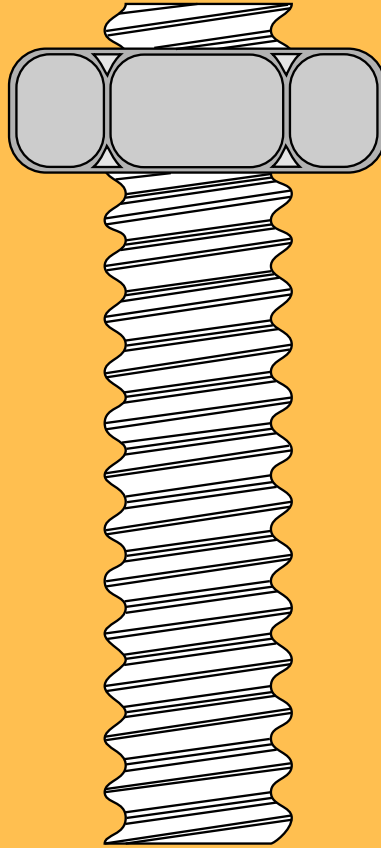


The Perfect Solution To High Wind Construction

THE STRONG HOLD



TIE MAX



STRUCTURAL TIE DOWN SYSTEM

Maximum Allowable Uplift 8377 Pounds

Simple Installation • Cleaner Frame • Superior Interior Finishes
Reduced Labor Costs • Lower Material Costs

NO MORE CONFUSING METAL STRAPS

www.tiemax.com

FL 19284.1

ICC-ES ESR-2328

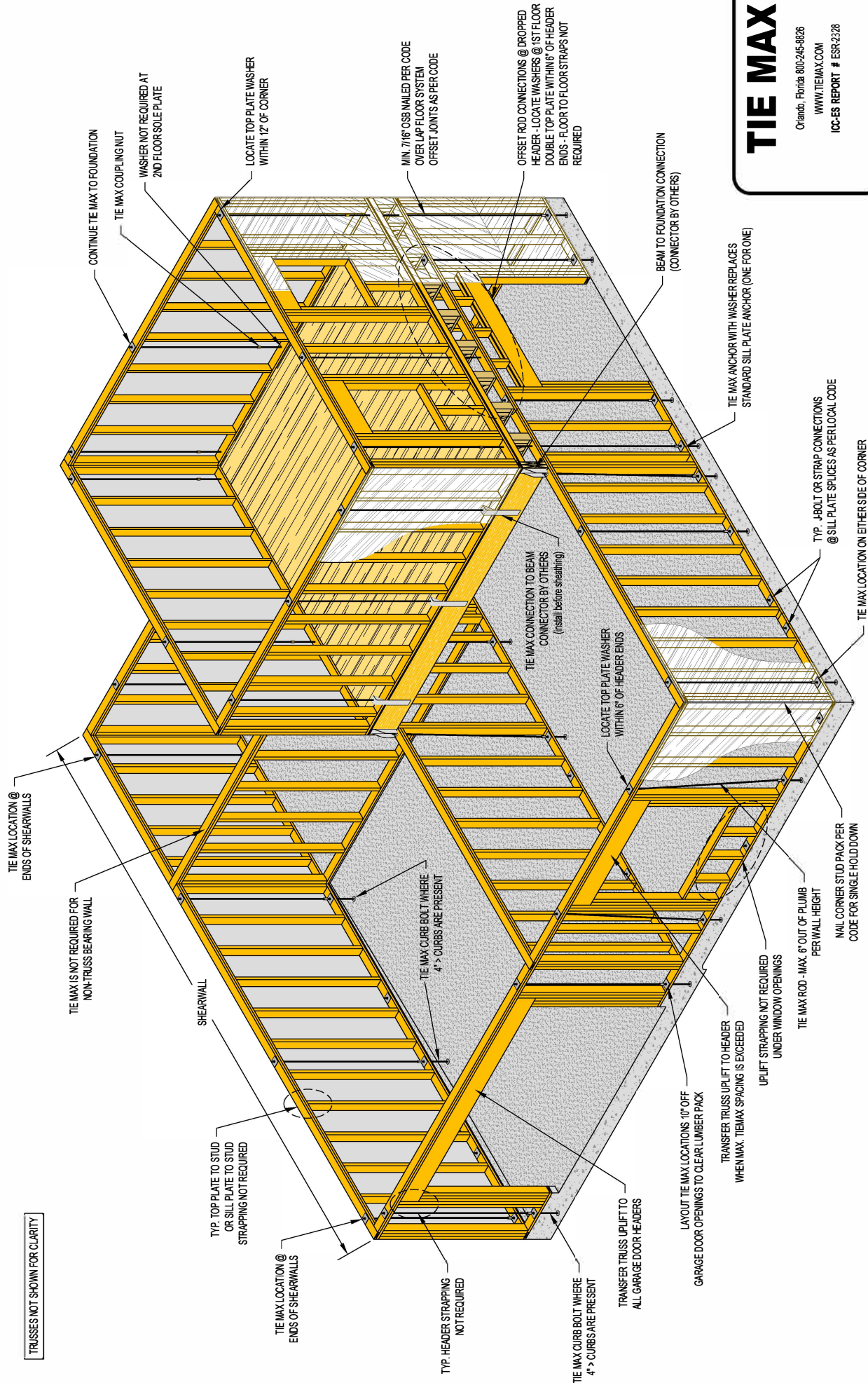


TIE MAX ITEM LIST

ZINC PLATED			DESCRIPTION	HOT DIPPED GALVANIZED		
Item #	Packed	Quantity		Item #	Packed	Quantity
40951	25		EDGE BOLT 5/8 X 10-1/2	39070	25	
40950	25		FIELD BOLT 5/8 X 10-1/2	39071	25	
40960	25		STUD 5/8-11 X 10-1/2	39074	25	
19892	1		STUD 5/8-11 X 16			
40949	25		CURB BOLT 5/8-11 X 14-1/2	39072	25	
40948	1		LONG BOLT 5/8-11 X 30	39073	1	
40959	100		SQUARE WASHER 2X2X1/8X1/2	39083	50	
40981	100		SQUARE WASHER 2X2X1/8X5/8	39084	50	
40982	50		SQUARE WASHER 2-1/2X2-1/2X1/2			
40984	100		SQUARE WASHER 3X3X1/2 SLOT	39086	25	
40985	100		SQUARE WASHER 3X3X5/8 SLOT	39087	25	
40988	100		SQUARE WASHER 3X3-1/2X1/2	N/A		
40987	100		SQUARE WASHER 3X3-1/2X5/8	N/A		
40956	50		HEX. NUT 1/2-13	39077	50	
40962	25		HEX. NUT 5/8-11	39078	25	
40963	25		REDUCING COUPLER 5/8 X 1/2	39081	25	
40973	25		REDUCING COUPLER 5/8 HDG to 1/2 ZINC	NEW		
40955	25		ROD COUPLER 1/2-13	39079	25	
40971	25		ROD COUPLER 1/2-13 HDG to ZINC	NEW		
40964	25		ROD COUPLER 5/8-11	39080	25	
40972	25		ROD COUPLER 5/8-11 HDG to ZINC	NEW		
40966	12		THREADED ROD 1/2-13 X 2FT	39090	25	
40967	12		THREADED ROD 1/2-13 X 3FT	39091	25	
40945	12		THREADED ROD 1/2-13 X 5FT	N/A		
N/A			THREADED ROD 1/2-13 X 6'	39092	15	
40952	12		THREADED ROD 1/2-13 X 8FT	39093	15	
40975	12		THREADED ROD 1/2-13 X 9FT	NEW	N/A	
40953	12		THREADED ROD 1/2-13 X 10FT	39094	15	
40954	12		THREADED ROD 1/2-13 X 12FT	39095	15	
40968	8		THREADED ROD 5/8-11 X 2FT	39096	15	
40969	8		THREADED ROD 5/8-11 X 3FT	39097	15	
40970	8		THREADED ROD 5/8-11 X 6FT	39098	9	
40996	8		THREADED ROD 5/8-11 X 8FT	39099	9	
40997	8		THREADED ROD 5/8-11 X 10FT	39100	9	
40998	8		THREADED ROD 5/8-11 X 12FT	39101	9	
42924	1		BLOW OUT BULB (PUFFER BALL)			
42922	1		3/4" CLEAN OUT BRUSH			
42949	1		TIE MAX EPOXY (10 OZ.)			
42947	1		TIE MAX EPOXY (22 OZ.)			
42940	1		22 OZ. TOOL (DUAL TUBE)			
42941	1		NOZZLE (DUAL CARTRIDGE)			

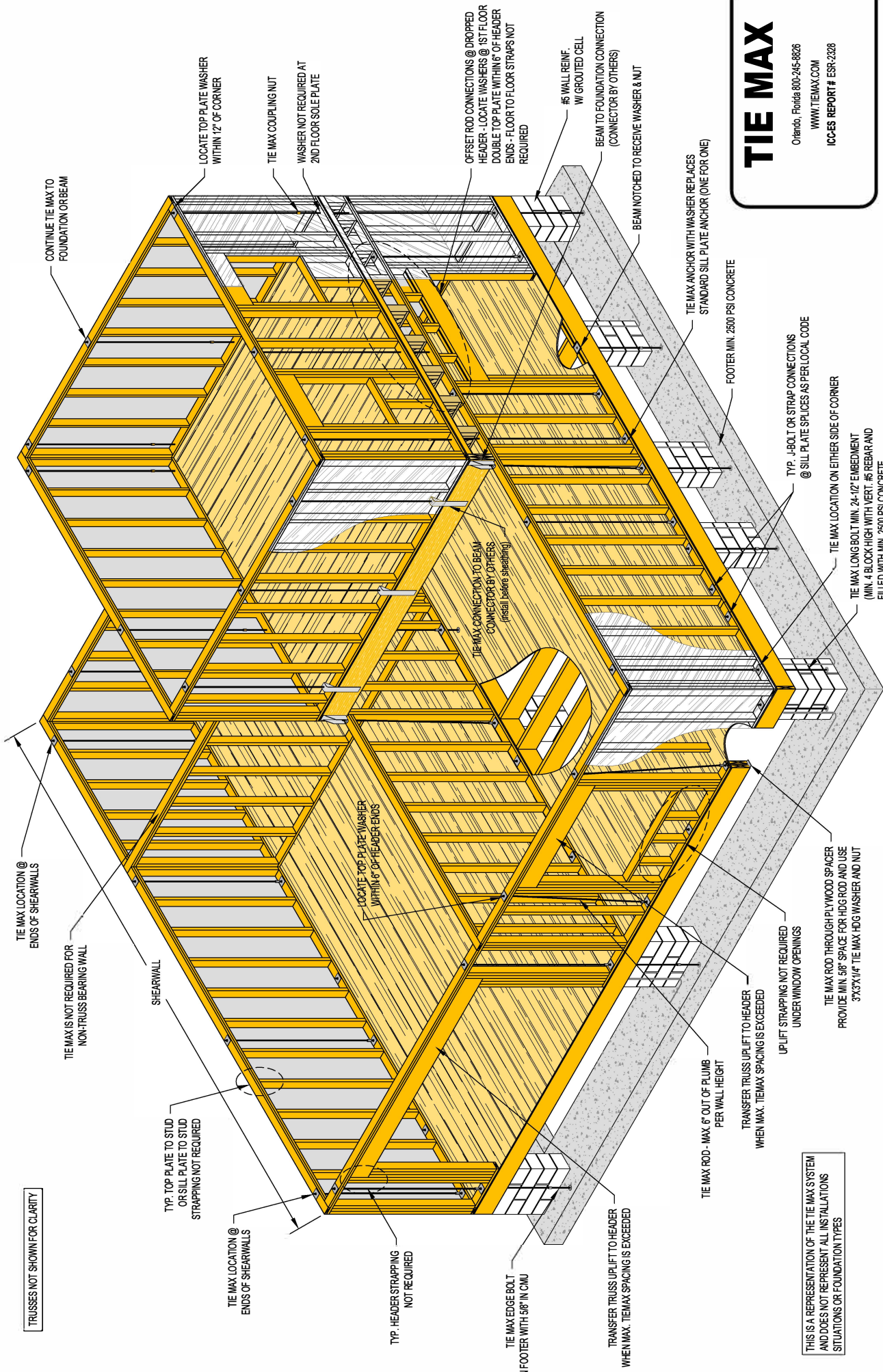
TIE MAX is a Structural Tie Down System. All components must be of TIE MAX manufacture.
Pricing and standard package quantities are subject to change without notice.

TRUSSES NOT SHOWN FOR CLARITY



TIE MAX

Orlando, Florida 800-245-8826
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ICC-ES REPORT # ESR-2228



TRUSSES NOT SHOWN FOR CLARITY

THIS IS A REPRESENTATION OF THE TIE MAX SYSTEM
AND DOES NOT REPRESENT ALL INSTALLATIONS
SITUATIONS OR FOUNDATION TYPES

TIE MAX

Orlando, Florida 800-245-8826
WWW.TIEMAX.COM
 ICCES REPORT # ESR-2328



TIE MAX

QUICK REFERENCE

CONCRETE DESIGN VALUES

	MINIMUM EMBED (in.)	MIN. EDGE DISTANCE (in.)	TIE MAX ROD (in. Dia.)	ALLOWABLE UPLIFT	ALLOWABLE SHEAR (F)	NOTES
5/8" TIEMAX BOLT	7	2	1/2	5585 lbs.	5343 lbs.	A,B,D
	7	7	1/2	6023 lbs.	5343 lbs.	A,B,D,
	7	7	5/8	8377 lbs.	5343 lbs.	A,B,D
5/8" TIE MAX STUD	7	2	1/2	3349 lbs.	3468 lbs.	A,C,D,E
	7	7	1/2	4943 lbs.	3468 lbs.	A,C,D,E

TABLE 1-A

- A. Capacity may be limited by top plate washer, see Tables 2-A or 2-B
 B. Safety factor 3.0 per 1997 SBC
 C. Power Bond Epoxy per manufacturer's recommendations
 D. Concrete strength: $F_c = 2500$ psi minimum
 E. Safety Factor 4.0
 F. TIE MAX'S allowable Shear at bottom plate with washer and nut in place per 1997 SBC.

REINFORCED MASONRY BOND BEAM

	EMBED (in.)	DISTANCE (in.)	TIE MAX ROD (in. Dia.)	ALLOWABLE UPLIFT	ALLOWABLE SHEAR	NOTES
5/8" TIE MAX BOLT	7	2	1/2	1998 lbs.	-	A,B,C

TABLE 1-B

- A. Reinforced Masonry Bond Beam with (1) #5 rebar minimum
 B. Grout strength: 2000-psi minimum
 C. Safety Factor 5.0 per ACI 530

TM TOP PLATE WASHERS, SYP

TOP PLATE WASHER	ALLOWABLE UPLIFT
2x2x1/8	2260 lbs.
2.5x2.5x3/16	3930 lbs.
3x3x1/4	5595 lbs.
3x3.5x1/4	6545 lbs.

TABLE 2-A

1. Loads controlled by wood bearing perpendicular to grain Fiber deformation of 0.04 inch at maximum loading shown Per NDS-1997.
 2. Top plate SYP#2, minimum with $F_c > 565$ psi

GENERAL SPACING, SYP (use 2.5x2.5x3/16 washer)

SPACING (ft.)	Maximum Truss Uplift (plf)	
		24"o.c.
4	950	1900
6	595	1190
8	465	930

Table 3-A

General guide based on:

- #2 Southern Yellow Pine Top Plate with min 7/16" OSB sheathing on one side nailed per 1997 SBC.
- Allowable shear for TIE MAX is 4161 lbs at uplift and corresponding spacing. Allowable shear for reduced uplifts may be increased in accordance with interaction equations.
- Uplift shall not exceed values of Table 1-A.

TM TOP PLATE WASHER, SPF

TOP PLATE WASHER	ALLOWABLE UPLIFT
2x2x1/8	1513 lbs.
2.5x2.5x3/16	2330 lbs.
3x3x1/4	3315 lbs.
3x3.5x1/4	3880 lbs.

Table 2-B

1. Loads controlled by wood bearing perpendicular to grain. Fiber deformation of 0.04 inch at maximum loading shown. Per NDS-1997.
 2. Top plate SPF#2, minimum with $F_c > 335$ psi.

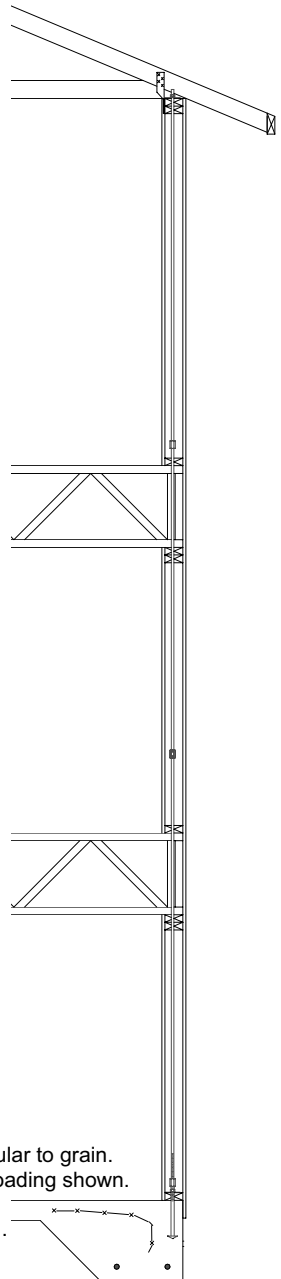
GENERAL SPACING, SPF (use 2.5x2.5x3/16 washer)

SPACING (ft.)	Maximum Truss Uplift (plf)	
		24"o.c.
4	527	1054
6	345	690
8	281	562

Table 3-B

General guide based on:

- #2 Spruce Pine Fir Top Plate with minimum 7/16" OSB sheathing on one side nailed per 1997 SBC.
- Allowable shear for TIE MAX is 4161 lbs at uplift and corresponding spacing. Allowable shear for reduced uplifts may be increased in accordance with interaction equations.
- Uplift shall not exceed values of Table 1-A.





TIE MAX

Installation Instructions

TIE MAX EMBED PLACEMENT

Field Placement

1. Determine the location of the TIE MAX Field bolt.
2. At the proper location, insert the TIE MAX Field bolt with its PVC pipe into the ground using a drive sleeve. (1" X 12" Pipe) until the bottom of the threads are at the top of the slab elevation.

Important Note: *Do not hammer top of bolt. It will not drive!*

3. Make concrete pour.

Edge Placement

1. Determine the location of the TIE MAX Edge bolt and mark the top of the form board for wet setting or place the TIE MAX bolt reusable anchor hanger prior to concrete pour.

- **Corner placement:** The TIE MAX embed shall be located 7 inches to 22 inches away from the corner of the structure to allow clearance for framing members.
- **Exterior walls:** The TIE MAX embeds shall be located 2 inches from the edge of slab with spacing as required to meet uplift values.

2. Position the TIE MAX embeds with the bottom of the threads at the top of slab. This insures the required 7-inches of embedment.
3. Make concrete pour. (The TIE MAX Edge bolt may be wet set during the pour.) Insert the TIE MAX bolt to the bottom of the threads with a 2-inch distance and consolidate the concrete.)

Retrofit

In retrofit situations after the concrete has been placed, use a 10-1/2 inch long 5/8-inch diameter TIE MAX STUD. Install the TIE MAX STUD with **POWERS POWER BOND** epoxy adhesive following all manufacturers' instructions. See detail instructions on the following page.

TIE MAX THREADED ROD

1. With wall framing in place, secure proper TIE MAX square washer to the sole plate with a 5/8 TIE MAX hex nut.
2. Install a TIE MAX 5/8" to 1/2" reducing coupler to the end of the TIE MAX threaded rod to be connected to the TIE MAX embed. Drill holes in the top plate or base plate if 2 or more stories and insert the rod into the top plate. Pull down on the rod till the end of the rod and the TIE MAX embed butt together. Spin the coupler down onto embed. (Center a TIE MAX 5/8" to 5/8" coupler when using 5/8" rod.)
3. Select threaded rod by length, which will allow sufficient room for couplers to be placed above or below double top plates or base plates. Butt the ends of the threaded rods together, center coupler over the rod ends.

TIE MAX TOP PLATE WASHER

1. Place TIE MAX steel plate washer on the threaded rod above the double top plate. See Table 3-A or 3-B of the TIE MAX Quick Reference sheet.
2. Secure the washer with a TIE MAX hex nut.
3. Just prior to installing interior wall sheathing, Hand tighten nuts, then one turn with wrench per floor to secure washer and tension rod. The TIE MAX system does not require a specific amount of torque.

TIE MAX is a Structural Tie Down System. All components must be of TIE MAX manufacture.



TIE MAX STUD

Retrofit Application

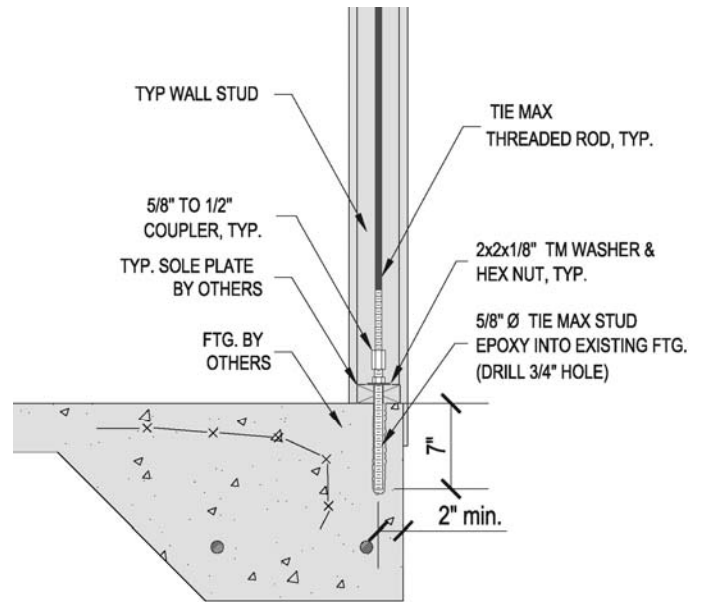
Use only approved epoxies supplied by Fastening Specialists, Inc.

TIE MAX STUD ANCHOR PLACEMENT

1. Determine the location of the TIE MAX STUD.
Refer to shop drawing for location and embedment depth.
2. Drill a 3/4-inch diameter by 7-inch deep (typical) hole in the concrete.
 - a) Edge placement minimum of 2 inches from edge to center of hole.
 - b) Field placement shall exceed 7 inches from edge to center of hole.
3. Clean hole with compressed air or puffer to clear dust and debris.
4. Brush hole with properly sized hole brush.
5. Clean hole with compressed air or puffer again.
6. Inject epoxy into hole, filling the hole 1/2 full starting from the bottom.
7. Insert the TIE MAX STUD with a twisting motion (to insure full thread coverage) until stud hits the bottom of the hole.

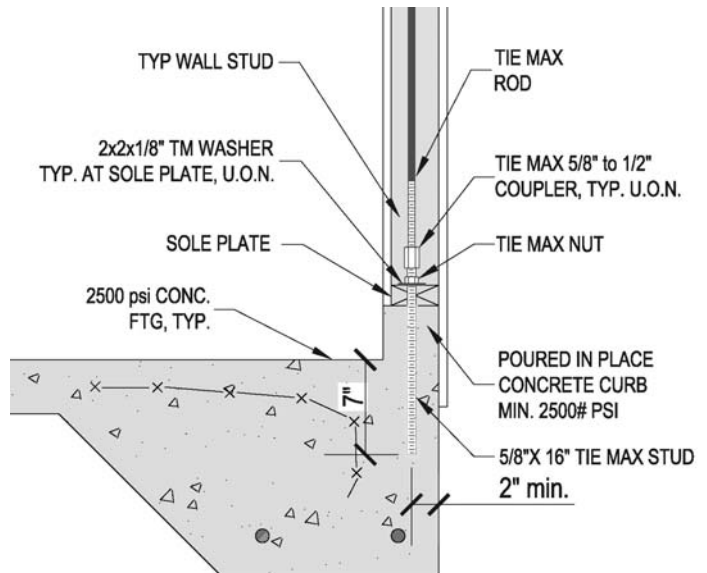
Note: If epoxy does not appear at the top of the hole when the TIE MAX STUD is inserted, remove TIE MAX STUD, apply additional epoxy to the hole, and reinsert TIE MAX STUD with a twisting motion.

8. Allow epoxy to set as per manufacturer's instructions before applying any load.



TIE MAX STUD IN CURB

1. Determine the location. Refer to shop drawings.
2. Drill a 3/4-inch diameter hole to a depth of not less than 7" below finish floor.
3. Follow steps 3 -8 above.



TIE MAX is a Structural Tie Down System. All components must be of TIE MAX manufacture.



TIE MAX

REFERENCIA RAPIDA

CARGAS DE DISEÑO EN CONCRETO

	EMPOTRAMIENTO MINIMO (in.)	DISTANCIA MINIMA DEL BORDE (in.)	VARILLA TIE MAX (in. Dia.)	LEVANTAMIENTO PERMISIBLE	FUERZA LATERAL PERMISIBLE	NOTAS
5/8" PERNO TIE MAX	7	2	1/2	5585 lbs.	5343 lbs.	A,B,D
	7	7	1/2	6023 lbs.	5343 lbs.	A,B,D,
	7	7	5/8	8377 lbs.	5343 lbs.	A,B,D
5/8" BARRA TIE MAX	7	2	1/2	3349 lbs.	3468 lbs.	A,C,D,E
	7	7	1/2	4943 lbs.	3468 lbs.	A,C,D,E

TABLA 1-A

- A. La resistencia podría estar limitada por la arandela de la placa superior, ver Tablas 2-A ó 2-B.
 B. Factor de Seguridad 3.0 según SBC 1997.
 C. Pegamento Power-Bond por recomendaciones del fabricante.
 D. Resistencia del concreto: $F_c = 2500$ psi mínimo
 E. Factor de Seguridad 4.0
 F. Fuerza Lateral Permissible del PERNO TIE MAX con arandela y tuerca puestas según SBC 1997.

VIGA DE BLOQUE DE CONCRETO REFORZADA

	EMPOTRA MIENTO (in.)	DISTAN CIA (in.)	VARILLA TIE MAX (in. Dia.)	LAVANTAMIENTO PERMISIBLE	FUERZA LATERAL PERMISIBLE	NOTAS
5/8" PERNO TIE MAX	7	2	1/2	1998 lbs.	-	A,B,C

TABLA 1-B

- A. Viga de bloque de concreto reforzada con (1) #5 reforzamiento mínimo
 B. Resistencia del concreto: 2000 psi mínimo
 C. Factor de Seguridad 5.0 según ACI 530

ARANDELA DE LA PLACA SUPERIOR TM, SYP

ARANDELA DE LA PLACA SUPERIOR	LEVANTAMIENTO PERMISIBLE
2x2x1/8	2260 lbs.
2.5x2.5x3/16	3930 lbs.
3x3x1/4	5595 lbs.
3x3.5x1/4	6545 lbs.

TABLA 2-A

1. Cargas controladas por la madera incidiendo perpendicularmente a las fibras con una deformación de 0.04 pulg. en carga máxima según NDS – 1997.
 2. Arandela de la placa superior SYP#2, mínimo con $F_c > 565$ psi

ESPACIAMIENTO, SYP (con arandela 2.5x2.5x3/16)

ESPACIAMIENTO	Levantamiento máximo de la armadura del techo (trusses)	
(ft.)	(plf)	24"o.c.
4	950	1900
6	595	1190
8	465	930

Tabla 3-A

Guía general basada en:

1. Placa Superior#2 Southern Yellow Pine con 7/16" OSB mínimo de un solo lado con clavos según 1997 SBC.
 2. La fuerza lateral permisible por TIE MAX es de 4161 lbs al levantamiento y espaciamiento correspondiente. La fuerza lateral permisible para levantamientos menores se puede incrementar de acuerdo con ecuaciones interactivas
 3. El levantamiento no excederá los valores de la tabla 1-A

ARANDELA DE LA PLACA SUPERIOR TM, SPF

ARANDELA DE LA PLACA SUPERIOR	LEVANTAMIENTO PERMISIBLE
2x2x1/8	1513 lbs.
2.5x2.5x3/16	2330 lbs.
3x3x1/4	3315 lbs.
3x3.5x1/4	3880 lbs.

Tabla 2-B

1. Cargas controladas por la madera incidiendo perpendicularmente a las fibras con una deformación de 0.04 pulg. en carga máxima según NDS – 1997.
 2. Arandela de la placa superior SPF#2, mínimo con $F_c > 335$ psi

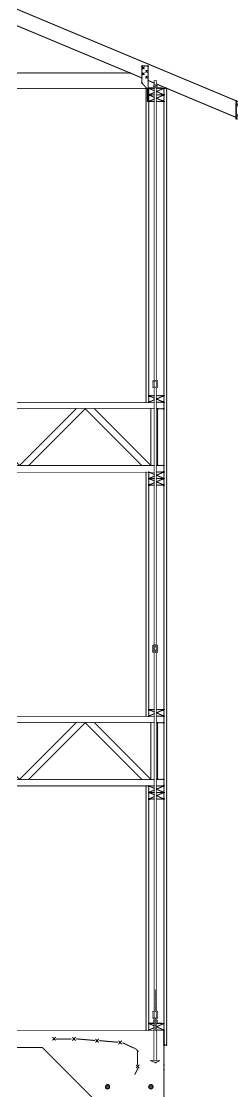
ESPACIAMIENTO, SPF (con arandela 2.5x2.5x3/16)

ESPACIAMIENTO	Levantamiento máximo de la armadura del techo (trusses)	
(ft.)	(plf)	24"o.c.
4	527	1054
6	345	690
8	281	562

Table 3-B

Guía general basada en:

1. Placa Superior#2 Spruce Pine Fir con 7/16" OSB mínimo de un solo lado con clavos según 1997 SBC.
 2. La fuerza lateral permisible por TIE MAX es de 4161 lbs al levantamiento y espaciamiento correspondiente. La fuerza lateral permisible para tracciones menores se puede incrementar de acuerdo con ecuaciones interactivas
 3. El levantamiento no excederá los valores de la tabla 1-A





TIE MAX

Instrucciones para la Instalación

POSICIONAMIENTO DE LOS PERNOS TIE MAX

Posicionamiento del Perno Interior

1. Determine la localización de los Pernos Interiores.
2. En el lugar apropiado, inserte el Perno Interior TIE MAX con su tubo de PVC en la tierra usando una guía. (TUBO 1" X 12") hasta que toda la rosca este a nivel con la parte superior del cimiento.

Nota Importante: No martille el Perno. No va a ceder!

3. Verter el concreto.

Posicionamiento del Perno Exterior

1. Determine la posición del Perno Exterior TIE MAX y marque la superficie del cimiento aún mojado o ponga el sujetador del Perno Tie Max antes de verter el concreto.

- **Posicionamiento en las esquinas:** El empotramiento de TIE MAX debe ser localizado de 7 a 22 pulgadas a partir de la esquina para posibilitar espacio para la partes de madera.
- **Paredes Exteriores:** Los empotramientos de TIE MAX deben ser localizados a 2 pulgadas del borde del cimiento para satisfacer los valores de levantamiento admisibles.

2. Haga el empotramiento de TIE MAX con la parte inferior de la rosca coincidente con la parte superior del concreto para asegurar las 7 pulgadas requeridas para el empotramiento.

3. Vierta el concreto. (El perno Exterior TIE MAX puede ser colocado durante el vertimiento). Inserte el perno TIE MAX hasta la parte inferior de la rosca con 2 pulgadas de separación y termine el vertimiento.

Reposicionamiento

En caso de reposicionamiento después que el concreto ha sido colocado, use una BARRA TIE MAX de 10-1/2 pulgadas de largo y 5/8 pulgadas de diámetro, instálelo con pegamento adhesivo **POWERS POWER BOND** siguiendo todas las instrucciones del fabricante. Vea los detalles en la próxima página.

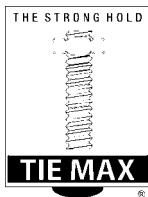
VARILLA ROSCADA TIE MAX

1. Cuando la estructura de madera este en su lugar, asegure adecuadamente la arandela cuadrada a la placa inferior con una tuerca hexagonal de 5/8" TIE MAX.
2. Instale un acople reductor de 5/8"-1/2" TIE MAX en un extremo de la varilla roscada de TIE MAX, el otro extremo del reductor será acoplado al perno empotrado de TIE MAX. Taladre agujeros en la placa superior o en la placa base si son 2 o mas pisos e inserte la varilla a través de la placa superior. Hale hacia abajo la varilla hasta que tope con el perno empotrado de TIE MAX. Enrosque hacia abajo el acople. (Use un acople de 5/8"-5/8" si usa una varilla de 5/8" de diámetro)
3. Seleccione la varilla roscada de acuerdo con el largo suficiente para colocar los acoples arriba o abajo de las placas superiores o inferiores. Haga topar los extremos de las varillas, centre el acople.

ARANDELA DE la PLACA SUPERIOR DE TIE MAX

1. Coloque la arandela de acero TIE MAX en la varilla roscada arriba de la placa superior. Vea la tabla 3-A o 3-B de la página de Referencia Rápida TIE MAX.
2. Asegure la arandela con una tuerca hexagonal TIE MAX.
3. Apriete la tuerca para asegurar la arandela y la tensión de la varilla. El sistema TIE MAX no requiere una cantidad específica de torque, la finalidad de TIE MAX es la resistencia al levantamiento, no la post tensión.

TIE MAX es un Sistema de Soporte Estructural. Todos los componentes deben de ser fabricación de TIE MAX.



TIE MAX STUD

Aplicación del Reposicionamiento

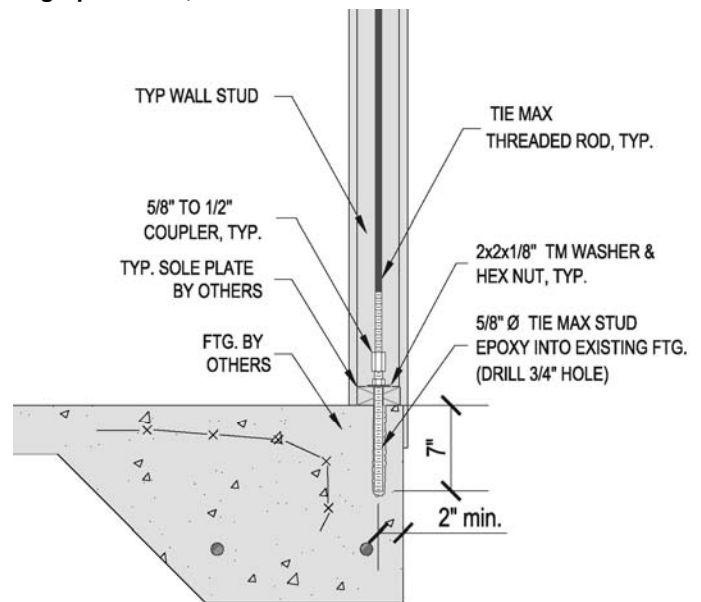
Use solamente pegamento aprobado y suministrado por Fastening Specialists, Inc.

LOCALIZACION DE LA BARRA EMPOTRADA TIE MAX

1. Determine la localización de la BARRA TIE MAX. Refierase al plano de Tie Max para la localización y profundidad de empotramiento.
2. Taladre un agujero de 3/4 pulg. de diámetro y 7 pulg. de profundidad (típicamente) en el concreto.
 - a) Distancia mínima de 2 pulg. entre el centro del agujero y el borde del concreto.
 - b) Distancia mínima de 7 pulg. entre el centro del agujero y la esquina del concreto
3. Limpie el agujero con aire comprimido o sople para remover el polvo y los escombros.
4. Cepille el agujero con el cepillo para agujeros apropiado.
5. Limpie el agujero con aire comprimido o sople otra vez.
6. Inyecte el pegamento en el agujero hasta la mitad de la profundidad.
7. Inserte la barra TIE MAX con movimiento rotatorio (para asegurar una total penetración del pegamento en la rosca) hasta que la barra tope con el fondo del agujero.

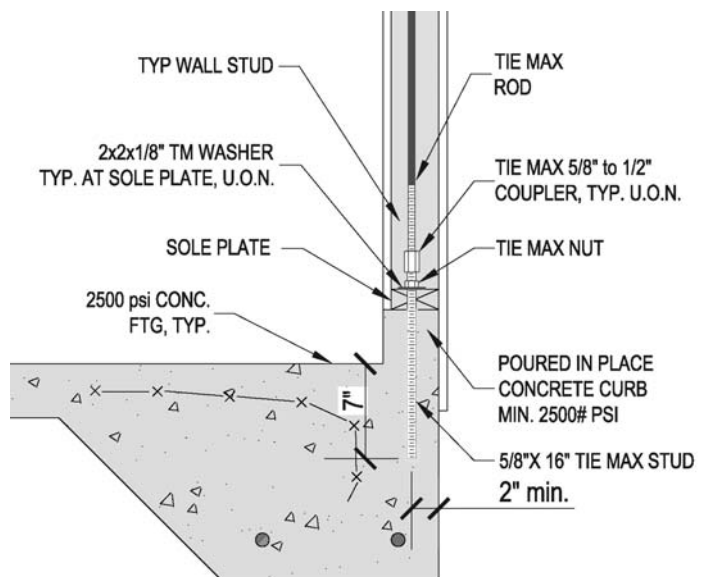
Nota: si el pegamento no aparece por encima del agujero cuando inserte la barra TIE MAX, remueva la barra, aplique mas pegamento al agujero, y reinserte la barra TIE MAX con movimiento rotatorio.

8. Deje secar el pegamento de acuerdo a las instrucciones del fabricante antes de aplicar cualquier carga.



BARRA TIE MAX EN PISOS INCLINADOS

4. Determine la posición. Vea el plano de TIE MAX.
5. Taladre un agujero de 3/4 pulg. de diámetro y una profundidad de al menos 7\"/>



TIE MAX es un Sistema de Soporte Estructural. Todos los componentes deben ser fabricación de TIE MAX

DIVISION: 03 00 00—CONCRETE

SECTION: 03 16 00—CONCRETE ANCHORS

DIVISION: 04 00 00—MASONRY

SECTION: 04 05 19.16—MASONRY ANCHORS

DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES

SECTION: 06 05 23—WOOD, PLASTIC, AND COMPOSITE FASTENINGS

REPORT HOLDER:

FASTENING SPECIALISTS, INC.

EVALUATION SUBJECT:

TIE MAX ANCHOR BOLTS AND CONTINUOUS ROD TIE-DOWN RUN (CRTR)



"2014 Recipient of Prestigious Western States Seismic Policy Council (WSSPC) Award in Excellence"



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ICC-ES Evaluation Report

ESR-2328

Reissued October 2018

This report is subject to renewal October 2019.

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DIVISION: 03 00 00—CONCRETE
Section: 03 16 00—Concrete Anchors

DIVISION: 04 00 00—MASONRY
Section: 04 05 19.16—Masonry Anchors

DIVISION: 06 00 00—WOOD, PLASTICS, AND COMPOSITES
Section: 06 05 23—Wood, Plastic, and Composite Fastenings

REPORT HOLDER:

FASTENING SPECIALISTS, INC.

EVALUATION SUBJECT:

TIE MAX ANCHOR BOLTS AND CONTINUOUS ROD TIE-DOWN RUN (CRTR)

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2012 and 2009 *International Building Code*® (IBC)
- 2012 and 2009 *International Residential Code*® (IRC)

Properties evaluated:

Structural

2.0 USES

The TIE MAX anchor bolts and continuous rod tie-down runs (CRTRs), which include TIE MAX threaded rods, TIE MAX washers, TIE MAX hex nuts, and TIE MAX threaded rod couplers, are used to resist wind uplift loads applied at the top of wood light-frame walls. Each CRTR provides a continuous load path from the top of the CRTR to a TIE MAX anchor bolt, which transfers the wind uplift loads into a concrete or masonry foundation.

3.0 DESCRIPTION

3.1 General:

Specifications for each product are covered under TIE MAX's approved quality documentation. Each product is available with and without a zinc coating. The CRTRs include the following components: TIE MAX threaded rods, TIE MAX washers, TIE MAX hex nuts, and TIE MAX threaded rod couplers.

3.2 TIE MAX Anchor Bolts:

The TIE MAX anchor bolts have a nominal shank diameter of $\frac{5}{8}$ inch and a minimum length of $10\frac{1}{2}$ inches (267 mm). The threads start $3\frac{1}{2}$ inches (88.9 mm) beyond the underside of the head. TIE MAX Anchor Bolts used in interior walls have a head diameter of 2 inches (50.8 mm).

3.3 Continuous Rod Tie-down Run (CRTR) Components:

3.3.1 TIE MAX Threaded Rods: The TIE MAX threaded rods have nominal shank diameters of $\frac{1}{2}$ and $\frac{5}{8}$ inch.

3.3.2 TIE MAX Washers: See Table 3 for sizes.

3.3.3 TIE MAX Hex Nuts: The TIE MAX hex nuts have nominal diameters of $\frac{1}{2}$ and $\frac{5}{8}$ inch.

3.3.4 TIE MAX Couplers: The TIE MAX hex couplers have nominal diameters of $\frac{1}{2}$ and $\frac{5}{8}$ inch on each end. A coupler reducer is also available with $\frac{1}{2}$ inch (12.7 mm) on one end and $\frac{5}{8}$ inch (15.9 mm) on the other end.

4.0 DESIGN AND INSTALLATION

4.1 Installation:

The TIE MAX Anchor Bolts and CRTR must be installed in accordance with this evaluation report and the manufacturer's published installation instructions. For each installation, all products must either be zinc-coated or uncoated, due to TIE MAX nuts and TIE MAX couplers being tapped oversized for applications of zinc coatings. In the event of a conflict between this report and the manufacturer's published installation instructions, the more restrictive condition governs.

4.2 Design:

The allowable (ASD) design loads for the TIE MAX anchor bolts are given in Tables 1 and 2 for embedment in, respectively, concrete and reinforced masonry. The allowable (ASD) design loads for the CRTR are listed in Tables 3 and 4.

5.0 CONDITIONS OF USE

The TIE MAX anchors and CRTRs described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 The contribution of wood shrinkage, wood deformation under load, and fastener slip, to the overall deflection of the wall in which the CRTRs are installed, must be analyzed by a registered design professional.

- 5.2** The tabulated allowable loads noted in this report are obtained from calculations on the individual components making up the CRTR. Other variables that may further limit capacities, such as anchorage strength in tension or shear, and stresses within the wood or steel members of the wall in which the CRTR is installed, must be analyzed by the registered design professional.
- 5.3** When using the basic load combinations in accordance with IBC Section 1605.3.1, the tabulated allowable loads for the CRTR must not be increased for wind or seismic loading. When using the alternate basic load combinations in IBC Section 1605.3.2 that include wind or earthquake loads, the tabulated ASD loads for the CRTR must not be increased by $33\frac{1}{3}$ percent, nor shall the alternative basic load combinations be reduced by a factor of 0.75.
- 5.4** The tabulated allowable CRTR tension (uplift) loads and corresponding elongations are not intended to represent the capacity or deflection of the framing systems, or any other portion of the wall in which the CRTR is installed.
- 5.5** Design of the framing systems is the responsibility of the design professional and must be performed in accordance with the applicable code, taking into account all of the design considerations given in Section 4.1 of this report.
- 5.6** The design of framing and other elements within the load path is the responsibility of the design professional, and must be performed in accordance with the applicable code, considering loads, displacements, shrinkage, etc.
- 5.7** The design of wall top plates receiving uplift load and distributing it through the CRTR must take into account both deflection and strength limit states, including combined axial and flexural stress for cases where the wood top plate(s) also acts as a drag strut or collector, and must also take into account geometric compatibility.
- 5.8** A positive method to resist torsional rotation and cross-grain flexure of the top plates due to offsets between the point of load application (e.g., hurricane ties at the sides of the top plates) and load resistance (e.g., anchors at the center of the top plate), must be provided where such conditions exist; and calculations in accordance with principles of mechanics must be used to determine the demand on connections used to resist top plate torsion.
- 5.9** The use of the CRTRs in contact with chemically treated wood is subject to the approval of the code official, since the effects of corrosion of metal in contact with chemically treated wood, on the structural performance of the components, are outside the scope of the report.
- 5.10** Exterior use applications, such as use that allows exposure to moisture, are outside the scope of this report.
- 5.11** Installation of the CRTRs must be limited to dry interior locations.
- 5.12** No further increase in duration of load for wind loading is allowed for the use of the CRTR.
- 5.13** Drawings and design details verifying compliance with this report must be submitted to the code official for approval. Drawings and calculations must be prepared by a registered design professional when required by the statutes of the jurisdiction in which the project is to be constructed.
- ## **6.0 EVIDENCE SUBMITTED**
- 6.1** Data in accordance with the ICC-ES Acceptance Criteria for Continuous Rod Tie-down Runs and Continuous Rod Tie-down Systems Used to Resist Wind Uplift (AC391), dated June 2010 (editorially revised March 2015).
- 6.2** Data in accordance with ACI 318 (for TIE MAX Anchors installed in concrete).
- 6.3** Data in accordance with ACI 530 (for TIE MAX Anchors installed in masonry).
- ## **7.0 IDENTIFICATION**
- 7.1** The TIE MAX anchor bolts, steel nuts, threaded rods, and threaded rod couplers are identified by the name of the report holder (Fastening Specialists, Inc.), the product name, and the evaluation report number (ESR-2328).
- 7.2** The report holder's contact information is the following:
- FASTENING SPECIALISTS, INC.**
726 CENTRAL FLORIDA PARKWAY
ORLANDO, FLORIDA 32824
(407) 888-9099
www.tiemax.com

**TABLE 1—ALLOWABLE UPLIFT LOADS (ASD),
TIE MAX ANCHOR IN CONCRETE¹⁻⁷**

$\frac{5}{8}$" TIE MAX ANCHOR BOLTS (CAST IN PLACE)	MINIMUM SPECIFIED CONCRETE COMPRESSIVE STRENGTH (psi)	MINIMUM EMBEDMENT (in.)	MINIMUM EDGE DISTANCE (in.)	ALLOWABLE UPLIFT LOAD (lbf)
	2,500	7	2	5,480
		7	7	6,140

For SI: 1 in. = 25.4 mm, 1 lbf = 4.5 N, 1 psi = 6.9 kPa.

Notes:

1. The minimum concrete thickness must be 10 inches.
2. Installations involving Seismic Design Categories C, D, E, and F listed in ACI 318 Section D.3.3 are beyond the scope of this report.
3. Allowable design loads calculated for use in regions of concrete members where analysis indicates no cracking at service loads according to ACI 318 Section D.5.2.6.
4. The distance from the center of the anchor to all other edges must be a minimum of 10.5 inches.
5. Minimum spacing between anchors must be 21 inches to act as a single fastener according to ACI318 Section D.1.
6. The allowable uplift values are based on calculations in accordance with Appendix D of AC318 divided by a factor of 1.6 in order to take into account the 1.6W load combination. The design wind load (W) must be less than the tabulated values.
7. The anchors must not be torqued (finger tightened).

**TABLE 2—ALLOWABLE DESIGN LOADS (ASD),
TIE MAX ANCHOR IN REINFORCED MASONRY¹⁻³**

$\frac{5}{8}$" TIE MAX ANCHOR BOLTS (CAST IN PLACE)	MINIMUM EMBEDMENT (in)	MINIMUM EDGE DISTANCE (in.)	MINIMUM END DISTANCE (in.)	ALLOWABLE UPLIFT LOAD (lbf)
	7	4	12	2,210

For SI: 1 in. = 25.4 mm, 1 lbf = 4.5 N, 1 psi = 6.9 kPa.

Notes:

1. Allowable uplift loads are for pullout from grouted reinforced masonry with minimum specified compressive strength of 2,000 psi.
2. Masonry units must have a minimum width of 8 inches.
3. Per ACI 530 Section 2.1.4.2.2.1, the projected areas of adjacent bolts must not overlap.

**TABLE 3—ALLOWABLE DESIGN LOADS (ASD),
TIE MAX WASHER BEARING CAPACITIES¹⁻³**

TIE MAX WASHERS	ALLOWABLE UPLIFT LOADS (lbf) SOUTHERN PINE (SYP) G = 0.55	ALLOWABLE UPLIFT LOADS (lbf) SPRUCE-PINE-FIR (SPF) G = 0.42
2 in. x 2 in. x $\frac{1}{8}$ in.	1,960	1,800
2.5 in. x 2.5 in. x $\frac{3}{16}$ in.	3,520	2,840
3 in. x 3 in. x $\frac{1}{4}$ in.	5,440	4,090
3 in. x 3.5 in. x $\frac{1}{4}$ in.	6,370	4,730

For SI: 1 in. = 25.4 mm, 1 lbf = 4.5 N, 1 psi = 6.9 kPa.

Notes:

1. Allowable uplift loads are the lesser of wood bearing perpendicular to grain capacity or washer bending capacity.
2. Double top plates are required, either Southern Pine No. 2 Grade with $F_c' = 565$ psi or Spruce-Pine-Fir No. 2 Grade with $F_c' = 425$ psi, per the NDS.
3. Reference compression design values perpendicular to grain are adjusted using Bearing Area Factor C_b , per the NDS. Wet Service Factor (CM) and Temperature Factor (Ct) are taken to equal 1.

**TABLE 4—ALLOWABLE DESIGN LOADS (ASD),
TIE MAX THREADED ROD**

MODEL	GROSS DIAMETER (in)	GROSS AREA (in²)	THREADS PER INCH, <i>n</i>	NET AREA, <i>A_n</i> (in²)	MAXIMUM ALLOWABLE TENSION (lbf)¹	ALLOWABLE TENSION (lbs) FOR ROD LENGTH LIMIT OF 0.18 inch ELONGATION			
						10 ft	15 ft	20 ft	25 ft
TIE MAX Threaded Rod	$\frac{1}{2}$	0.196	13	0.142	4,420	4,420	4,120	3,090	2,470
	$\frac{5}{8}$	0.307	11	0.226	6,900	6,900	6,550	4,920	3,930

For SI: 1 in. = 25.4 mm, 1 lbf = 4.5 N, 1 psi = 6.9 kPa.

Notes:

1. Maximum allowable tension based on AISC 360 Section J3.

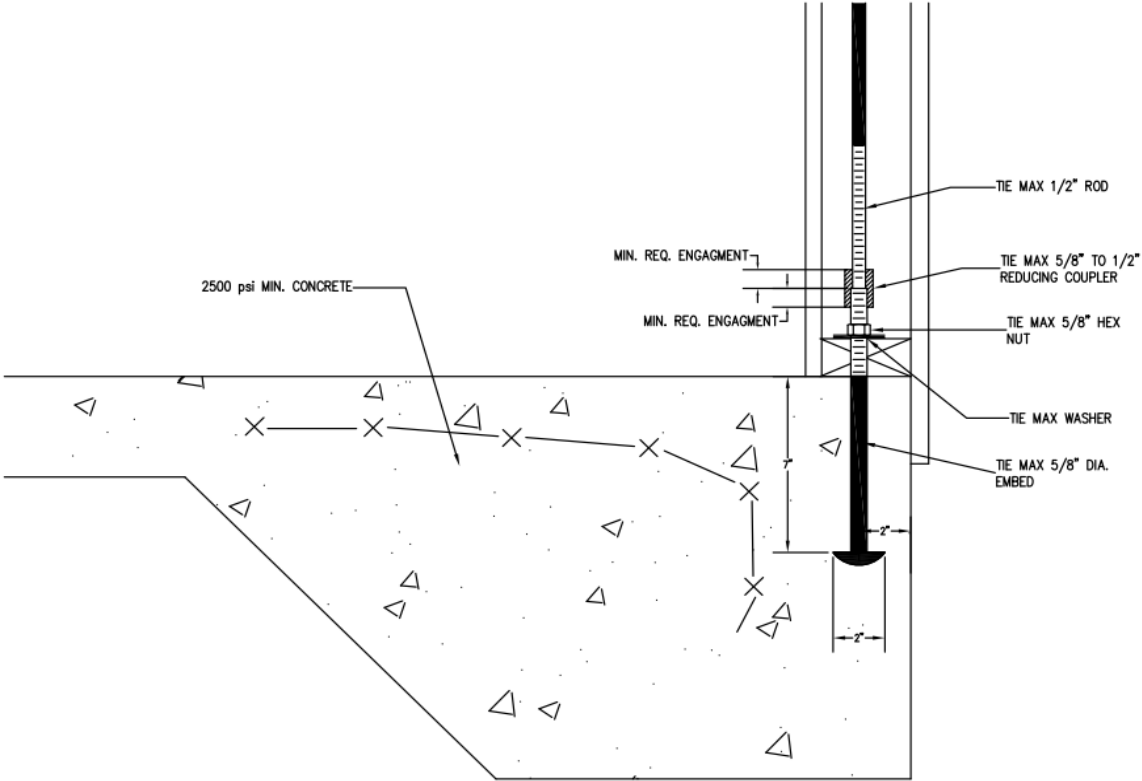


FIGURE 1

ICC-ES Evaluation Report

ESR-2328 FBC Supplement

Reissued October 2018

This report is subject to renewal October 2019.

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DIVISION: 03 00 00—CONCRETE
Section: 03 16 00—Concrete Anchors

DIVISION: 04 00 00—MASONRY
Section: 04 05 19.16—Masonry Anchors

DIVISION: 06 00 00—WOOD, PLASTICS, AND COMPOSITES
Section: 06 05 23—Wood, Plastic, and Composite Fastenings

REPORT HOLDER:

FASTENING SPECIALISTS, INC.

EVALUATION SUBJECT:

TIE MAX ANCHOR BOLTS AND CONTINUOUS ROD TIE-DOWN RUN (CRTR)

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that the Tie Max anchor bolts and continuous rod tie-down runs (CRTRs), recognized in ICC-ES master evaluation report ESR-2328, have also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2014 *Florida Building Code—Building*
- 2014 *Florida Building Code—Residential*

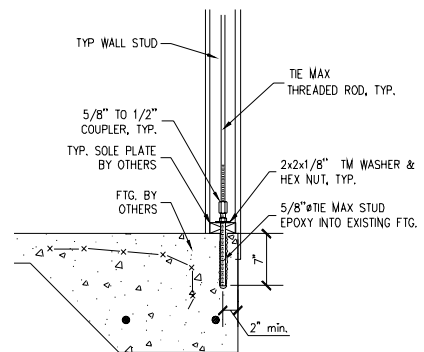
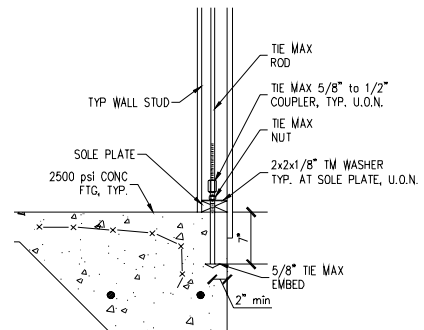
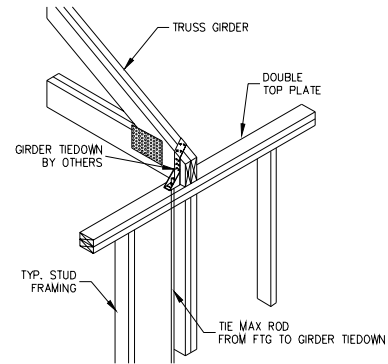
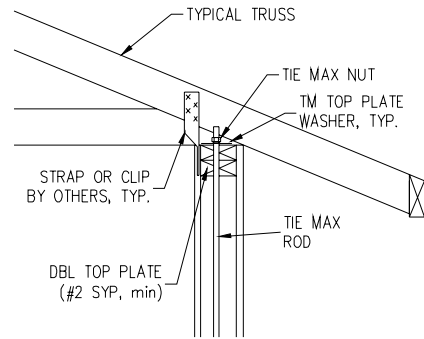
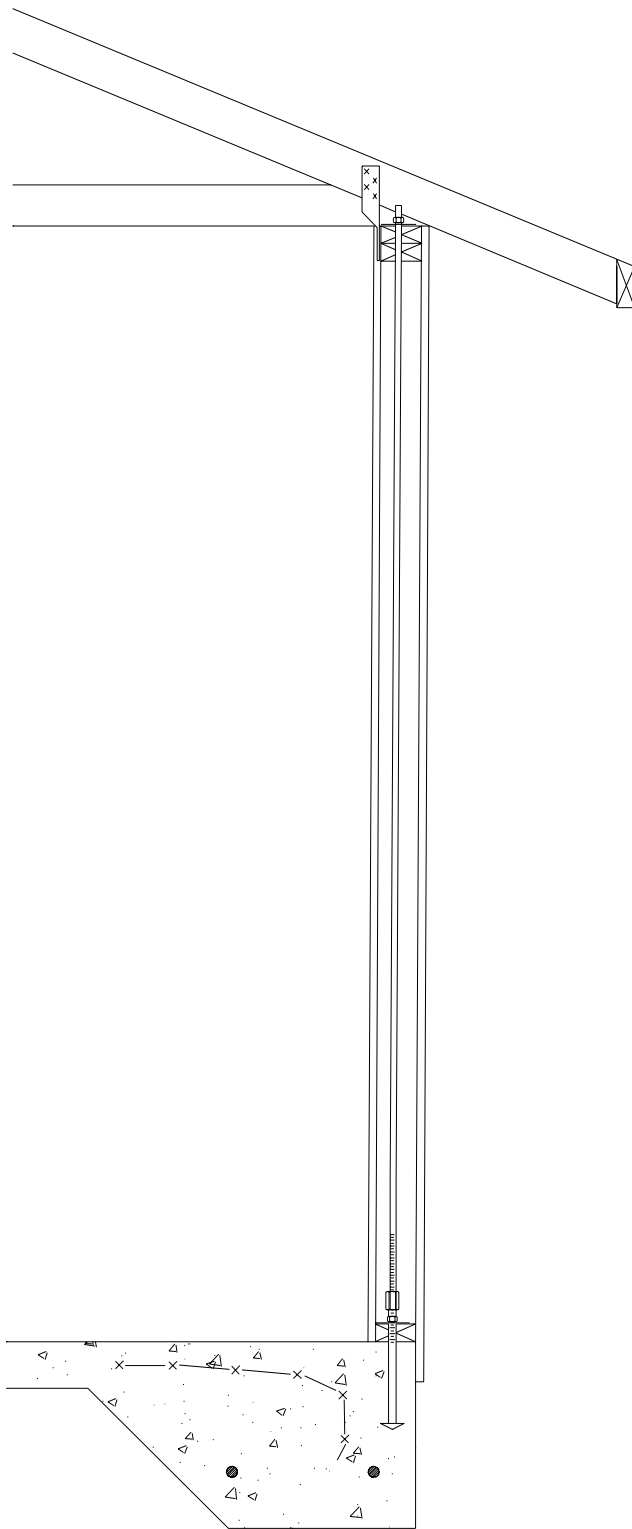
2.0 CONCLUSIONS

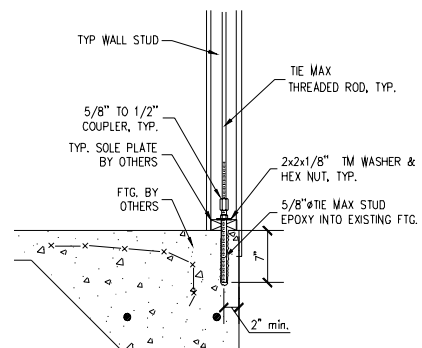
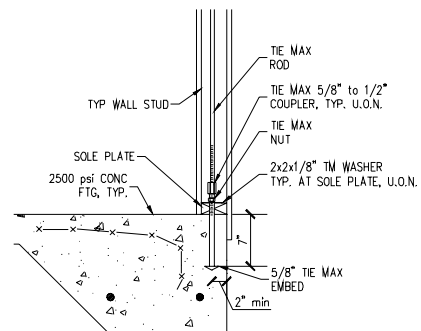
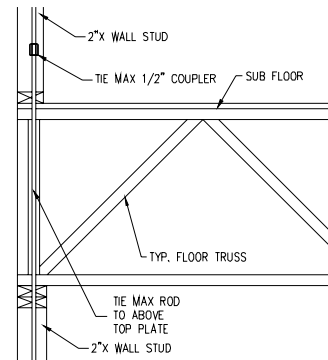
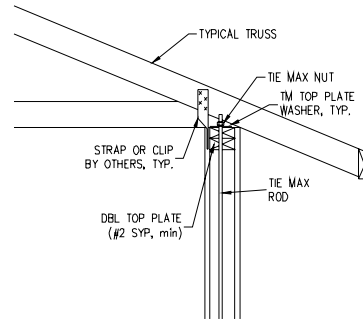
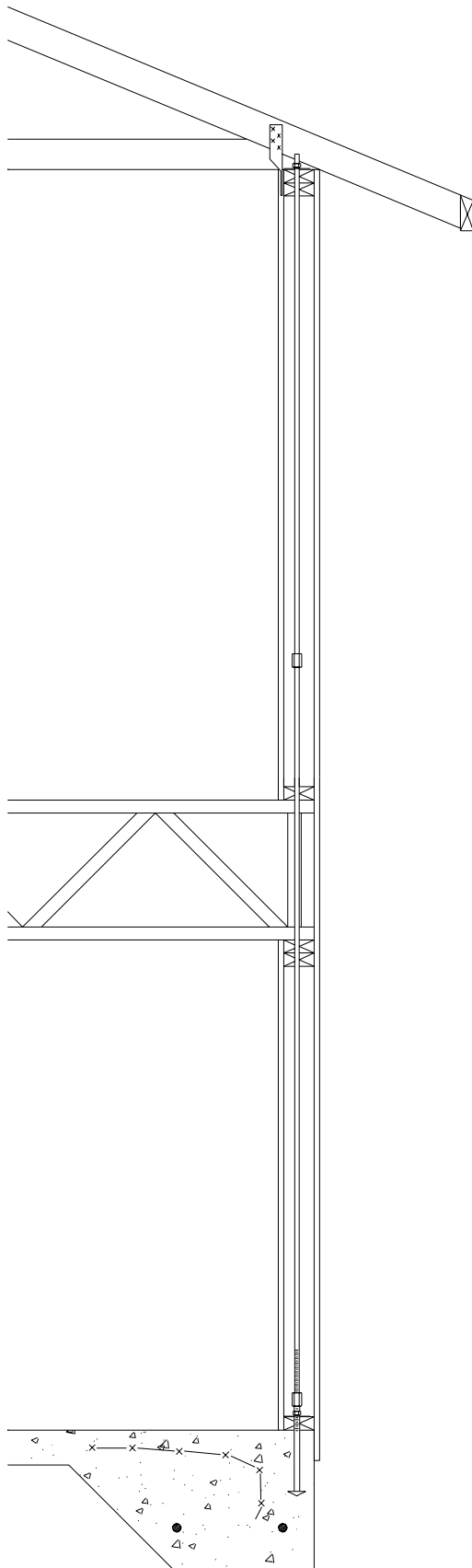
The Tie Max anchor bolts and CRTRs, described in Sections 2.0 through 7.0 of the master evaluation report ESR-2328, comply with the *Florida Building Code—Building*, and the *Florida Building Code—Residential*, provided the design and installation are in accordance with the 2012 *International Building Code*® (IBC) provisions noted in the master report.

Use of the Tie Max anchor bolts and CRTRs for compliance with the High-Velocity Hurricane Zone provisions of the *Florida Building Code—Building*, and the *Florida Building Code—Residential*, has not been evaluated, and is outside the scope of this supplemental report.

For products falling under Florida Rule 9N-3, verification that the report holder's quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission for the type of inspections being conducted is the responsibility of an approved validation entity (or the code official when the report holder does not possess an approval by the Commission).

This supplement expires concurrently with the master report, reissued October 2018.

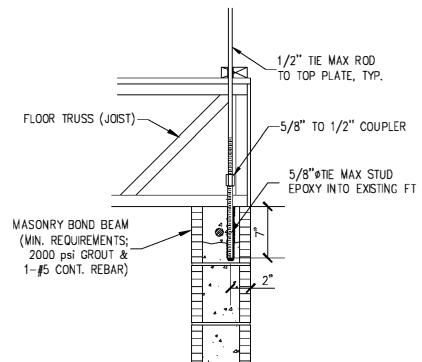
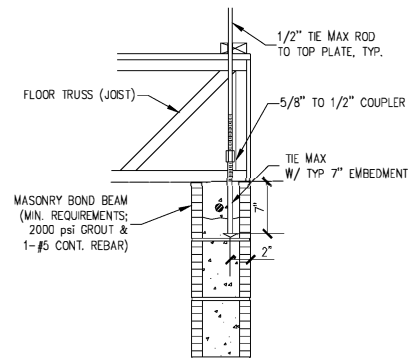
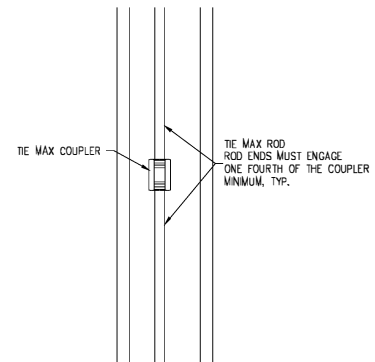
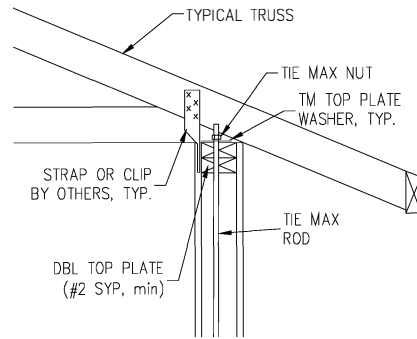
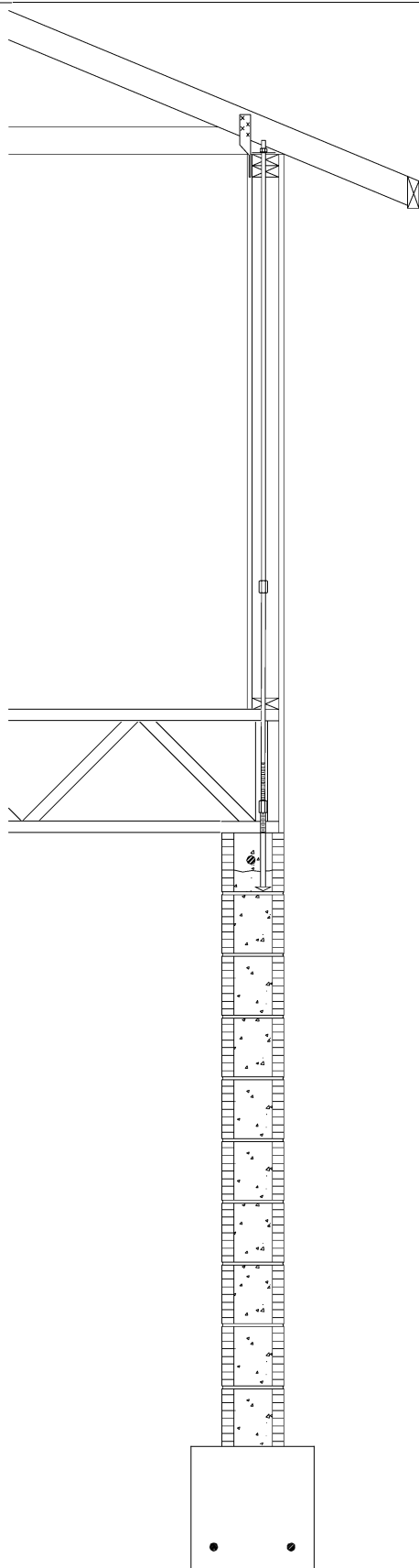


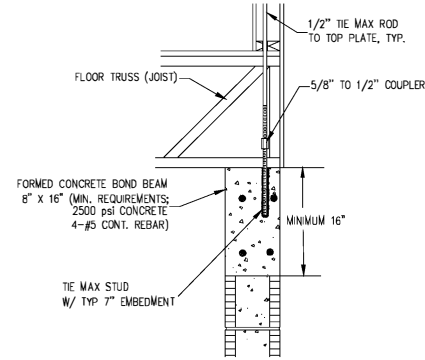
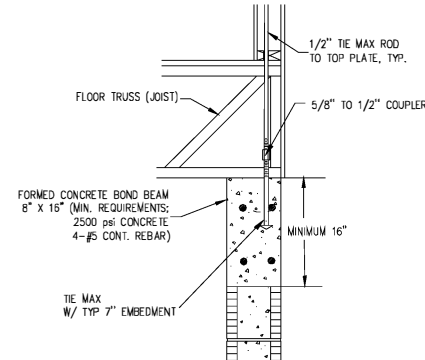
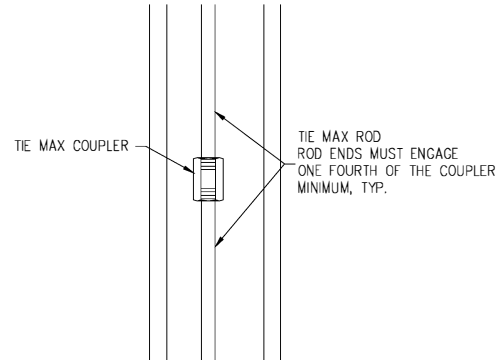
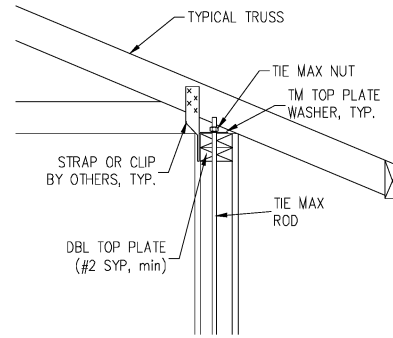
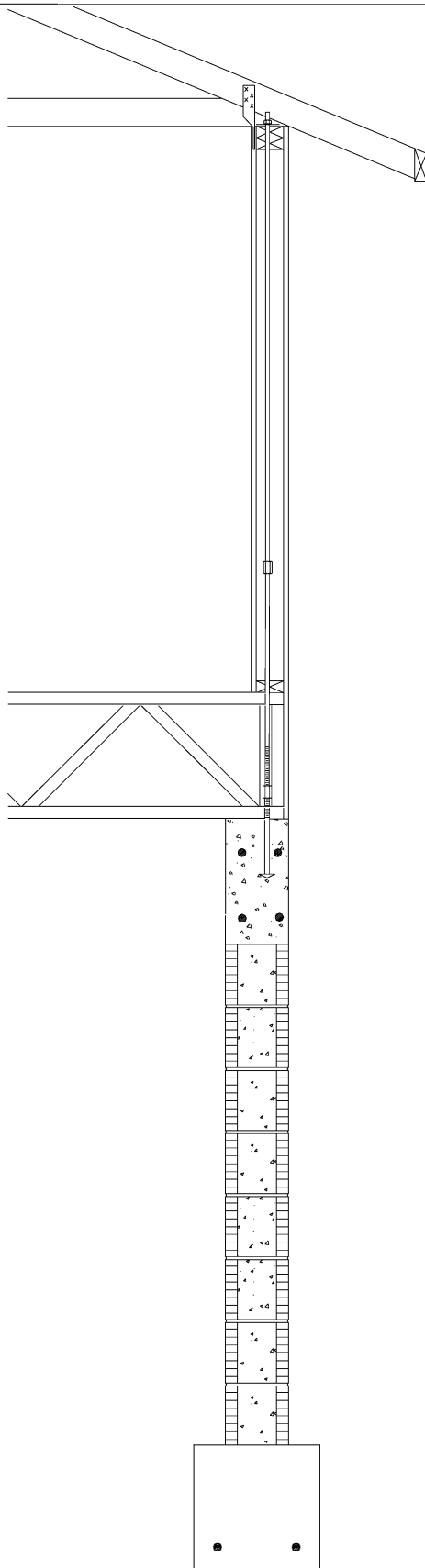


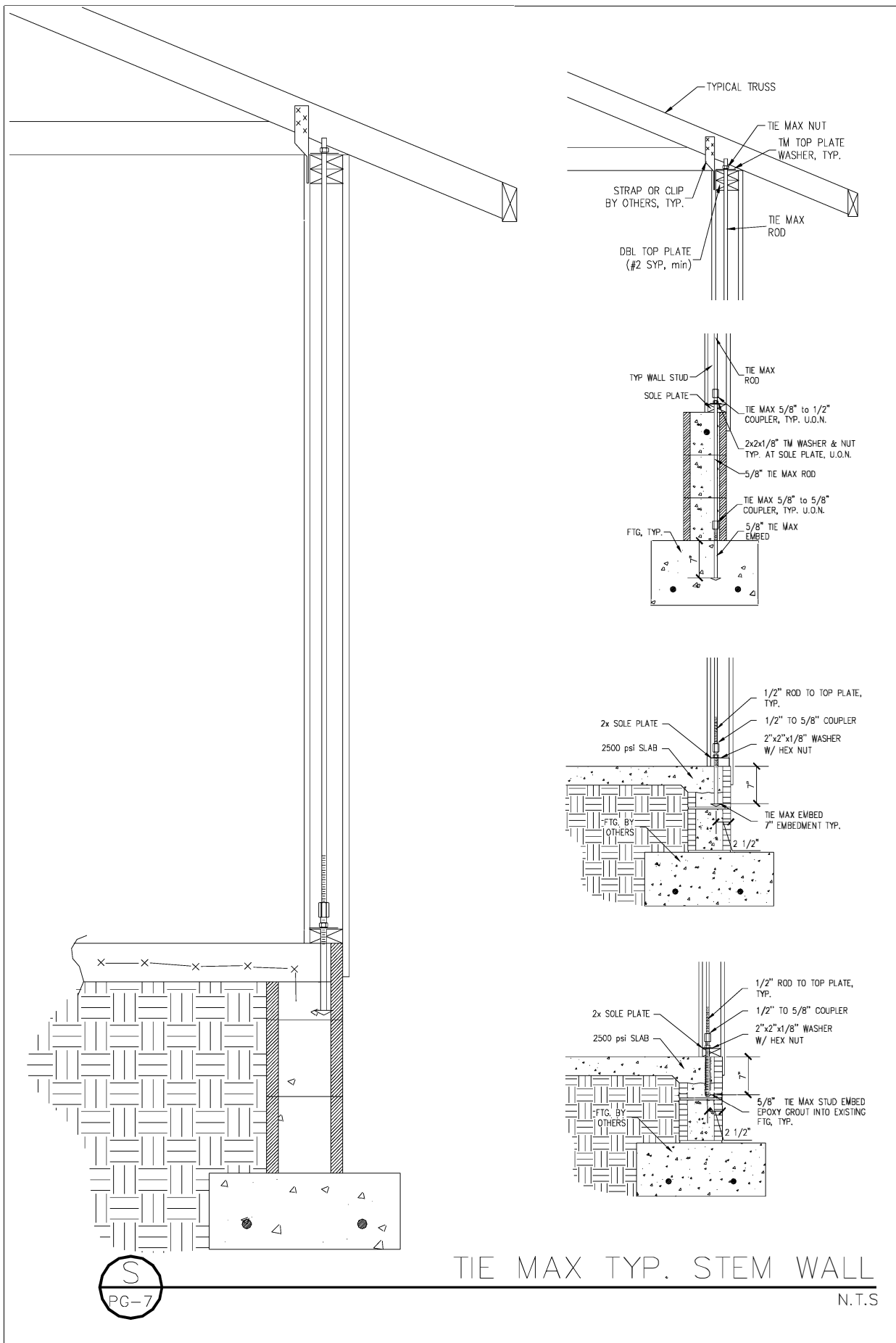
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TIE MAX TYP. 2 FLOOR MONOLITHIC SLAB

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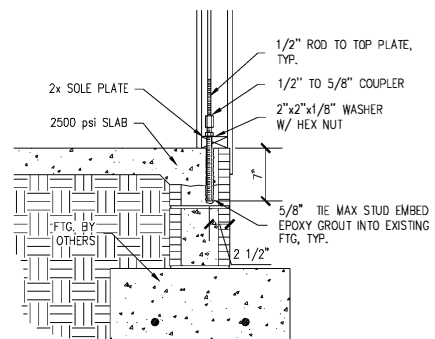
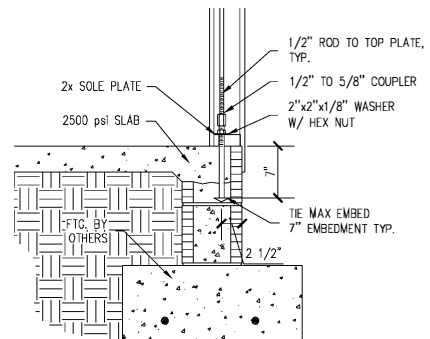
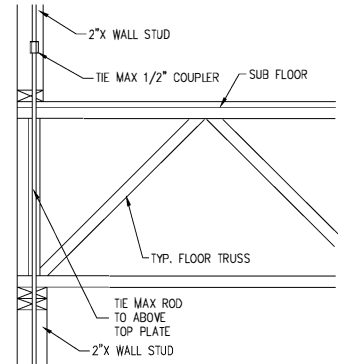
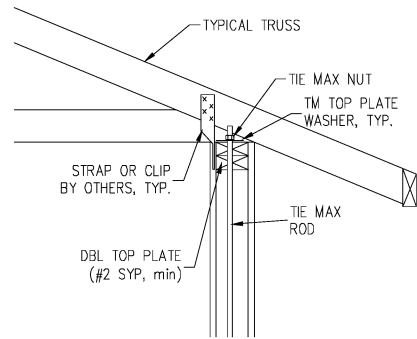
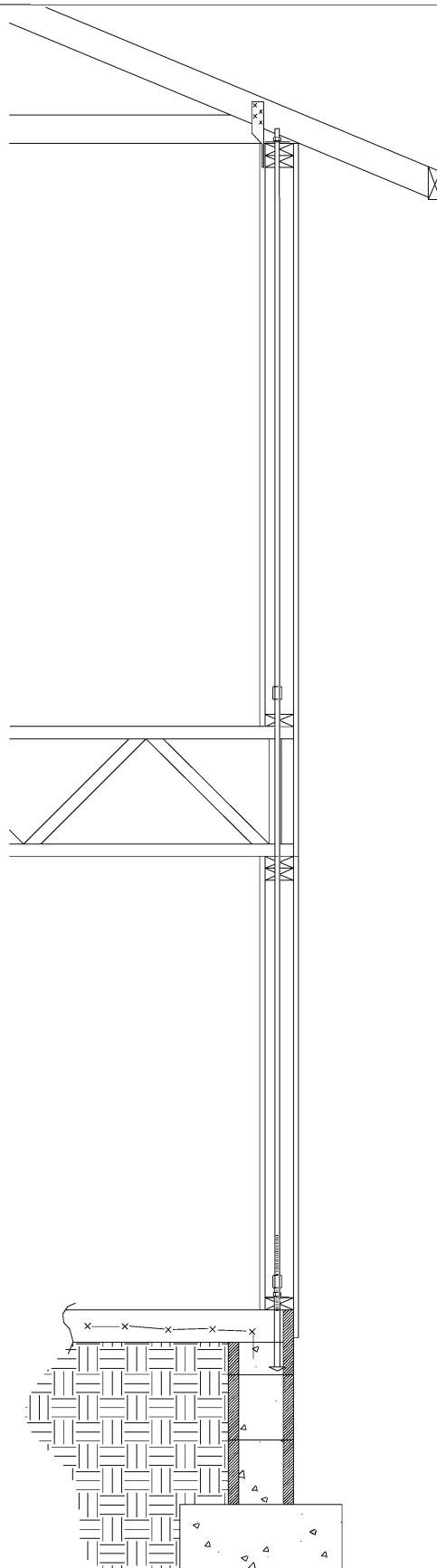


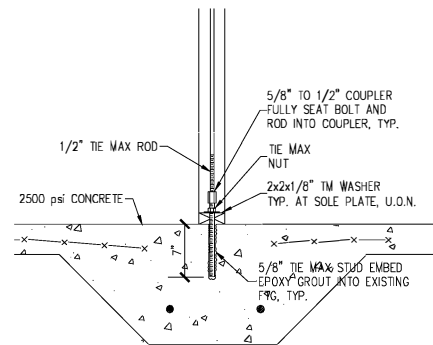
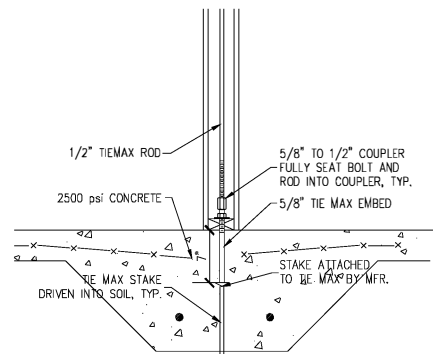
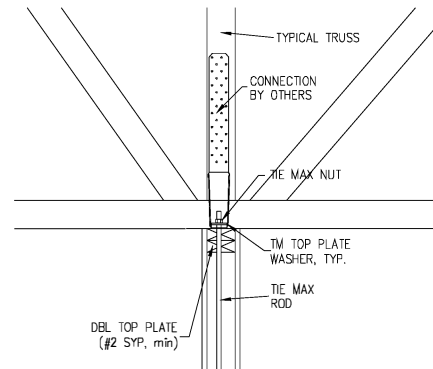
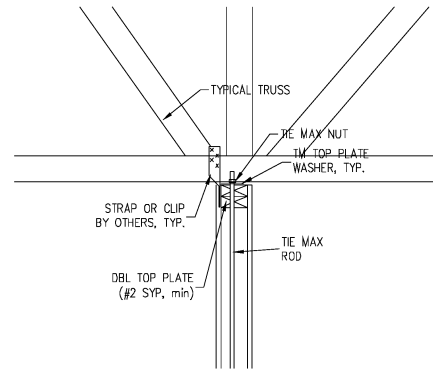
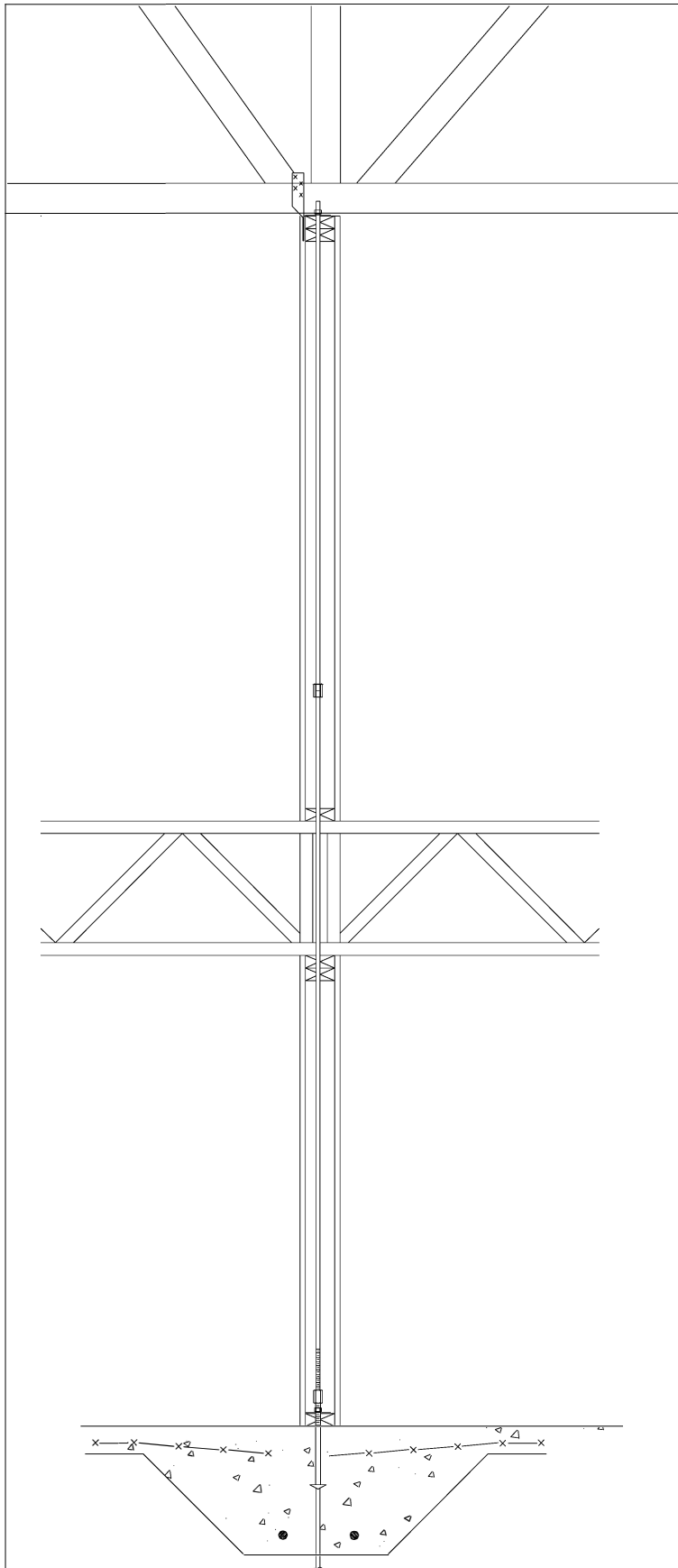


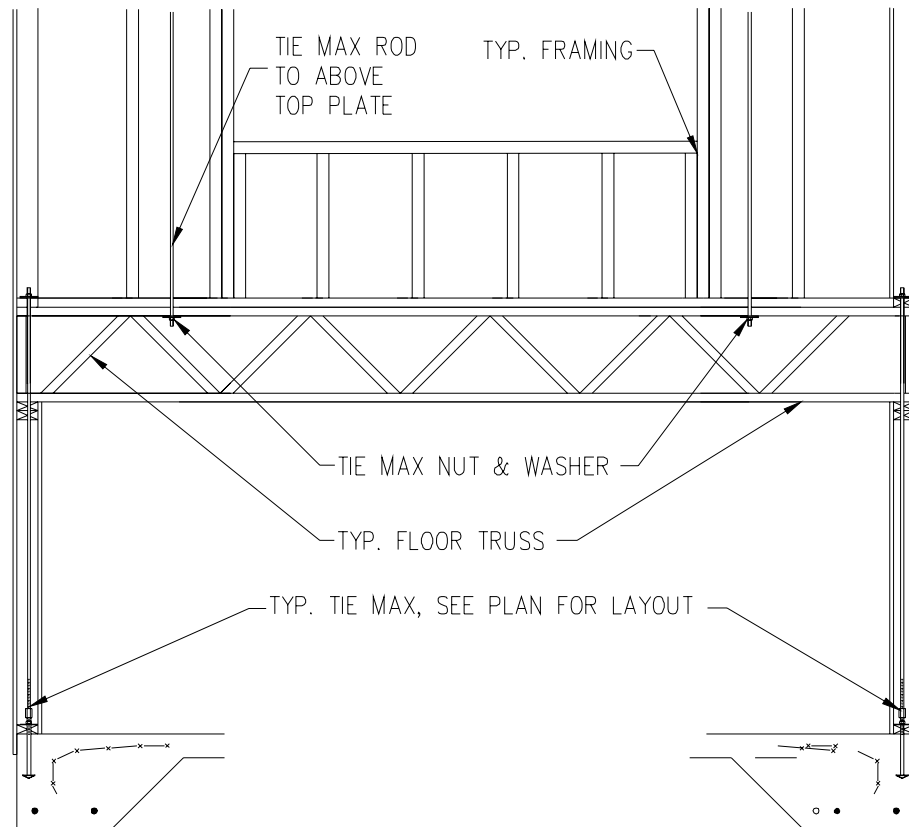
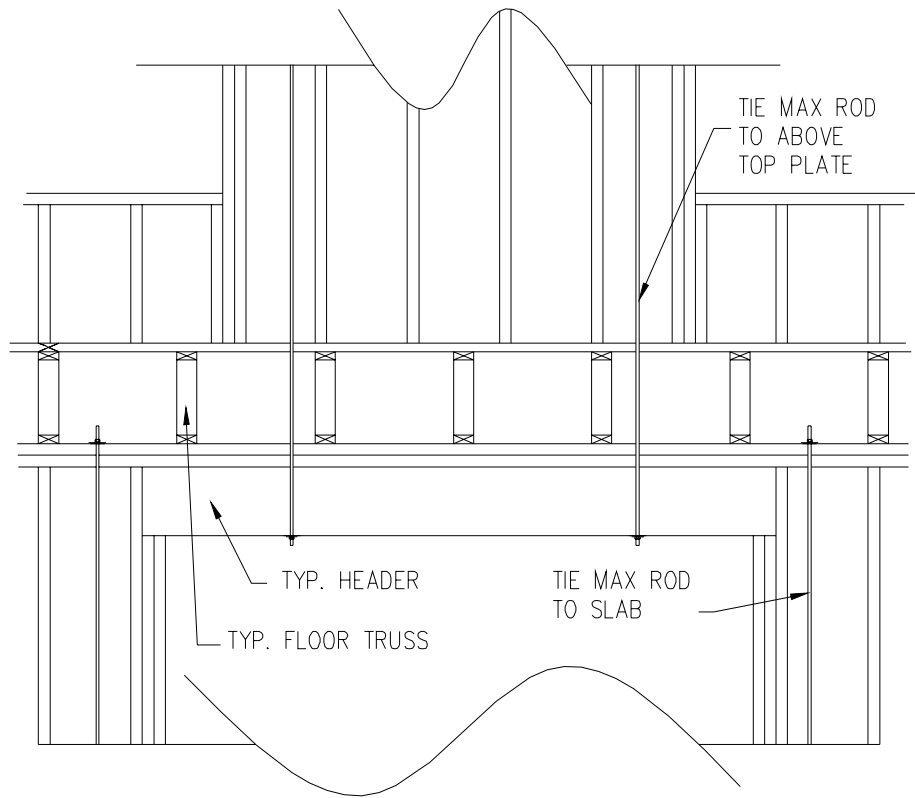
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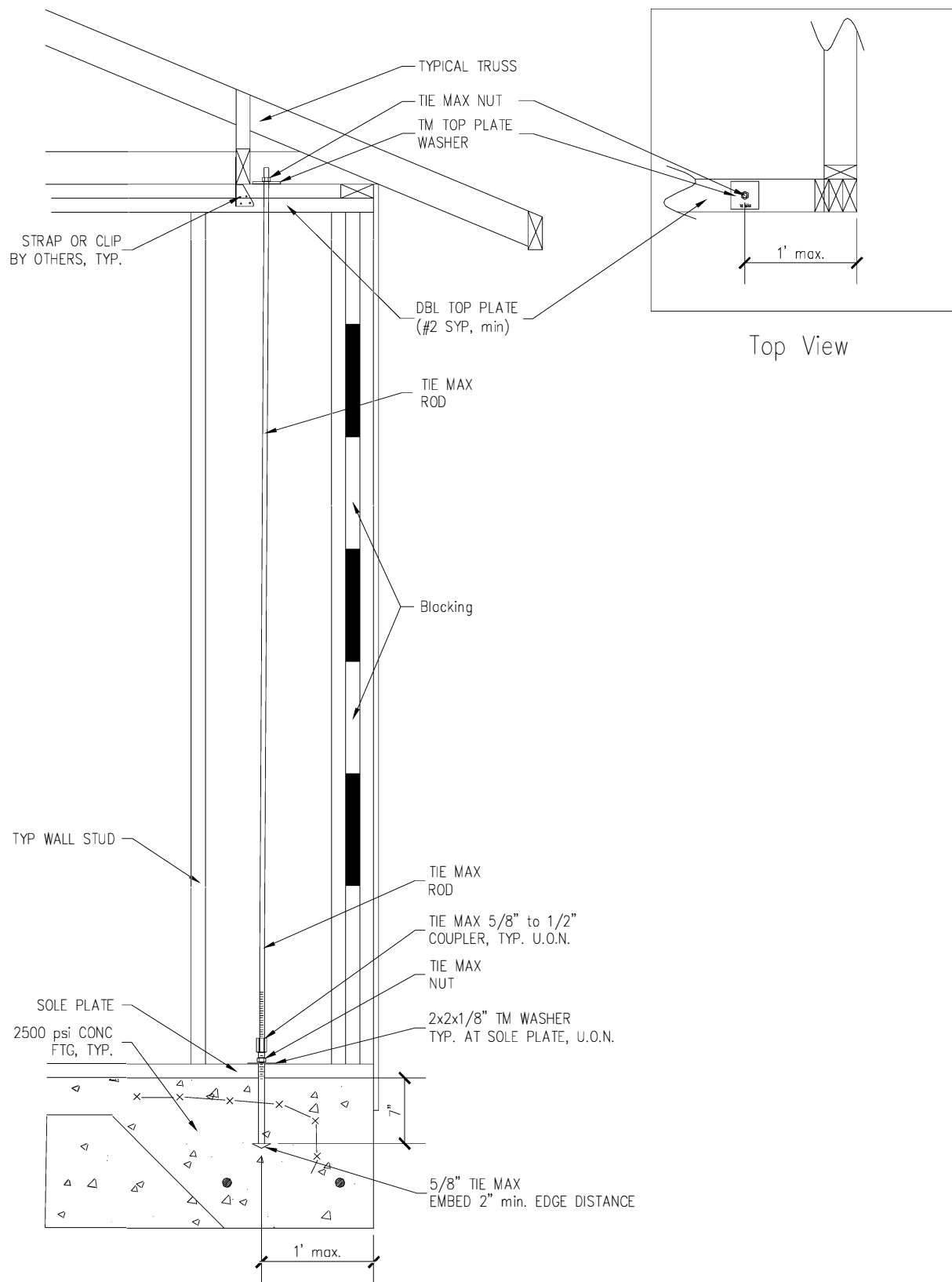
TIE MAX TYP. STEM WALL

N.T.S











TIE MAX

LAYOUT INFORMATION SHEET

Company Name: _____

Contact Person: _____

Plan Name: _____

*The following information **must** be provided to complete the TIE MAX Layout. **Please** send a completed copy of this form with each set of plans.*

Check List

_____ **Top Plate Type:** SYP__ SPF__ OTHER_____
(Please check one)

_____ **Slab Type:** Monolithic____ Stem Wall____
Bond Beam____ Formed Lintel____
Pier and Beam____
(Please check one)

_____ **Foundation Plans, Floor Plans and Structural details**
Wind Speed____ Exposure____
Building Type: Enclosed or Part. Enclosed (circle one)
Truss or Rafter to top plate connector____

_____ **Floor Framing Plans** (layouts and profiles)

_____ **Elevation Plans** (for truss bearing heights)

_____ **Rafter layout page** (for rafter placement and spacing)

_____ **Truss Plans** with layout and profiles.
(Must be sealed if you need sealed TIE MAX layout.)

Plans may be e-mailed to plans@tiemax.com

Tie Max Office
Information

Start Date:

End Date:

Designer:

Reviewing Engineer:

Notes:

TIE MAX

Bus: (407) 888-9099

(800) 245-8826

Bus Fax: (407) 888-2799

(800) 253-0833

E-mail: plans@tiemax.com