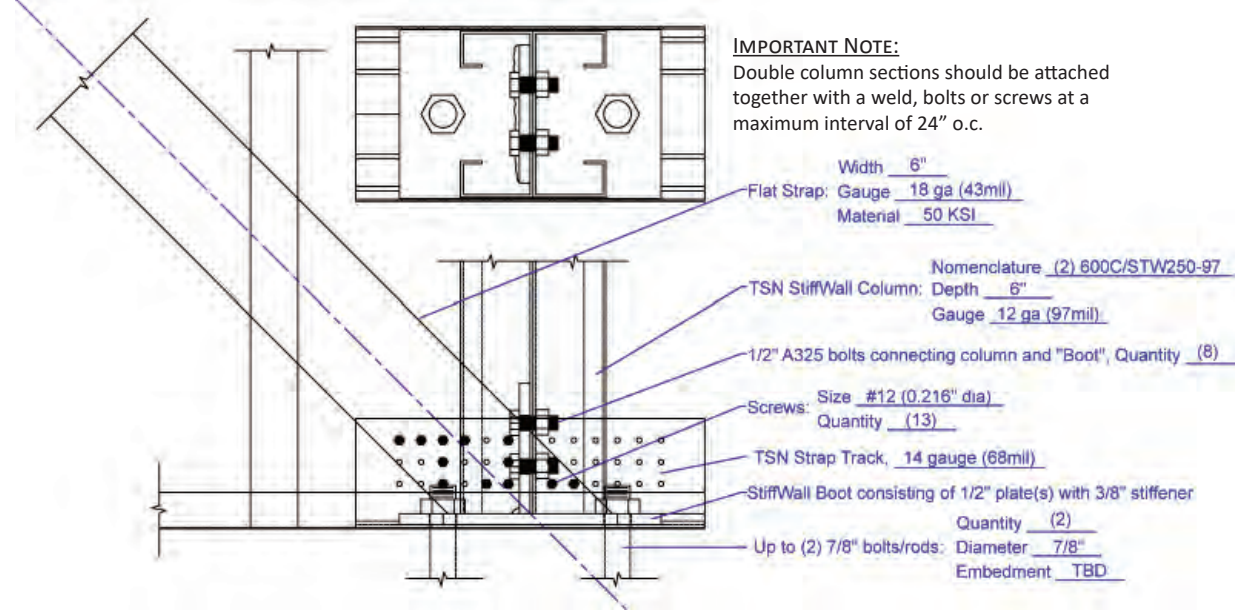
Important Note:

Since the Light, Plus, Small, and Medium Boots utilize 7/8" anchor bolts and the Transition and Large Boots utilize a 1 1/4" anchor bolt, it is recommended to use a Transition Boot at the top of the wall and a Large Boot at the bottom of the wall above to maintain continuity of load transfer using the 1 1/4" anchor bolts.

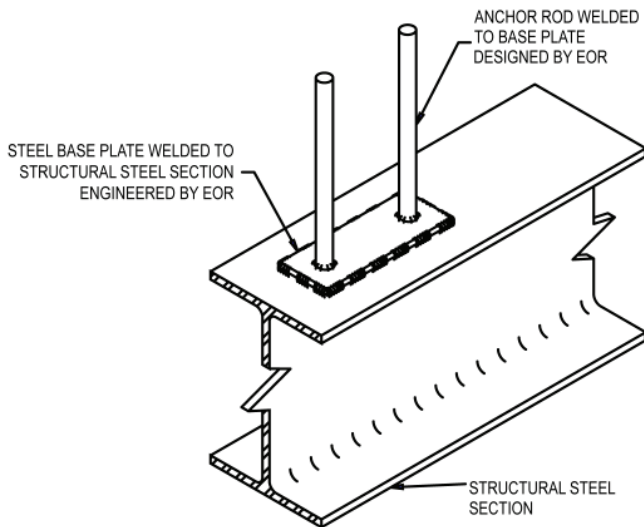
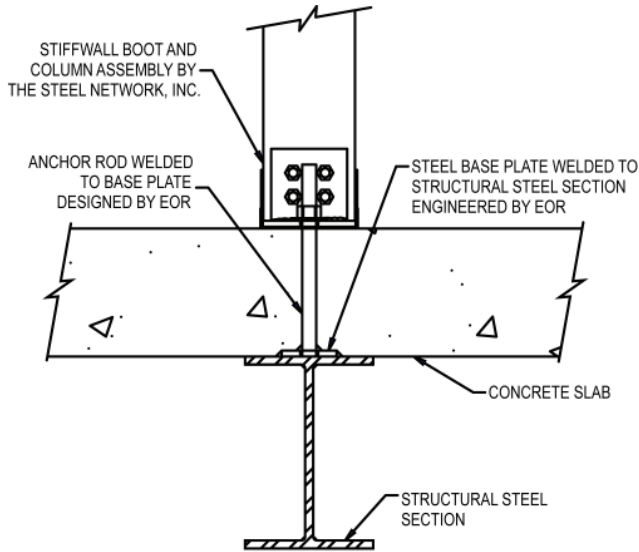
EOR is responsible for verifying that the composite deck acts as a compression member between Stiffwall columns to support the horizontal shear load.

Load Bearing Wall Systems Construction Guide StiffWall® Connection Details

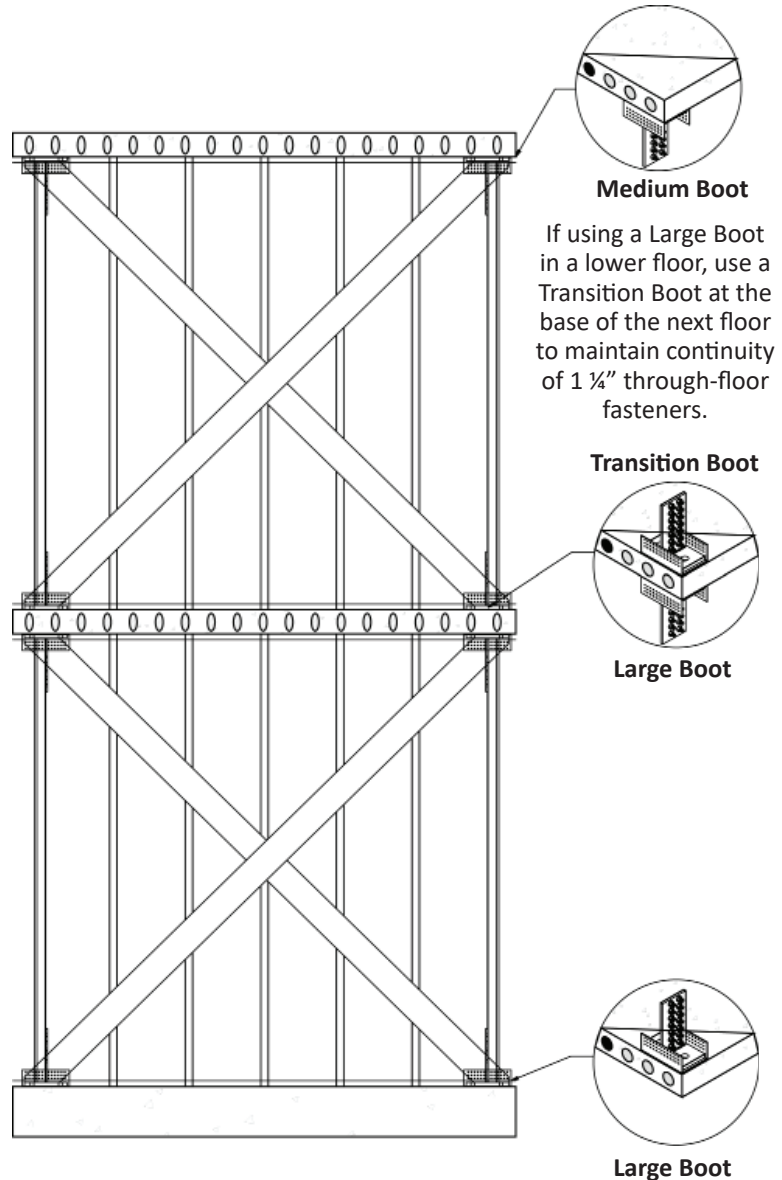
Typical Through-Floor Connection Between Boot B-E (Top) And Boot B-E (Bottom) - Double Column Back to Back



When StiffWall terminates into Structural Steel, attach the shear wall to the red iron with an approved method. The details below are one example, and must also be approved by the Engineer of Record.



Multi-Story Detail - Medium, Transition & Large Boots

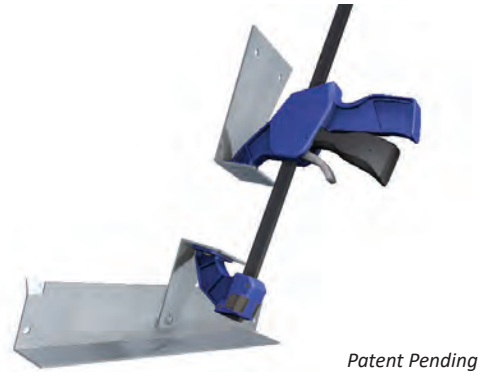


Product Description

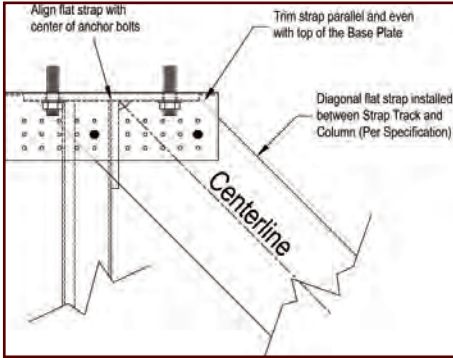
The pre-tensioning of a shear wall flat strap provides a means to ensure the shear wall will perform as designed. It is important that the flat straps are as tight as possible when installed to achieve optimal system performance.

Tightstrap® is a unique device used to tension (tighten) flat strap in the field. Use Tightstrap to improve structural performance of a shear wall by removing “waviness” or “bowing” prior to fastening.

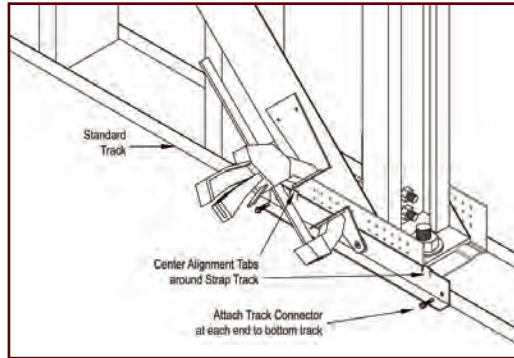
Tightstrap is designed to be used in both StiffWall® and generic flat strap shear walls. Tightstrap’s track connector fastens to standard track at the corners of the shear wall to provide a base for the tensioning process. It is preferable to tighten the flat straps after applying some vertical load (own weight) on top of the shear wall panel. View the animated installation procedure at www.steelnetwork.com.



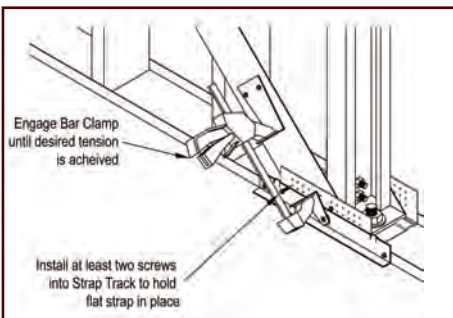
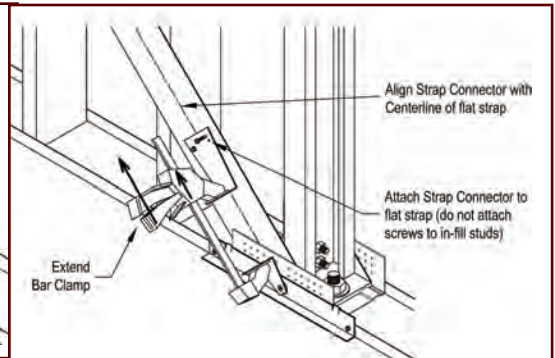
Using Tightstrap®



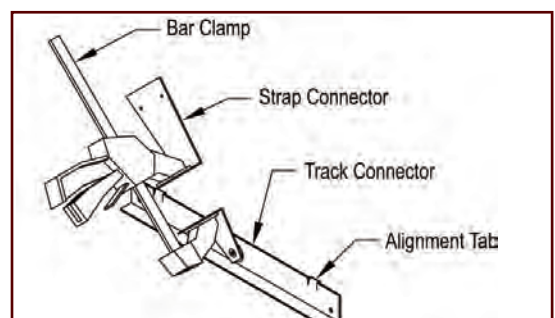
Step 1 - Align & trim flat strap at each corner, attach one end with at least 2 screws.



Step 2 - Align Track Connector and attach to track.



Step 4 - Engage Bar Clamp, install at least 2 screws for flat strap attachment, remove Tightstrap and install remaining screws for strap attachment.



How to Install the StiffWall® Shear Wall:

The boots are attached to the foundation or floor and the roof or ceiling with approved anchors or bolts as determined and approved by the Engineer (Boots are made up of the Strap Track and the “T” shaped Base Plate)

- Light, Small & Medium Boots utilize a 7/8” anchor bolt or threaded rod.
- Transition and Large Boots utilize a 1 1/4” anchor bolt or threaded rod.
- Attach the Flat Strap to the Strap Track, corner to corner, on both sides (4 straps needed) with the specified amount of #12 screws (or weld). The use of low profile screws help to reduce a “bump out” of finished sheetrock. To achieve the designed loads, the strap should be tight from corner to corner (with no slack). This is done by tightening the strap after the wall is loaded with a Tightstrap® tool.

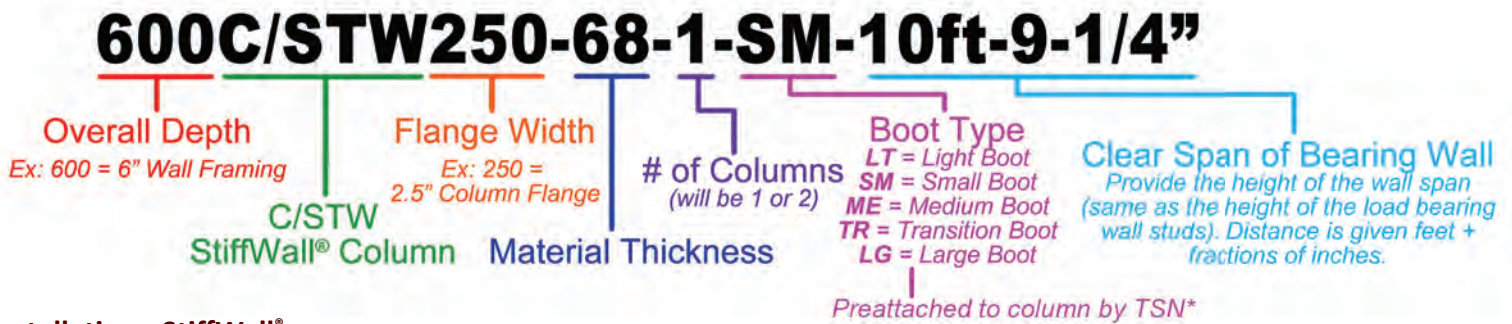
⑤ Attach flat strap through StiffWall Strap Track.

Points to Remember - SigmaStud®

- Load bearing wall studs must be firmly seated in the top and bottom tracks. TSN recommends a maximum gap of 1/8" between the stud and the track.
- Do not cut holes in SigmaStud without an approved detail for hole reinforcement (**SigmaStud® Web RFT**).
- Track thickness at the top and the bottom of wall should match the stud when the stud thickness is greater than or equal to 54mils.
- Use a minimum 54mil (16ga) track at the top and bottom of the wall for stud thicknesses of 43mils (18ga) or less.
- SigmaStud may be used with all types of floor systems.
- SigmaStud should not be cut by other trades.
- No gaps should exist between the top and bottom tracks and the floor system. **SigmaTrak®** is the best way to prevent gaps.
- SigmaStud should have square ends (if field cutting, be sure to level the ends of the studs).
- Wall bridging is critical. Means and methods should be specified by the Engineer.

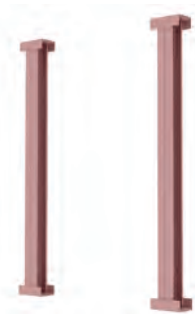
Ordering/Estimating - StiffWall®

- Provide the full height of the load bearing wall when ordering a StiffWall Column.
- The StiffWall Boot will only work with the StiffWall Column, and not a standard stud (S-section). The standard stud web depths exceed the width of the StiffWall Strap Track.
- StiffWall is engineered with 50ksi flat strap. Do not use 33ksi flat strap with the StiffWall system.
- A StiffWall contains 4 boots (one for each corner of the shear wall). Boots are pre-installed to each Column prior to shipping from TSN.
- Indicate the number of punched holes required at each end of the StiffWall Column when ordering.
- Each StiffWall uses four (4) flat straps.
- Light, Plus, Small, and Medium Boots utilize a 3/8" anchor bolt or threaded rod.
- Transition and Large Boots utilize a 1 1/4" anchor bolt or threaded rod.
- Do not enlarge the existing holes in the Boot.



Installation - StiffWall®

- Shear walls should be aligned vertically from the top of the structure to the foundation.
- Do not attach the sheathing to the StiffWall® Column (the width of the Column is less than that of the other studs).
- When using a Large Boot, use a Transition Boot as the bottom connection for the floor above in order to maintain continuity in the load path.
- Do not tighten the flat straps until the floor above is loaded (if possible, until 2 floors above are loaded). Use TightStrap® to tighten the flat straps quickly and easily.
- Do not splice the flat straps used in a StiffWall®.
- StiffWall® Columns and straps should not be cut by other trades.
- Ensure full bearing between through-floor bolts and the floor slab. Enlarged or notched bolt holes in the slab must be filled with grout.



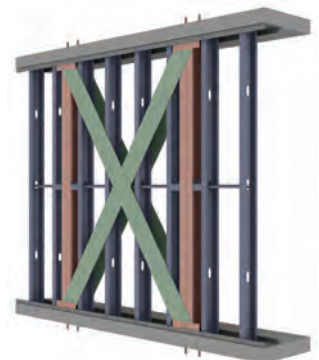
Column/Boot Assembly
(1) at each end post
(same height as studs)



SigmaStud® & BuckleBridge®
Load bearing wall studs & bridging
are not a part of the StiffWall System*



Flat Strap
(2) at each side of X-bracing



StiffWall® System
Embedded within load
bearing wall studs

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