

INSTALLATION MANUAL & DETAILS

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CERTIFICATIONS AND GENERAL CONDITIONS

A. HUD COMPLIANCE: All designs are in compliance with the vertical and lateral load requirements of the; **U.S. HOUSING and URBAN DEVELOPMENT (HUD) HANDBOOK 7584-7487, PERMANENT FOUNDATION GUIDE FOR MANUFACTURED HOUSING, SEPTEMBER 1996.**

For installations where a loan is to be insured by FHA or VA, the HUD Guide requirements must be met in entirety.

B. BUILDING CODES: All designs are in compliance with UBC (1997), ASCE-7 (Latest), FEMA.

C. OTHER LENDERS: Where HUD/FHA/VA compliance is not required, some elements such as mate line supports, perimeter blocking, frost protection, and an enclosure wall may not be required as part of this installation.

D. CONDITIONS FOR USE:

The SURE SAFE® STEEL BUTTRESS™ SYSTEM is intended for both off site and site built structures with crawl spaces.

This system is custom designed for each and every installation and must be accompanied by a set of site specific calculations obtained from SURE SAFE® DESIGN. Each design is sealed by a professional engineer, registered in the state where the system is to be installed. The engineer assumes responsibility only for the site specific designs presented in those calculations and in this manual.

E. PRODUCTS REQUIRED FOR THIS

INSTALLATION: Refer to the site specific calculations for the products that are required for this installation. Products generally include;

- Mainframe (Chassis) support piers
- Mate line support piers under column loads
- Mate line blocking, where perimeter blocking is required
- Marriage locks, for more than one section
- Perimeter side wall and door and wide opening blocking
- Perimeter enclosure wall

F. INSTALLER RESPONSIBILITIES: The installer shall insure that all components used are SURE SAFE® INDUSTRIES INTERNATIONAL, U. S. Patented products, labeled with the patent number or as follows;

- SURE® FORM BAGS, #5664377
- SAFETY JACKS: #4886797
- MARRIAGE LOCKS: #4937989

- PIERS: as manufactured by SEDCO
- CONCRETE: F'c = 2500 psi @ 28 days. Min.

Insure that all frost depth and other requirements are met with the installation of the system.

Install all products and components as required by the calculation set and this manual.

G. SOIL CONDITIONS AND PREPARATION:

All concrete footings must be placed on undisturbed soil (organic matter and sod removed), or engineered fill that has been compacted to a minimum density of 95% to achieve a minimum bearing pressure of 1000PSF.

Any existing ground vapor barrier must be cut and removed from below each new support pier.

The engineer can not be responsible for the ultimate performance of the SURE SAFE® support system on a site having expansive clay, fill or other adverse conditions, when a site specific soils report has not been provided to the engineer, prior to the design.

H. RESPONSIBILITIES OF OTHERS:

- a. General delivery and installation of the building, including temporary supports, floor leveling, and insuring proper height clearances.
- b. Site conditions and improvements, and utilities compliance with local zoning regulations and building codes.
- c. Site is properly graded to drain water away from the building foundations.
- d. Finished grade level beneath the building is above the required 100 year return frequency flood elevation, when not designated as being in a flood zone.
- e. Hitch and running gear (wheels and axle) removal.
- f. Perimeter enclosure wall, when the design is not provided by SURE SAFE® DESIGN.
- g. Removal of temporary supporting piers, if desired, after the concrete in the SURE SAFE® support system has cured a minimum of 28 days.

INSTALLATION INSTRUCTIONS THE SUPPORT SYSTEM: Vertical and Lateral Load

1. MAINFRAME SUPPORT PIERS: Mainframe support piers must be spaced not further apart than the maximum spacing indicated in the site specific calculation summary. *However, the distance between any two adjacent piers may deviate from the maximum spacing by 10%, provided the overall average distance between piers does not exceed the maximum spacing.* An equal number of supports must be installed under each mainframe. When additional support piers are required for vertical and/or lateral loads, the additional piers must be divided equally along the two extreme outside mainframes, and placed anywhere between the maximum spaced piers

1.1 LOCATIONS: Using the maximum spacing and the maximum dimension from the end to the first support, mark the bottom of the mainframes where each pier is to be installed. Measure from the bottom of the mainframe to the ground at each pier location. Refer to Table 1, for required pier height.

1.2 ASSEMBLY and INSTALLATION: Assemble the appropriate safety jack to a pier as per the instructions and details.

1.2.1 Refer to Detail 1. 2. Attach the safety jack and pier assembly to the mainframe at proper locations. Tighten the nuts on the (2) 3/8" bolts, to secure the safety jack to the mainframe. Adjust the top and bottom nuts on the safety jacks 1" stud bolt, up or down as required for proper clearances at top and bottom.

Place the proper size Sure® Form bag over the bottom of the steel pier. Tighten and knot the drawstring around the steel pier so that the top of the bag is 10" above the ground. Fill the bag with concrete to the top of the bag. The concrete should be fluid enough to fill the entire bag easily.

TABLE 1. MAINFRAME SUPPORTS	
Bottom of mainframe to ground dimension	SURE SAFE® Pier height required
15" - 19"	8"
19" - 23"	12"
23" - 27"	16"
27" - 31"	20"
31" - 35"	24"
35" - 39"	28"
39" - 43"	32"
43" - 47"	36"

NOTE: If ground to mainframe dimensions exceed these heights, contact SURE SAFE® DESIGN.

2. MATE LINE SUPPORT PIERS for multiple section homes. Existing supports must be replaced by SURE SAFE® supports.

2.1 LOCATIONS: Using the locations indicated on the manufacturers floor plan, measure and mark, where each pier is to be installed. On existing homes, replace each existing support along the mate line. Measure the distance from the bottom of the floor to the ground in each location where a pier is to be installed. Refer to Table 2, for the required pier heights.

2.2 ASSEMBLY and INSTALLATION: Assemble the wood beam safety jack as per the Safety Jack Assembly instructions and details.

2.2.1 Refer to detail 2. 2. Attach the wood 2 x 4 to the floors rim joists. Attach the safety jack and pier assembly to the wood, using (2) 1 1/2" long deck screws each side. Adjust the top and bottom nuts on the safety jacks 1" stud bolt up or down as required for proper clearances at top and bottom.

Place the proper size SURE® FORM bag over the bottom of the steel pier. Tighten and knot the drawstring around the base of the steel pier so that the top of the bag is 10" above the ground. Fill the bag with concrete to the top of the bag.

TABLE 2 MATE LINE SUPPORTS	
Bottom of floor to ground dimension	SURE SAFE® Pier height Required
17" - 21"	8"
21" - 25"	12"
25" - 29"	16"
29" - 33"	20"
33" - 37"	24"
37" - 41"	28"
41" - 45"	32"
Over 45"	36"

3. SURE® FORM BAGS for all mainframe and mate line support piers. Use a 30" x 30" x 10", 36" x 36" x 10" or 42" x 42" x 10" bag as noted in the design calculations. One bag will hold approximately the following cubic feet of concrete; 30 x 30 x 10= 5.5 CF, 36 x 36 x 10=8 CF, 42 x 42 x 10= 11 CF. *Refer to details 1.2 and 1.2.A.*

4. MARRIAGE LOCKS: The marriage lock assembly comes with an adjustable eyebolt to be installed on each end. Stub safety jacks (2) are required for each marriage lock. Stub safety jacks are the same as other safety jacks, except for shorter 1" stud bolts.

4.1 LOCATIONS: *Refer to the foundation plan.* Marriage locks must not be more than 15' apart nor more than 15' from each end of the home. Marriage locks must be installed at 90 degree angles to the mainframe on either side of the mate line.

4.2 ASSEMBLY & INSTALLATION. *See detail 4.1.* Assemble stub Safety Jack as per instructions and details, then attach the Safety Jacks to the mainframe and tighten the nuts on the 3/8" bolts.

4.2.1 Insert the eyebolts into the ends of the marriage lock and screw inward until you can slip the marriage locks eyebolts, onto the safety jacks 1" stud bolts. Attach and tighten bottom nuts to the safety jack bolt.

5. PERIMETER POST PIERS: For blocking at exterior doors and wide openings, when the perimeter wall is not load bearing. When a load bearing perimeter enclosure wall is used, all of the perimeter blocking loads can be placed on that wall.

5.1 LOCATION: Required locations and spacing for perimeter blocking are noted in the calculations, *and when available, shown on the building manufacturers foundation plan.*

5.2. ASSEMBLY & INSTALLATION: *See detail 5.2.* Fasten the wood 2 x 4 to the bottom of the floor joists. Attach the safety jack with nut to the wood beam with wood screws.

5.2.1 Measure the distance from the top of the concrete footing to the bottom of the safety jack. Cut the open end of the steel tube pier, so the length of the pier is 2- 3 inches less than the measured height. Slide the open end of the pier up over the bolt of the safety jack. Fasten the piers bottom plate to the concrete footing, using concrete nails. Adjust the nut on the safety jack bolt, up or down, until snug.

6. PERIMETER & MATE LINE BLOCKING: When the Manufacturer of the home requires perimeter and mate line blocking. Refer to calculations for spacings and loading conditions. Install as per 2. MATE LINE SUPPORT PIERS along the mate line and 5. PERIMETER POST PIERS along the long perimeter walls.

7. PERIMETER ENCLOSURE WALL:

The SURE SAFE® support system does not require a perimeter enclosure wall to carry any vertical or lateral loads.

However, to fully comply with HUD/FHA/VA requirements, as a permanent foundation system, a perimeter enclosure wall, whether load bearing or non-load bearing, must be installed in addition to the SURE SAFE ® STEEL BUTTRESS™ support system.

WHERE THERE IS A FROST DEPTH REQUIREMENT, the enclosure wall must have a continuous concrete footing supporting that wall. This enclosure wall assembly and footing must be insulated from the underside of the floor to the bottom of the footing. The insulation is to be placed on the exterior face of the wall and footing.

SURE SAFE® DESIGN uses performance based criteria for "Frost Protected Shallow Foundation" designs for perimeter enclosure walls, requiring footing depths of only 12 - 16" below finished grade.

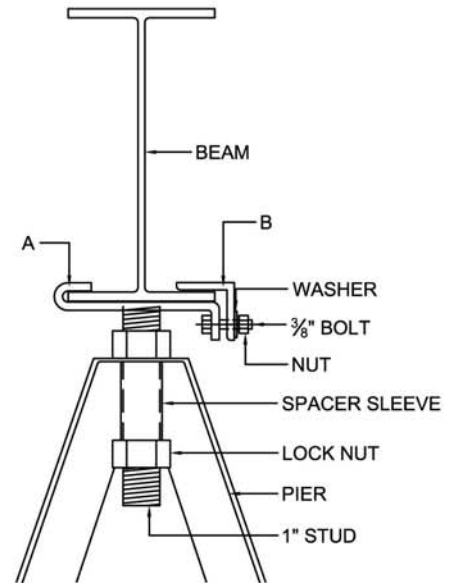
Details of the perimeter enclosure wall, if requested from SURE SAFE® DESIGN are included with the calculation design documents. *When the perimeter enclosure wall details are to be provided by a third party, they must be attached to the calculation design documents.*

The enclosure wall must have a min. 32" access panel, screened ventilation (1sf. of ventilation for each 150sf. of floor area) and keep out vermin and water.

SAFETY JACK ASSEMBLY INSTRUCTION & DETAILS

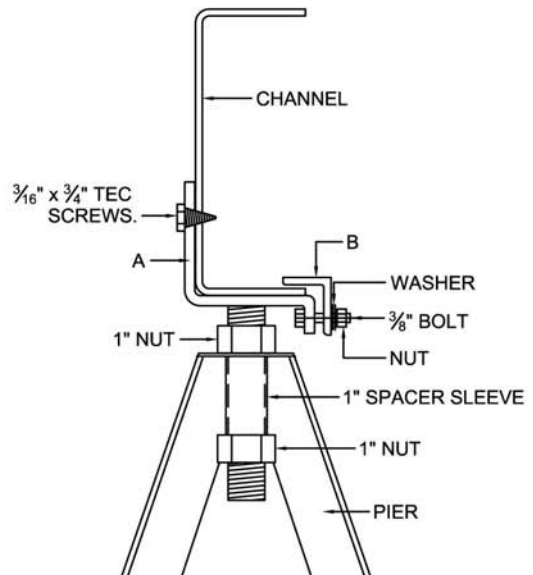
SP302- I BEAM SAFETY JACK ASSEMBLY:

- 1: ATTACH (1) NUT TO STUD BOLT, LEAVING 1" - 3" OF THE BOLT EXPOSED ABOVE THE NUT.
- 2: INSERT (2) 3/8" DIA. BOLTS THROUGH PARTS A & B, ADD WASHERS AND NUTS TO BOLTS. DO NOT TIGHTEN NUTS UNTIL SAFETY JACK IS ON THE MAINFRAME BEAM.
- 3: INSERT THE STUD BOLT THROUGH TOP OF THE PIER. SLIDE SPACER AND LOCK NUT ONTO BOLT AND TIGHTEN.



SP304 - FLAT CHANNEL SAFETY JACK ASSEMBLY:

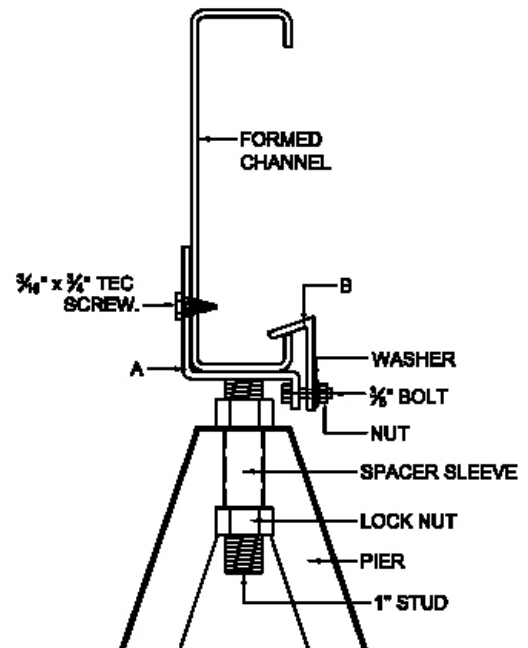
- 1: ATTACH (1) NUT TO STUD BOLT, LEAVING 1" - 3" OF THE BOLT EXPOSED ABOVE THE NUT.
- 2: INSERT (2) 3/8" DIA. BOLTS THROUGH PARTS A & B, ADD WASHERS AND NUTS TO BOLTS. DO NOT TIGHTEN NUTS UNTIL SAFETY JACK IS ON THE MAINFRAME CHANNEL.
- 3: INSERT THE STUD BOLT THROUGH TOP OF THE PIER. SLIDE SPACER AND LOCK NUT ONTO BOLT AND TIGHTEN.
- 4: SECURE PART A TO CHANNEL WITH (1) 3/16" X 3/4" TEC SCREW.



SAFETY JACK ASSEMBLY INSTRUCTION & DETAILS

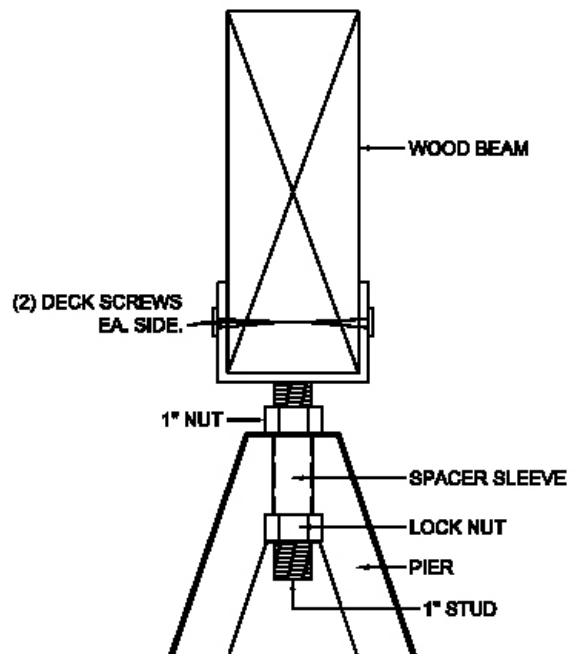
SP306 - FORMED CHANNEL SAFETY JACK ASSEMBLY:

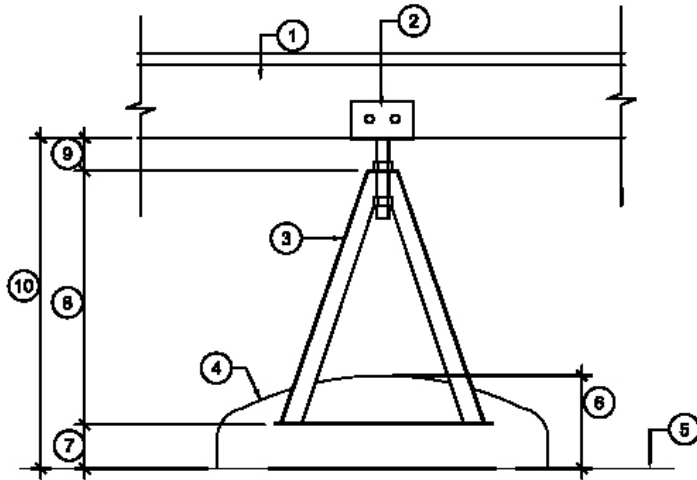
- 1: ATTACH (1) NUT TO STUD BOLT, LEAVING 1" - 3" OF THE BOLT EXPOSED ABOVE THE NUT.
- 2: INSERT (2) 3/8" DIA. BOLTS THROUGH PARTS A & B, ADD WASHERS AND NUTS TO BOLTS. DO NOT TIGHTEN NUTS UNTIL SAFETY JACK IS ON THE MAINFRAME CHANNEL.
- 3: INSERT THE STUD BOLT THROUGH TOP OF THE PIER. SLIDE SPACER AND LOCK NUT ONTO BOLT AND TIGHTEN.
- 4: SECURE PART A TO CHANNEL WITH (1) 3/16" X 3/4" TEC SCREW.



SP308 - WOOD BEAM SAFETY JACK ASSEMBLY:

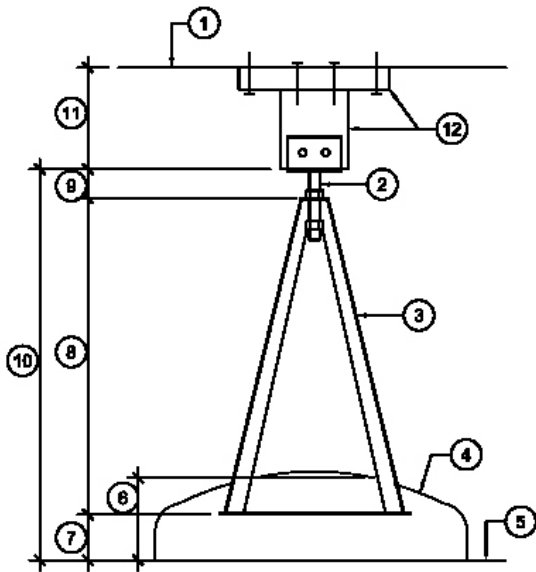
- 1: ATTACH (1) NUT TO STUD BOLT, LEAVING 1" - 3" OF THE BOLT EXPOSED ABOVE THE NUT.
- 2: INSERT STUD BOLT THROUGH TOP OF THE PIER. SLIDE SPACER AND LOCK NUT ONTO BOLT AND TIGHTEN.
- 3: ATTACH SAFETY JACK TO WOOD BEAM WITH SCREWS.





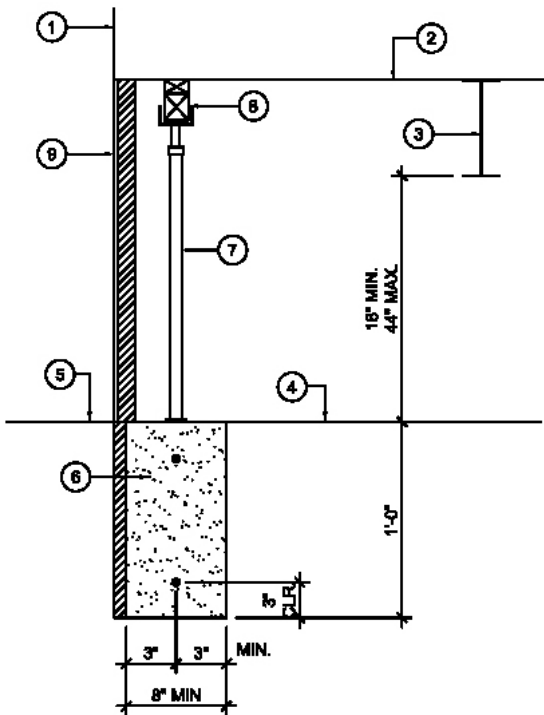
- 1.) MAINFRAME BEAM. I BEAM, STEEL CHANNEL OR WOOD BEAM.
- 2.) SAFETY JACK CONNECTOR. SELECT PRODUCT TO ACCOMMODATE BEAM SHAPE.
- 3.) "SEDCO" LOAD TESTED COATED STEEL BUTTRESS™ PIER. (4) LEGS, L 1 1/4" X 1 1/2" X 1/8".
- 4.) SURE © FORM GEOTEXTILE BAG WITH DRAWSTRING AT OPENING. TIE TIGHT TO PIER LEGS AT HEIGHT SHOWN. PUMP FULL WITH 2800 PSI @ 28 DAYS, 3/8" DIA. GRAVEL/CONCRETE. REFER TO CALCULATION SUMMARY FOR SIZE REQUIRED.
- 5.) PREPARED FINISHED GRADE.
- 6.) 10" HEIGHT OF CONCRETE FILLED BAG.
- 7.) HANG SAFETY JACK AND PIER OFF MAINFRAME WITH BOTTOM OF PIER 5'- 7' ABOVE GRADE.
- 8.) PIER HEIGHTS AVAILABLE FROM 8" TO 36".
- 9.) TOP OF PIER TO BOTTOM CAN VARY FROM 2' - 5' MAX. BOLT MUST NOT EXTEND MORE THAN 4" ABOVE THE NUT.
- 10.) BOTTOM OF FRAME TO GRADE CAN VARY FROM 15" TO A MAX. OF 47".
- 11.) HEIGHT ABOVE SADDLE JACK CAN VARY FROM 11/2" TO 24" WOOD 2 X 4 X 8 LAID FLAT. IF REQUIRED FOR EXTRA HEIGHT, ADD WOOD 4 X 4 VERTICALLY AS REQUIRED. FASTEN TWO WOOD MEMBERS TOGETHER WITH (4) WOOD DECK SCREWS, THEN ATTACH TO RIM JOIST WITH (4) WOOD DECK SCREWS.

MAINFRAME SUPPORT PIER: DETAIL 1.2



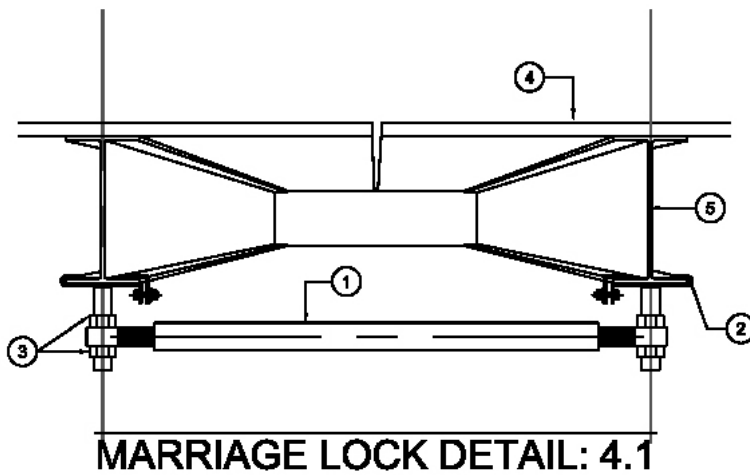
MATE LINE SUPPORT PIER: DETAIL 2.2

FOR VERTICAL LOAD UP TO: (@ 1000 PSF SOIL BEARING)
 6200 LBS. USE A 30 X 30 BAG,
 8201 LBS. - 9000 LBS. USE A 36 X 36 BAG,
 9001 LBS. - 12000 LBS. USE A 42 X 42 BAG



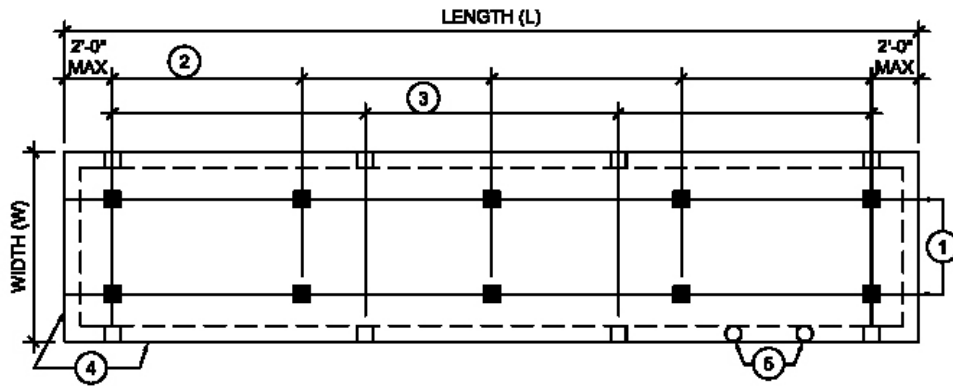
- 1.) SIDE WALL OF HOME.
- 2.) BOTTOM OF FLOOR STRUCTURE.
- 3.) STEEL BEAM MAINFRAME.
- 4.) FINISHED GROUND LEVEL IN CRAWL SPACE.
- 5.) FINISHED GROUND LEVEL OUTSIDE.
- 6.) CAST IN PLACE, REINFORCED (1) - #4 REBAR TOP & BOTTOM, CONTINUOUS CONCRETE (2500 PSI) FOOTING. WHERE PERIMETER BLOCKING IS REQUIRED, THE FOOTING MUST BE CONTINUOUS AROUND THE PERIMETER OF THE HOME. WHERE THERE IS NO FROST DEPTH REQUIREMENT AND THE FOOTING IS ONLY SUPPORTING PIERS AT DOORS AND WINDOW OPENINGS, THE FOOTING MAY SIMPLY BE
- 7.) 2'-0" LONGER THAN THE WIDTH OF THE DOOR OR WINDOW OPENING (1'-0" EACH SIDE).
- 8.) POST PIER (PP100) WITH WOOD BEAM SADDLE JACK (SP308) LOCATED AT EACH SIDE OF EVERY DOOR OPENING AND EACH SIDE OF WINDOW (OVER 4' WIDE) OPENING. FASTEN SADDLE JACK TO WOOD BEAM USING (2) DECK SCREWS AND TO CONCRETE FOOTING USING CONCRETE NAILS OR ANCHORS. USE ALSO, WHERE PERIMETER BLOCKING SUPPORTS ARE REQUIRED. (SEE CALCULATIONS FOR SPACINGS).
- 9.) WOOD 2X4, OVER A 4X4. FASTEN THE 2X4 TO THE 4X4, THEN FASTEN WOOD BEAM TO FLOOR JOISTS AT EACH END. USE WOOD SCREWS. THE 2X4 SHOULD BE AT LEAST 4" LONGER THAN THE 4X4 AND EXTEND AT LEAST 8" WIDER THAN THE OPENING ABOVE.
- 10.) PERIMETER ENCLOSURE WALL. WHERE THERE IS A FROST DEPTH REQUIREMENT, THE ENCLOSURE WALL MUST BE INSULATED FROM THE BOTTOM OF THE FLOOR TO THE BOTTOM OF THE CONCRETE FOOTING. THE R-VALUE REQUIRED OF INSULATION DEPENDS ON THE SITE LOCATION.

PERIMETER POST PIER: DETAIL 5.2

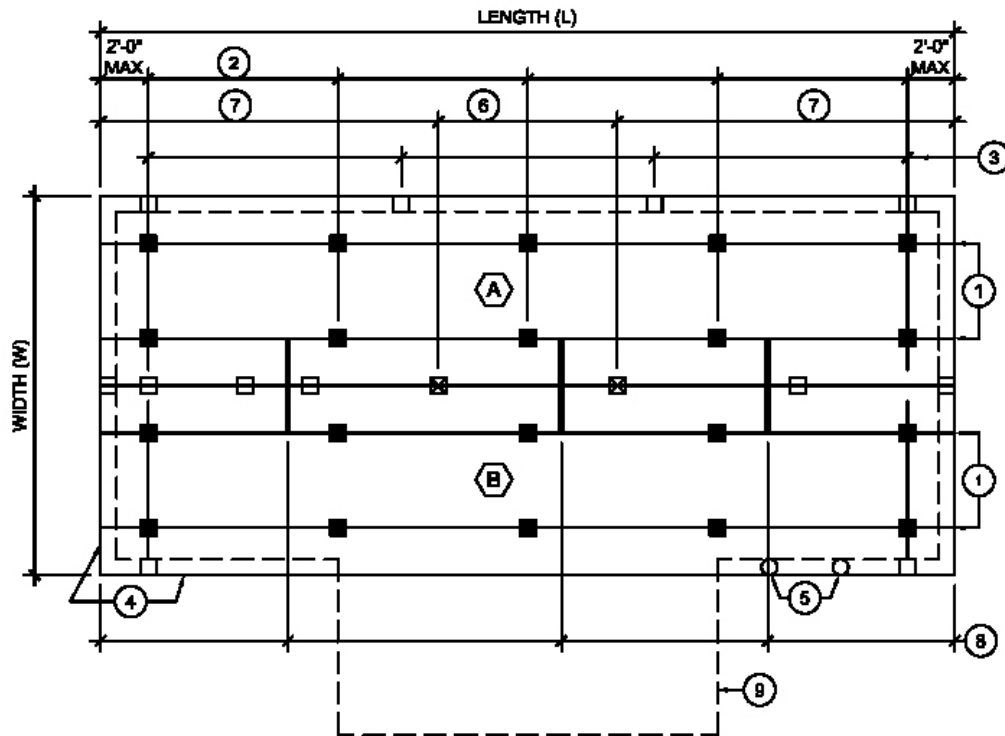


- 1.) TS 2"x2"x 3/16", WITH 1" DIA. THREADED EYE BOLT EACH END.
- 2.) STUB SAFETY JACK, SELECTED TO FIT MAINFRAME SHAPE.
- 3.) NUTS SAFETY JACK, (1) ABOVE AND (1) BELOW EYEBOLT.
- 4.) FLOOR.
- 5.) MAINFRAME.

MARRIAGE LOCK DETAIL: 4.1



TYPICAL SINGLE WIDE FOUNDATION PLAN

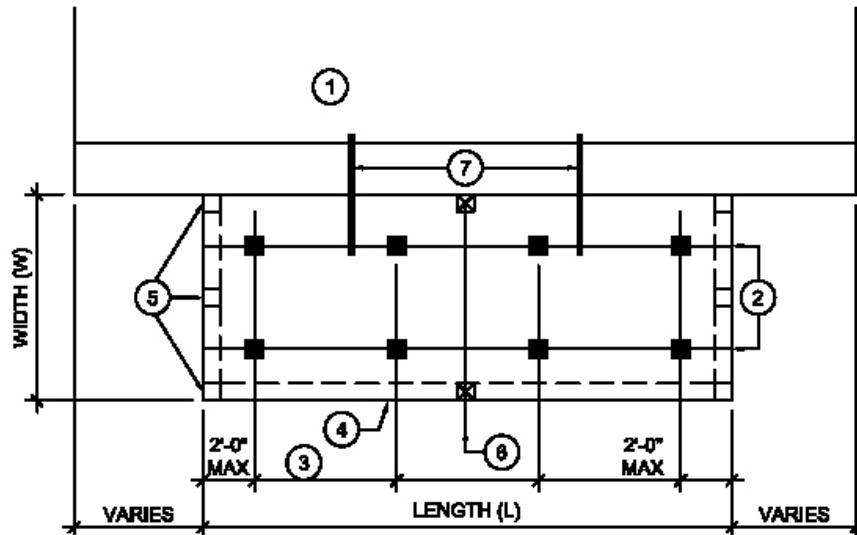


TYPICAL DOUBLE & WIDER FOUNDATION PLAN

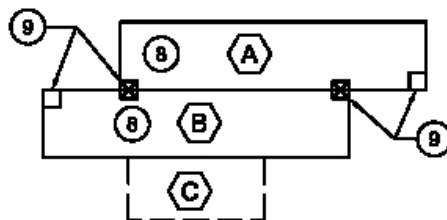
PIER LEGEND

- MAINFRAME SUPPORT PIERS
- ⊗ MATE LINE SUPPORTS AT OPENINGS
- PERIMETER & MATE LINE BLOCKING SUPPORTS
- EXTERIOR OPENING SUPPORTS

- 1.) MAINFRAMES.
- 2.) MAINFRAME SUPPORT PIERS, SEE SITE SPECIFIC CALCULATION SUMMARY FOR MAXIMUM SPACING AND SIZE OF SURE FORM BAG REQUIRED.
- 3.) PERIMETER BLOCKING. REFER TO CALCULATIONS FOR REQUIREMENT AND SPACINGS.
- 4.) PERIMETER ENCLOSURE WALL AND FOOTING WHEN REQUIRED FOR HUD COMPLIANT INSTALLATIONS.
- 5.) BLOCKING AT DOORS AND OTHER WIDE EXTERIOR OPENINGS. REFER TO CALCULATIONS FOR REQUIREMENT AND LOCATIONS.
- 6.) SUPPORT PIERS UNDER COLUMNS ON EITHER SIDE INTERIOR MATE LINE OPENINGS. REFER TO HOME MANUFACTURERS FLOOR PLAN FOR LOCATIONS.
- 7.) MATE LINE BLOCKING UNDER INTERIOR WALLS ALONG THE MATE LINE WHEN PERIMETER BLOCKING IS REQUIRED. REFER TO CALCULATIONS FOR REQUIREMENTS AND SPACINGS.
- 8.) MARRIAGE LOCKS. SPACING NOT TO EXCEED 16' APART OR FROM END OF HOME. REFER TO CALCULATIONS FOR QUANTITY REQUIRED.
- 9.) REFER TO 'TAG ALONG' PLAN WHERE APPLICABLE



TYPICAL "TAG ALONG UNIT" FOUNDATION PLAN



PIER LEGEND

- MAINFRAME SUPPORT PIERS
- ⊗ MATE LINE SUPPORTS AT OPENINGS
- PERIMETER BLOCKING SUPPORTS
- EXTERIOR OPENING SUPPORTS

TYP. OFFSET FOUNDATION PLAN

- 1.) ADJACENT SECTION.
- 2.) MAINFRAMES.
- 3.) MAINFRAME SUPPORT PIERS. REFER TO SITE SPECIFIC CALCULATIONS FOR MAXIMUM SPACING AND SIZE OF SURE @ FORM BAG REQUIRED.
- 4.) PERIMETER ENCLOSURE WALL AND FOOTING WHEN REQUIRED FOR HUD COMPLIANT INSTALLATIONS.
- 5.) PERIMETER BLOCKING. REFER TO CALCULATIONS FOR REQUIREMENT AND SPACINGS.
- 6.) MATE LINE COLUMN SUPPORT PIERS. REFER TO MANUFACTURERS FLOOR PLAN FOR LOCATIONS.
- 7.) MARRIAGE LOCKS. SPACING NOT TO EXCEED 15' APART OR FROM END OF HOME.
- 8.) HOMES SECTIONS ARE OFFSET. REFER TO TYPICAL DOUBLEWIDE PLAN FOR THOSE SECTIONS REQUIREMENTS.
- 9.) ADDITIONAL PERIMETER BLOCKING MAY BE REQUIRED AT CORNERS AND INTERSECTIONS OF SECTIONS. REFER TO MANUFACTURERS FLOOR PLAN