

**Chief**   
*custom homes*



***FIELD INSTALLATION MANUAL  
MANUFACTURED HOMES (HUD)  
MULTI-SECTION HOMES***

***Housing Division of Chief® Industries, Inc.***

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Visit us at [www.chiefcustomhomes.com](http://www.chiefcustomhomes.com)

**January 2007**

21.0500

**CHIEF® INDUSTRIES, INC.**  
**HOUSING DIVISION**

**----CONTENTS----**

This booklet contains **Field Installation Specifications**  
for all Chief® Industries, Inc., Housing Division,  
Manufactured Homes (HUD), Multi-Section Homes, per category as follows:

- SECTION I    REQUIREMENTS FOR LOCATION OF HOME SUPPORT PIERS**
- SECTION II    PIER CONSTRUCTION**
- SECTION III    SUPPORT BLOCKING**
- SECTION IV    PERIMETER FOUNDATION**
- SECTION V    BASEMENT CONSTRUCTION**
- SECTION VI    TYPICAL ANCHORAGE & FOOTAGE INSTRUCTIONS**
- SECTION VII    SITE ASSEMBLY INSTRUCTIONS**

**SECTION I**

**REQUIREMENTS FOR LOCATION  
OF HOME SUPPORT PIERS**

## ADDENDUM - LOCATION OF HOME SUPPORT PIERS

Information contained on these addendum pages is to enhance and sometimes supersede the following pages that pertain to the details of the completion of the setting of your home.

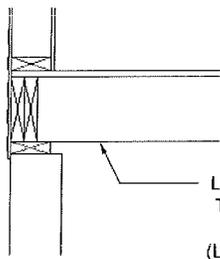
Incorrect size, location or spacing of piers may cause serious structural damage to your home. It is important to install piers around the perimeter if required for your home. Failure to do so may lead to sagging floors, walls and roofs.

The location and spacing of piers depends upon the dimensions and weight of the home, the roof load zone, the type of construction (multi-section), and other factors such as the locations of doors, support wall openings or fireplace sidewall locations. Place piers on both sides of exterior doors, any sidewall openings 4' or wider and at fireplace sidewall locations.

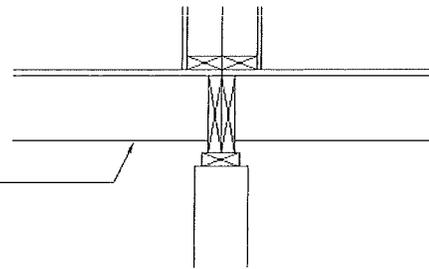
In addition to piers located along main beams and at exterior openings, piers are to be placed at each ridgebeam column location. These piers are necessary to transfer concentrated roof loads safely to the ground. The locations of these piers are shown either by dimensioned drawings provided with your home or by labels on the bottom side of the center floor line. (Detail shown on page 21.504)

Piers used for perimeter support must be installed with the long dimension parallel to the perimeter rail. Piers may be offset up to 6" in either direction along the supported members to allow for plumbing, electrical, etc. When perimeter blocking is required, any mating wall opening span greater than 10 foot must have intermediate piers placed at a maximum spacing of 10'-0" on centers. Location of all piers (main beams, ridgebeam columns, perimeter, etc) are designated by the aforementioned labels.

The load that each pier must carry depends on factors such as the dimensions of the home, the roof live load, the spacing of the piers, and the way they are used to support the home. Center beam/marriage wall blocking is required for multi-section homes.

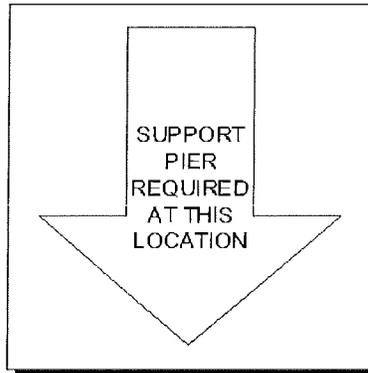


LOCATE LABEL AT EACH PIER LOCATION ON THE UNDERSIDE OF BELLY PAPER, SO IT IS STILL VISIBLE WHEN HOME IS SET.  
(LABEL SHOWN IN DETAIL) (DO NOT REMOVE)



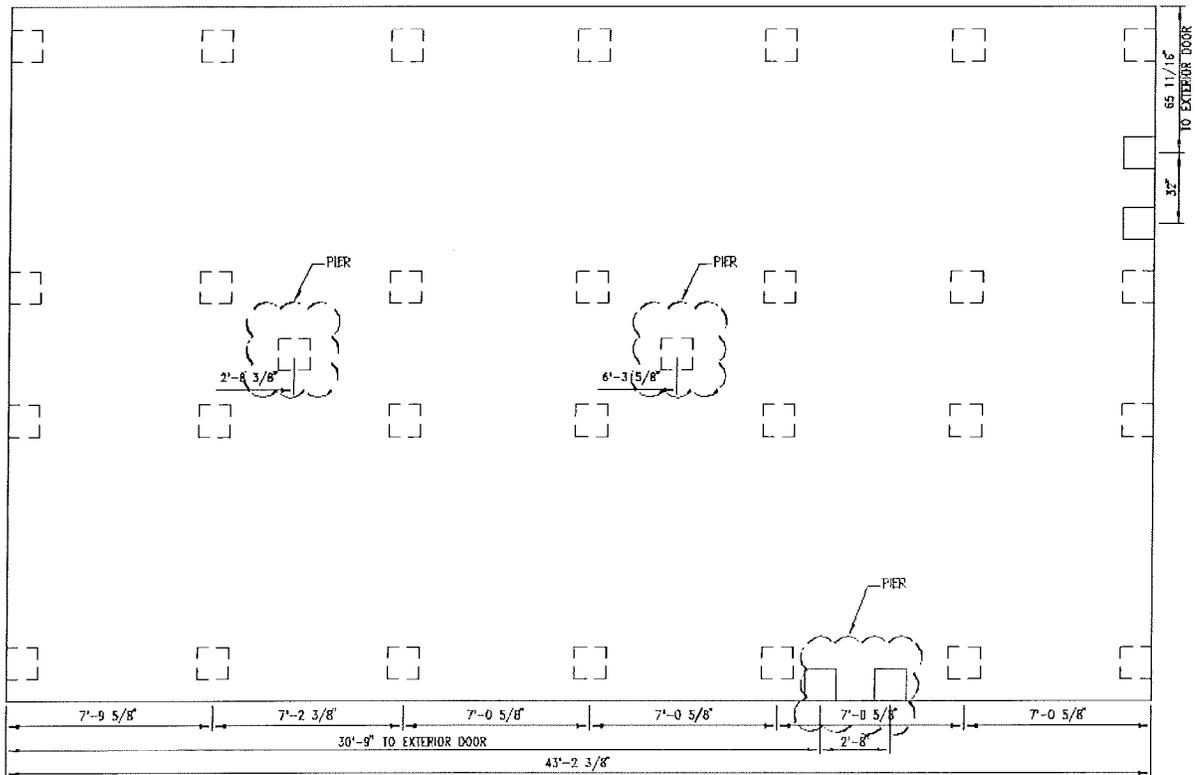
PIER BLOCKING @ EXTERIOR ON BOTH SIDES OF DOOR OR ANY EXTERIOR OPENING(S) 4'-0" OR LARGER.

PIER BLOCKING AT MARRIAGE WALL



DETAIL OF LABEL

**TYPICAL FOUNDATION PLAN**  
SHOWING PLACEMENT OF FOOTINGS AND PIERS



REVISIONS	DATE
REVISED NOTES	3/17/10



**CHIEF® INDUSTRIES**  
HOUSING DIVISION

DRWG. BY:	CES 11/08/06
CHKD. BY:	
SCALE:	NONE 21.0504

**SECTION II**

**PIER CONSTRUCTION**

## ADDENDUM - PIER CONSTRUCTION

Information contained on these addendum pages is to enhance and sometimes supersede the following pages that pertain to the details of the completion of the setting of your home.

Piers may be concrete blocks or pressure-treated wood, capped and shimmed with wedges, or adjustable manufactured metal or concrete devices. Manufactured piers must be listed and labeled for the required load capacity and installed to the pier manufacturer's installation instructions. Metal or other types of pre-manufactured piers must be provided with corrosion resistance of at least equal to that provided by a coating of zinc on steel of 0.30 oz/sq ft of surface.

You may construct piers less than 36" high out of single, open or closed-cell concrete blocks, 8" x 8" x 16". Install them so that the long side is at right angles to the supported I-beam. Horizontal offsets are not to exceed 1/2" top to bottom. Mortar is not required. Manufactured piers should be listed and labeled. Do not extend their adjusting stands beyond the limits specified by the manufacturer.

Construct all piers between 36" and 67" high, out of double, interlocked concrete blocks. Mortar will not be required. Horizontal offsets are not to exceed 1/2" top to bottom. Piers over 67" high must be designed by a registered professional engineer with consideration also given to the tie down system. They must also be constructed to provide a minimum clearance of 12" between the lowest member of the main frame and the grade under all areas of the home.

Concrete blocks should have nominal dimensions of at least 8" x 16". They must be stacked with their hollow cells aligned vertically. When piers are constructed of blocks stacked side-by-side (double stacked), every layer should be at right angles to the previous one.

Cap hollow block piers to distribute the structural load evenly across them. Caps must be of solid masonry of at least 4" nominal thickness or hard wood, or pressure treated lumber at least 2" nominal thickness, or of corrosion-protected minimum 1/2" steel, and of the same length and width as the piers they rest upon. Avoid plywood, as it may lead to unwanted settling or movement.

When split caps are used on double-stacked blocks, the caps must be installed with the long dimension across the joint in the blocks below.

Use 4" x 6" hardwood or pressure treated shims to level the home and fill any gaps between the base of the I-beam and the top of the pier cap. Always use shims in pairs. Drive them in tightly so they do not occupy more than 1" of vertical space.

Select manufactured pier heights so that their adjustable risers do not extend more than 2" when finally positioned.

All piers must rest on footings that either extend below the frost line or are otherwise protected from frost effects, and are placed on either undisturbed soil or compacted fill. Consult local authorities to determine frost penetration.

Support every pier with a properly designed footing. Footings may consist of precast or poured-in-place concrete, pads, slabs or ribbons with a 28-day compressive strength of at least 3,000 psi. Unreinforced footings must have a depth in accordance with Table 6.1. Precast footings must meet or exceed ASTM C90-02. Poured footings must be 6" thick minimum or per tables (whichever strictest). ABS Footing Pads are permitted provided they are installed in accordance with the pad manufacturer's installation instructions and certified for use in the soil classification and capacity at the site. They must be listed or labeled for the required load capacity.

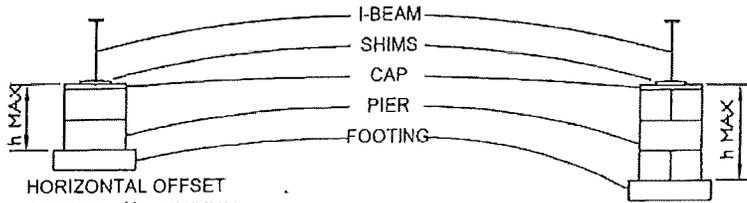
When properly engineered by a registered professional engineer, compatible with the anchorage requirements of section 6, and acceptable to the local authority having jurisdiction, "floating slab system" may be used above the frost line.

Proper sizing of footings depends upon the load-carrying capacity of both the piers and the soil. See Table 6.1 for recommended footing sizes for various pier capacities.

# TYPICAL PIER CONSTRUCTION

## PIER 1

I-BEAM PIER SINGLE  
STACKED BLOCKS



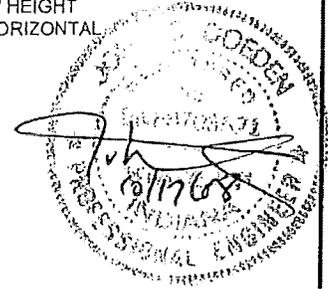
HORIZONTAL OFFSET  
OF PIER = 1/2" MAXIMUM  
SINGLE BLOCKS  
MAXIMUM HEIGHT = 36"  
(SEE NOTE #2)

SPECIAL NOTE: MINIMUM SET HEIGHT OF  
HOME IS 12" AS MEASURED UNDER HOME  
TO GROUND, INCLUDING AREA BETWEEN  
THE LOWEST POINT OF THE FRAME OR  
CROSSMEMBERS.

## PIER 2

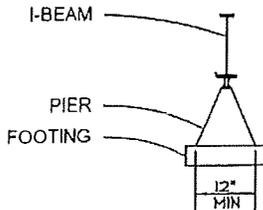
I-BEAM PIER DOUBLE STACKED  
BLOCKS PIERS OVER 36" HEIGHT  
TO MAXIMUM HEIGHT, HORIZONTAL  
OFFSET = 1" MAXIMUM

DOUBLE INTERLOCKED BLOCKS  
MAXIMUM HEIGHT = 67"  
OR AS ILLUSTRATED ON  
MAXIMUM PIER HEIGHTS OF  
FRAME TIEDOWN SPACING  
CHARTS



## PIER 3

I-BEAM PIER

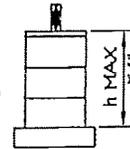


STEEL OR CONCRETE  
MANUFACTURED PIER  
(SEE NOTE #5)

## PIER 4

SINGLE STACKED PIER SUPPORTING  
CENTERLINE COLUMNS OR PERIMETER  
OR CENTERLINE JOISTS

SINGLE STACKED  
BLOCKS  
PERPENDICULAR TO  
CENTERLINE JOISTS  
OR PARALLEL TO  
PERIMETER RAIL  
MAX. HEIGHT = 54"



CAPACITY AT  
DOUBLE CENTERLINE  
JOIST = 8000#  
CAPACITY AT SINGLE  
PERIMETER JOIST =  
8000#

### NOTES:

1. CONCRETE BLOCKS FOR PIERS ARE 8x8x16 NOMINAL SIZE, HOLLOW CELL LOAD BEARING CMU'S MANUFACTURED IN CONFORMANCE WITH ASTM C90-70, GRADE 'N'. OPEN CELLS ARE VERTICAL.
2. SINGLE STACKED CONCRETE BLOCKS ARE ORIENTED SO THAT LONG DIRECTION IS PERPENDICULAR TO THE LONG DIRECTION OF THE MAIN BEAM.
3. FOOTERS MAY BE PRECAST OR POURED, BUT, IN EITHER CASE, MUST BE LEVEL IN ALL DIRECTIONS. PRECAST MUST MEET OR EXCEED ASTM C90-02a. POURED FOOTERS MUST BE 6" THICK MINIMUM (OR PER TABLES, WHICHEVER IS STRICTEST) AND MUST BE MINIMUM 3000 psi COMPRESSIVE STRENGTH AT 28 DAYS.
4. PIERS ARE TO BE PLACED ON THE FOOTER APPROXIMATELY CENTERED SO THAT THE FOOTER PROJECTION FROM THE PIER IS EQUAL FROM SIDE-TO-SIDE AND FRONT-TO-BACK. PIERS MUST BE LEVEL VERTICALLY ON ALL SIDES AND SQUARE WITH THE FOOTER.
5. PREFABRICATED PIERS (TYPE #3) MUST BE CERTIFIED FOR A RATED CAPACITY AT LEAST EQUAL TO THE LOAD DETERMINED FROM THE TABLES.
6. CONCRETE TO HAVE A MINIMUM COMPRESSIVE STRENGTH ( $F_c'$ ) OF 3000 PSI AFTER 28 DAYS.
7. GAP BETWEEN TOP OF PIER AND MAIN FRAME MAY BE A WOOD PLATE (NOT EXCEEDING 2" IN THICKNESS) AND SHIMS (NOT EXCEEDING 1" IN THICKNESS). SHIMS SHALL BE AT LEAST 4" WIDE AND 6" LONG, FITTED AND DRIVEN TIGHT BETWEEN WOOD PLATE OR PIER AND MAIN FRAME (SHIMS TO BE PERPENDICULAR TO I-BEAM). TWO INCH OR FOUR INCH SOLID CONCRETE BLOCK MAY FILL REMAINDER OF GAP.
8. PIER HEIGHT IS MEASURED FROM TOP OF FOOTER TO THE TOP OF THE PIER. THESE DRAWINGS TYPIFY THE CONSTRUCTION ONLY OF DIMENSIONED BLOCK HEIGHTS.
9. PIER AND FOOTER DESIGNS SHOWN DO NOT CONSIDER FLOOD OR SEISMIC LOADS AND ARE NOT INTENDED FOR USE IN FLOOD OR SEISMIC HAZARD AREAS. IN THOSE AREAS, THE DESIGN MUST BE DONE BY A PROFESSIONAL ENGINEER.

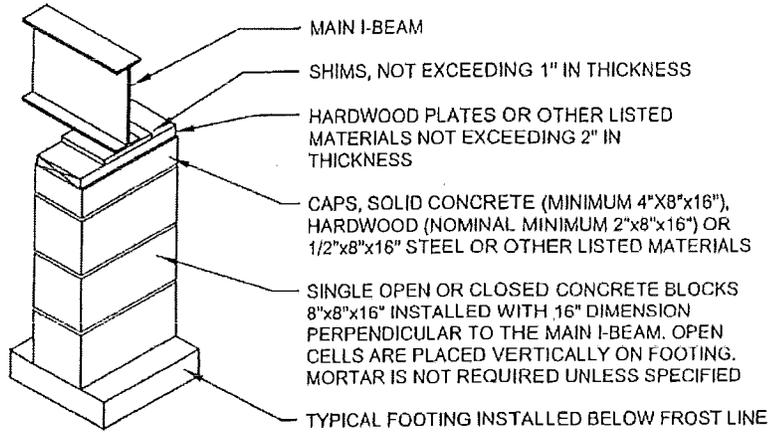
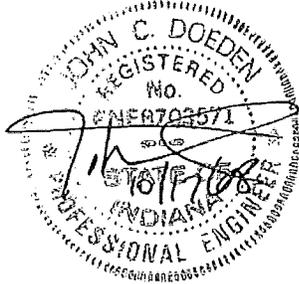
FIGURE 2.1

REVISIONS	DATE		CHIEF® INDUSTRIES	DRWG. BY: CES 11/08/06
REVISE FOR NEW HUD REQ.	10/8/08		HOUSING DIVISION	CHKD. BY:
				SCALE: NONE HUDSM06

21.0506

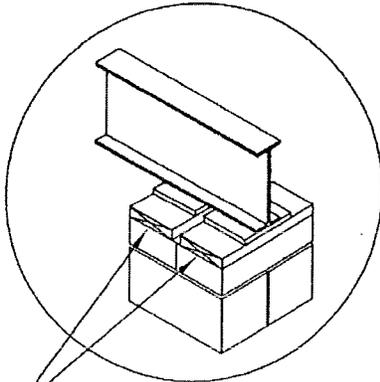
# TYPICAL PIER CONFIGURATION

## SINGLE STACKED CONCRETE BLOCKS

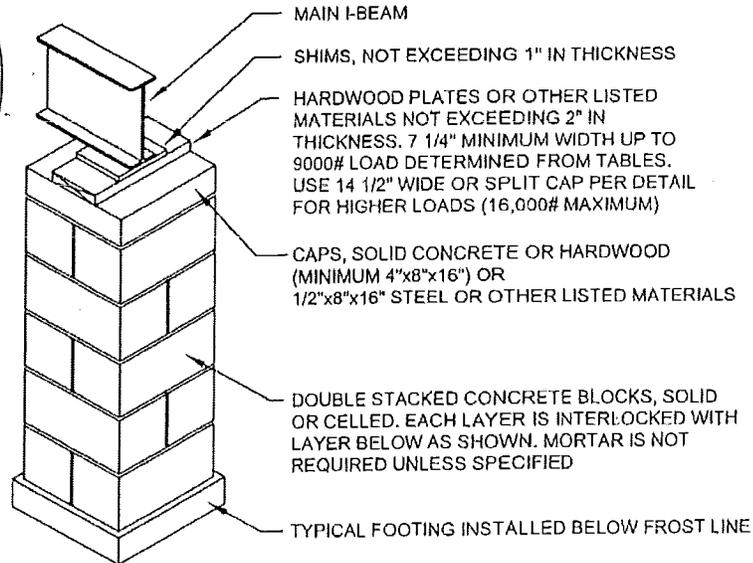


CAPACITY = 8000 LBS.

## DOUBLE STACKED CONCRETE BLOCKS



WHEN SPLIT CAPS ARE USED AND THE JOINT RUNS PERPENDICULAR TO THE MAIN I-BEAMS, SHIMS AND BLOCKS MUST BE INSTALLED OVER EACH INDIVIDUAL CAP.



### NOTES:

- SHIMS, WHEN REQUIRED, ARE TO BE USED IN PAIRS, INSTALLED IN OPPOSITE DIRECTIONS AND BE FITTED AND DRIVEN TIGHT BETWEEN MAIN I-BEAM FRAME AND SHIMS OR CAPS BELOW. SHIMS MUST BE INSTALLED SO THAT ALL GAPS BETWEEN THE HOME'S BEARING MEMBER (I-BEAM OR RIM OR CENTERLINE JOISTS) ARE FILLED FOR THE LENGTH OF THE PIER OR REQUIRED PLATES. MINIMUM COMPRESSIVE STRESS CAPACITY FOR SHIMS IS 425 psi.
- STEEL CAPS MUST BE PROTECTED BY A MINIMUM OF A 10 MIL COATING OF AN EXTERIOR PAINT OR AN EQUIVALENT CORROSION RESISTANT PROTECTION.

FIGURE 2.2

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			CHKD. BY:
			SCALE: NONE HUDSM06.1

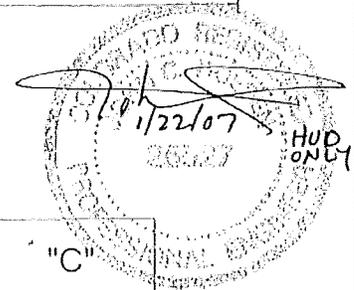
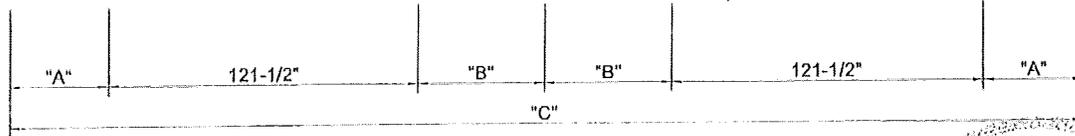
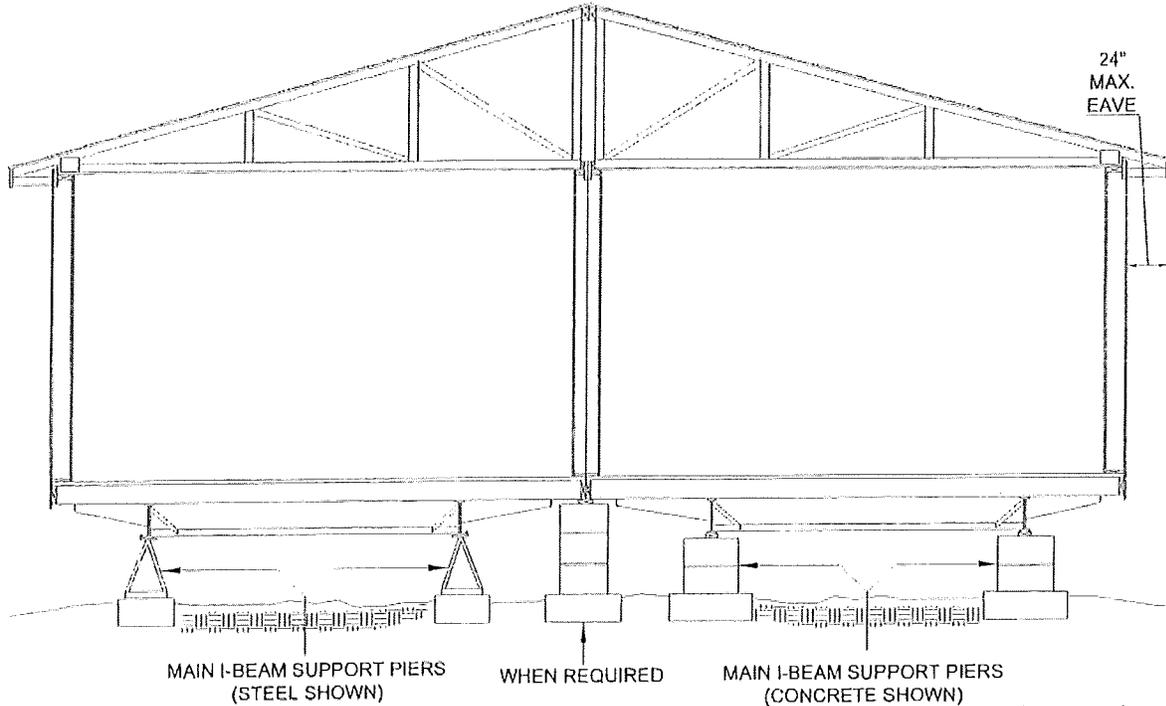
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**SECTION III**

**SUPPORT BLOCKING**

# STANDARD SUPPORT BLOCKING

FOR 30 LB./SQ. FT. ROOF LIVE LOAD  
121-1/2" FRAME SPAN



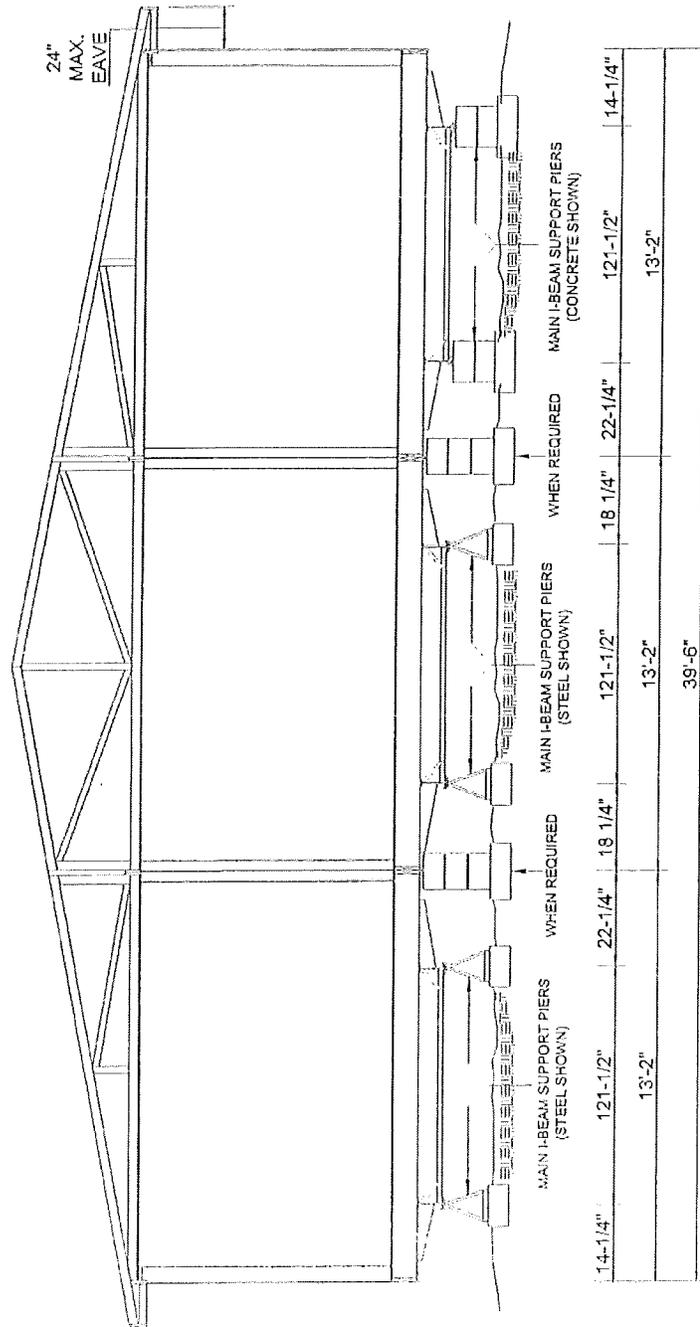
BOX SIZE	"A"	"B"	"C"
28' WIDE HOME (26'-4")	14-1/4"	22-1/4"	26'-4"
32' WIDE HOME (29'-0")	21-1/4"	31-1/4"	29'-0"

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			CHKD. BY:
			SCALE: NONE HUDSM08

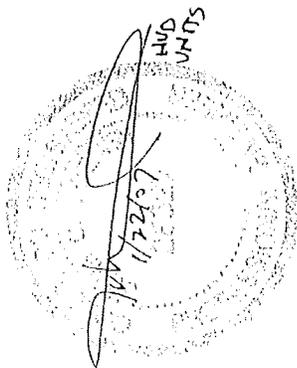
21.0508

# STANDARD SUPPORT BLOCKING

FOR 30 LB./SQ. FT. ROOF LIVE LOAD  
121-1/2" FRAME SPAN



42' WIDE HOME



REVISIONS	DATE



CHIEF® INDUSTRIES  
HOUSING DIVISION

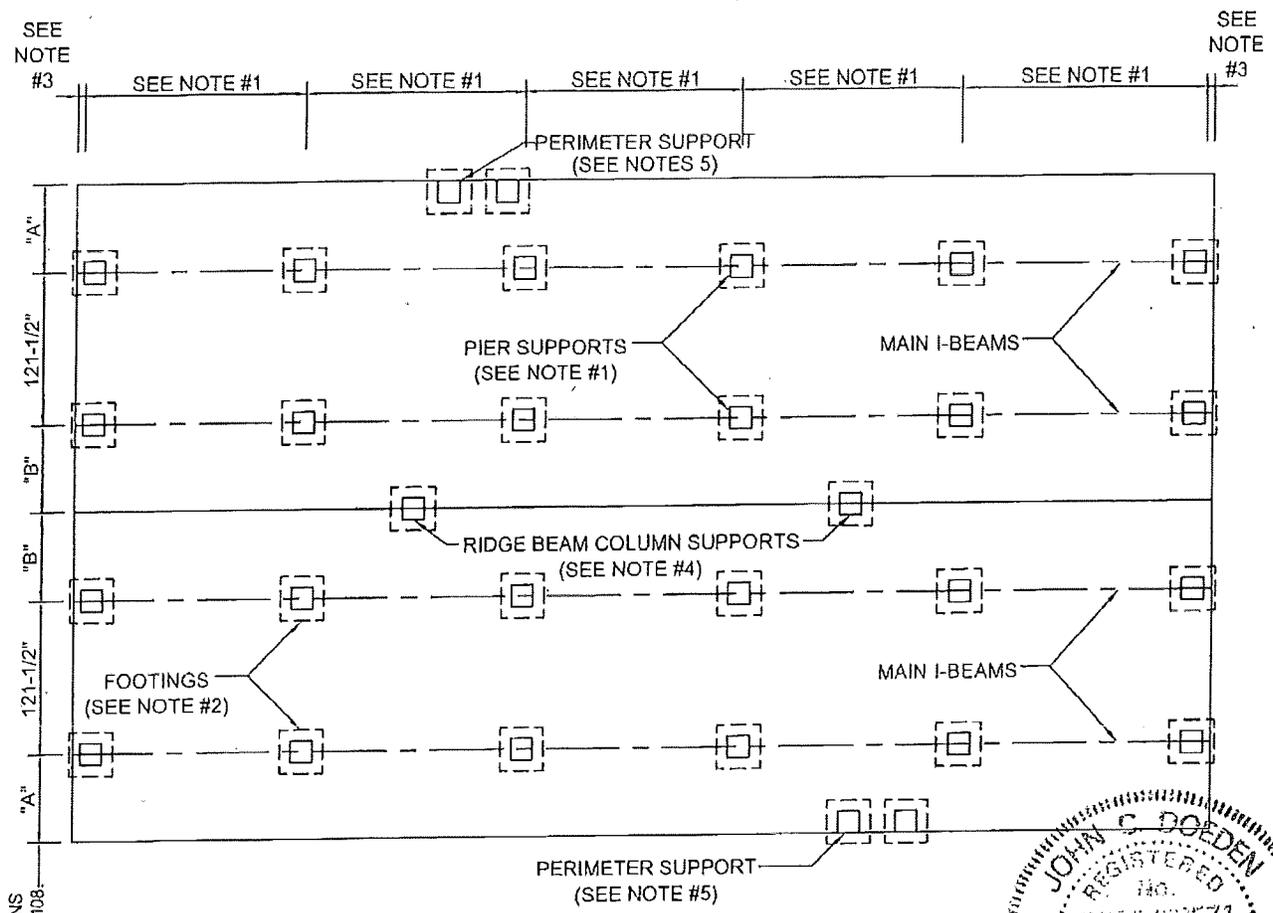
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# TYPICAL BLOCKING LAYOUTS

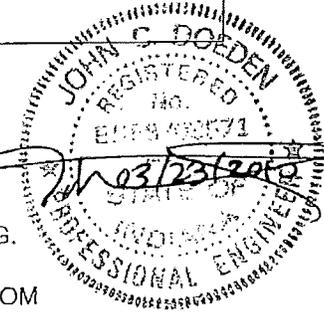
## STANDARD BLOCKING - 30 LB. ROOF LOAD

### DOUBLE SECTION



FOR "A" & "B" DIMENSIONS REFER TO PAGE HUDSM08

- NOTES:
1. SEE TABLE 3.1 FOR REQUIRED PIER CAPACITY AND SPACING.
  2. SEE TABLE 6.1 FOR FOOTING REQUIREMENTS.
  3. A. THE EDGE OF THE PIER SHALL BE LOCATED (4-1/2) INCHES IN FROM BOTH ENDS OF HOME WITH THE STANDARD FRAME.  
 B. THE EDGE OF THE PIER SHALL BE LOCATED TEN (10) INCH IN FROM BOTH ENDS OF HOME WITH THE OPTIONAL TEN (10) INCH RECESSED FRAME.
  4. SEE TABLE 3.2 FOR REQUIRED RIDGE BEAM COLUMN PIER CAPACITY.
  5. PERIMETER PIERS SHALL BE LOCATED ON BOTH SIDES OF ALL SIDEWALL EXTERIOR DOORS AND ANY OTHER SIDEWALL EXTERIOR OPENING(S) 4'-0" OR LARGER.
  6. ABOVE DESIGN IS FOR 30 PSF ROOF LIVE LOADS ONLY.

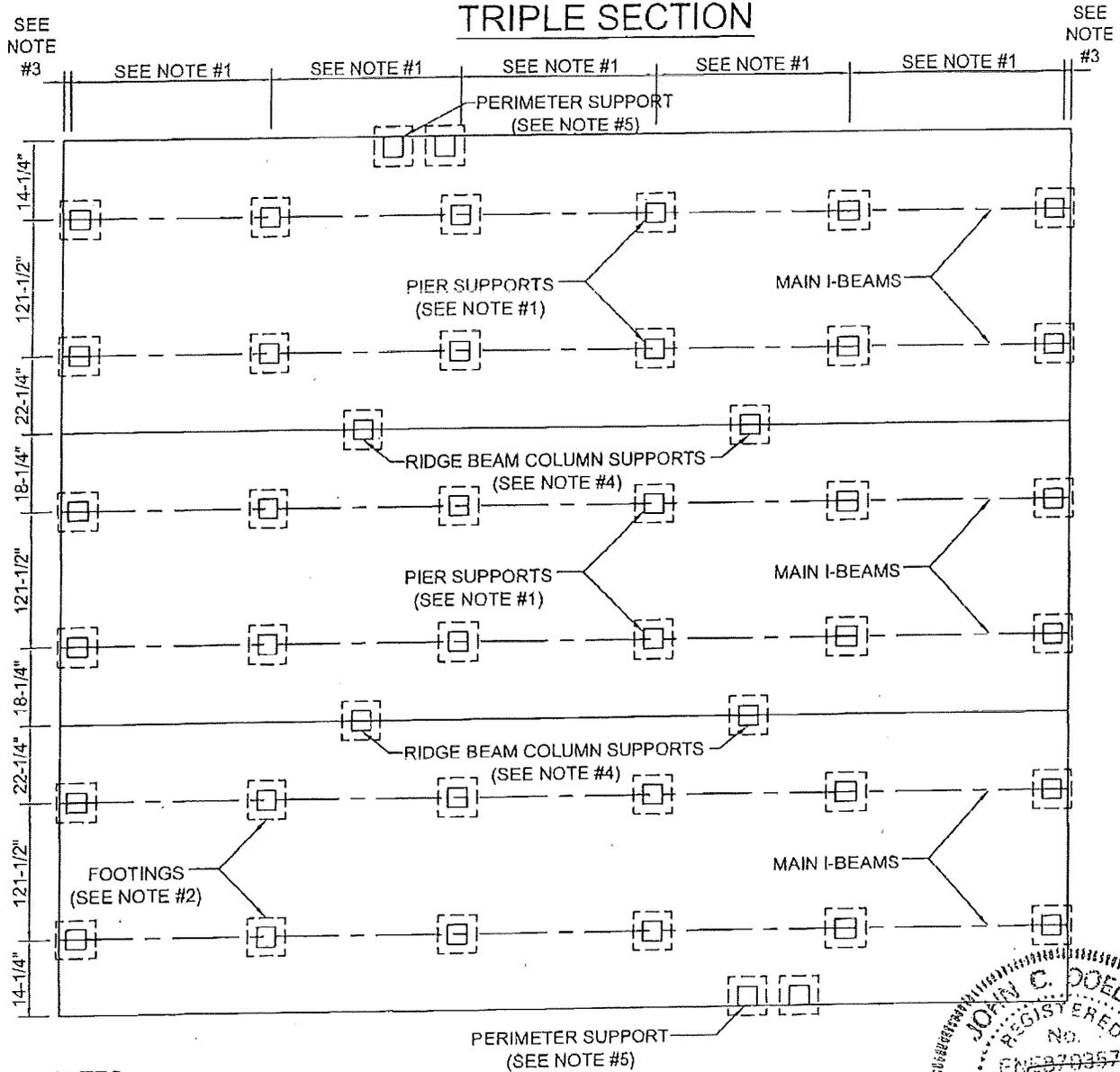


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# TYPICAL BLOCKING LAYOUTS

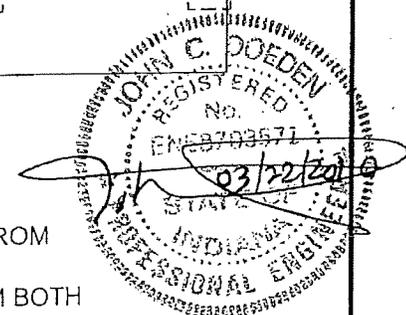
## STANDARD BLOCKING - 30 LB. ROOF LOAD

### TRIPLE SECTION



**NOTES:**

1. SEE TABLE 3.1 FOR REQUIRED PIER CAPACITY AND SPACING.
2. SEE TABLE 6.1 FOR FOOTING REQUIREMENTS.
3. A. THE EDGE OF THE PIER SHALL BE LOCATED (4-1/2) INCHES IN FROM BOTH ENDS OF HOME WITH THE STANDARD FRAME.  
B. THE EDGE OF THE PIER SHALL BE LOCATED TEN (10) INCH IN FROM BOTH ENDS OF HOME WITH THE OPTIONAL TEN (10) INCH RECESSED FRAME.
4. SEE TABLE 3.2 FOR REQUIRED RIDGE BEAM COLUMN PIER CAPACITY.
5. PERIMETER PIERS SHALL BE LOCATED ON BOTH SIDES OF ALL SIDEWALL EXTERIOR DOORS AND ANY OTHER SIDEWALL EXTERIOR OPENING(S) 4'-0" OR LARGER.
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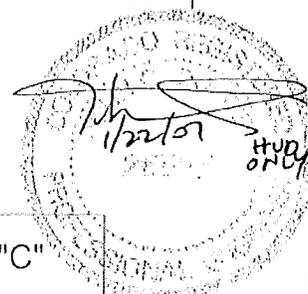
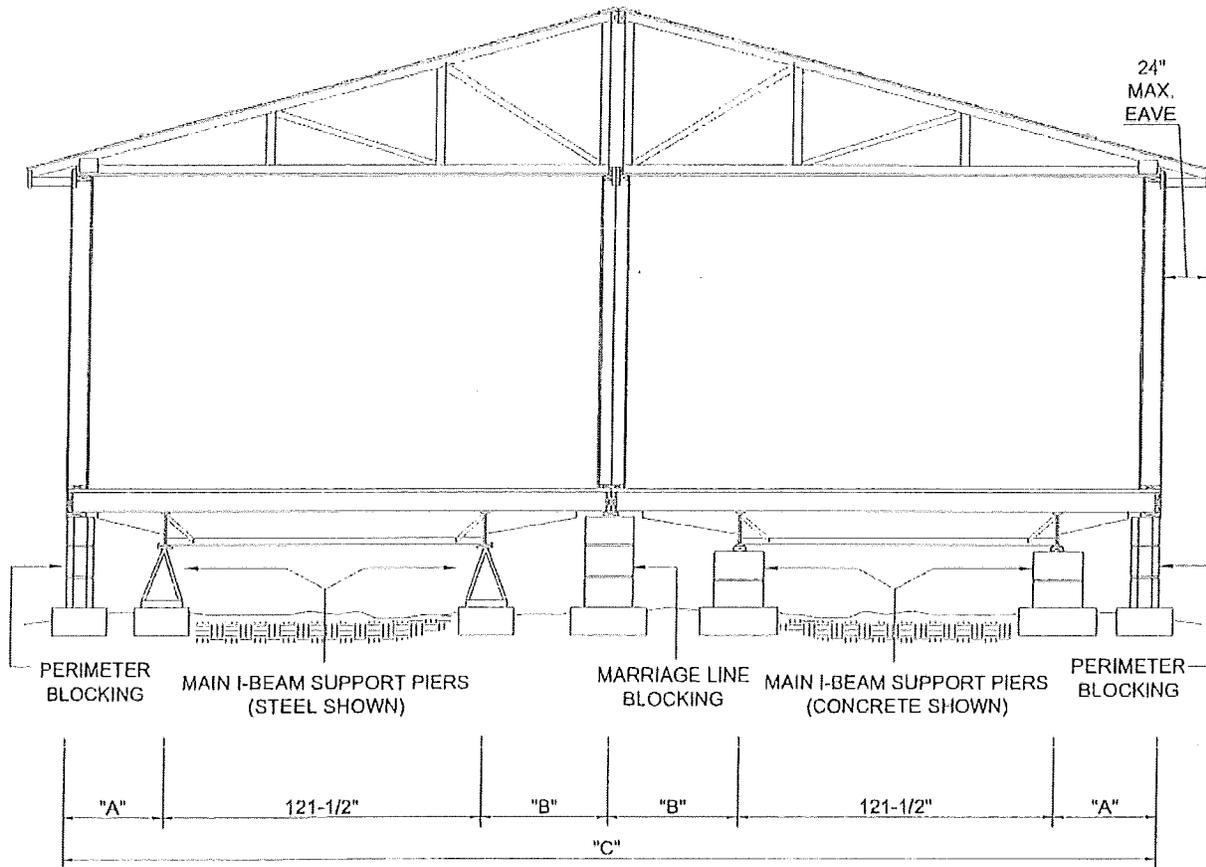


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			SCALE: NONE 21.0511

# STANDARD SUPPORT BLOCKING

WITH OPTIONAL ROOF LOADS

121-1/2" FRAME SPAN



BOX SIZE	"A"	"B"	"C"
28' WIDE HOME (26'-4")	14-1/4"	22-1/4"	26'-4"
32' WIDE HOME (29'-0")	21-1/4"	31-1/4"	29'-0"

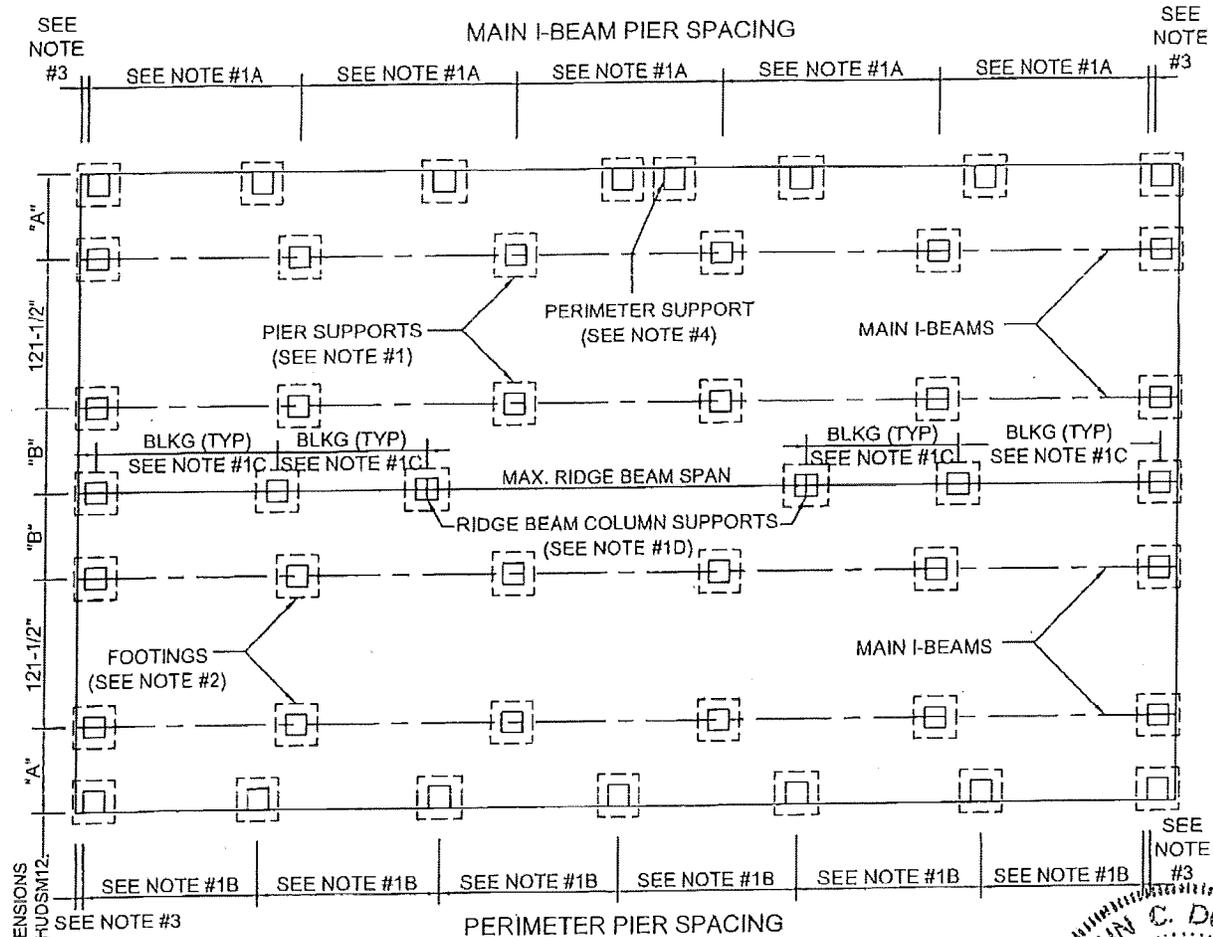
REVISIONS	DATE	 <b>CHIEF® INDUSTRIES</b> HOUSING DIVISION	DRWG. BY: CES 11/08/06
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			SCALE: NONE HUDSM12

21.0512



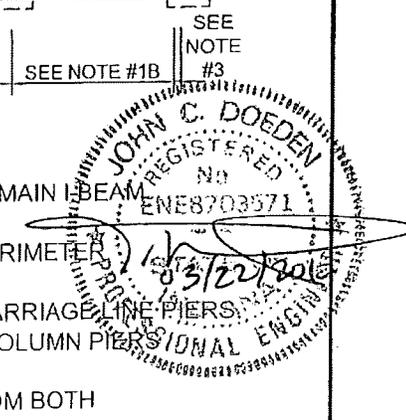
# TYPICAL BLOCKING LAYOUTS

## OPTIONAL ROOF LOADS WITH PERIMETER BLOCKING



### NOTES:

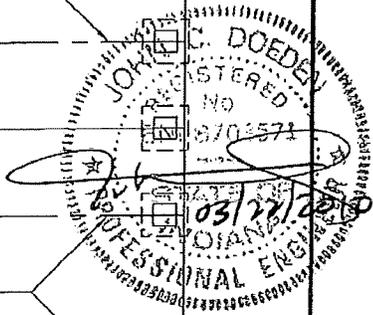
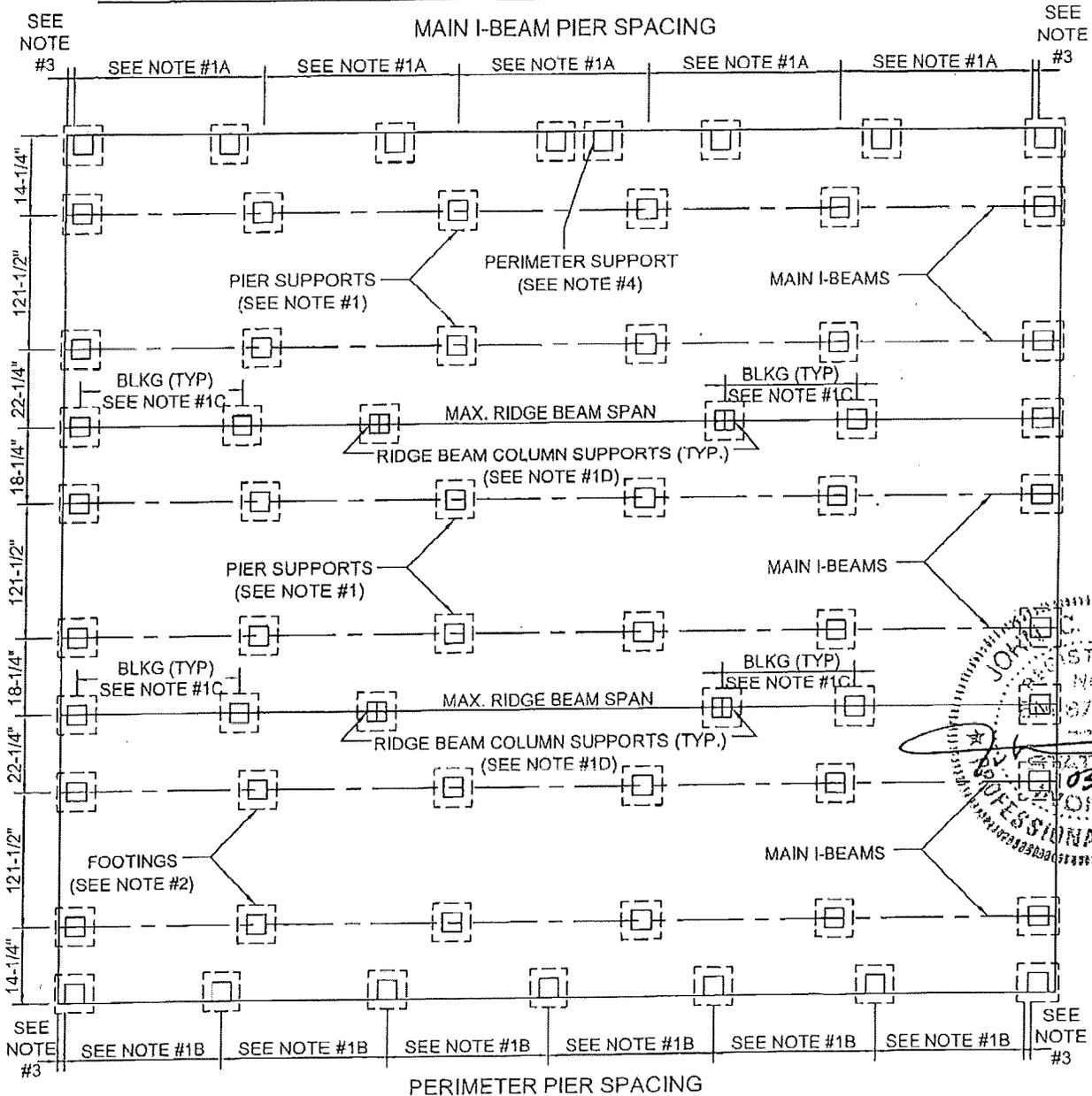
1. A. SEE TABLE 3.3 FOR REQUIRED PIER CAPACITY AND SPACING OF MAIN I-BEAM PIERS.
- B. SEE TABLE 3.4 FOR REQUIRED PIER CAPACITY AND SPACING OF PERIMETER (SIDEWALL) PIERS.
- C. SEE TABLE 3.5 FOR REQUIRED PIER CAPACITY AND SPACING OF MARRIAGE LINE PIERS.  
SEE TABLE 3.6 FOR REQUIRED PIER CAPACITY OF RIDGE BEAM COLUMN PIERS.
2. SEE TABLE 6.1 FOR FOOTING REQUIREMENTS.
3. A. THE EDGE OF THE PIER SHALL BE LOCATED (4-1/2) INCHES IN FROM BOTH ENDS OF HOME WITH THE STANDARD FRAME.
- B. THE EDGE OF THE PIER SHALL BE LOCATED (10) INCHES IN FROM BOTH ENDS OF HOME WITH THE OPTIONAL TEN (10) INCH RECESSED FRAME.
4. PERIMETER PIERS SHALL BE LOCATED ON BOTH SIDES OF ALL SIDEWALL EXTERIOR DOORS AND ANY OTHER SIDEWALL OPENING(S) 4'-0" OR LARGER.
5. ABOVE DESIGN IS FOR OPTIONAL ROOF LIVE LOADS ONLY GREATER THAN 30 PSF.



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			SCALE: NONE 21.0514

# TYPICAL BLOCKING LAYOUTS

## OPTIONAL ROOF LOADS WITH PERIMETER BLOCKING



**NOTES:**

1. A. SEE TABLE 3.3 FOR REQUIRED PIER CAPACITY AND SPACING OF MAIN I-BEAM PIERS.
- A. SEE TABLE 3.4 FOR REQUIRED PIER CAPACITY AND SPACING OF PERIMETER (SIDEWALL) PIERS.
- B. SEE TABLE 3.5 FOR REQUIRED PIER CAPACITY AND SPACING OF MARRIAGE LINE PIERS.
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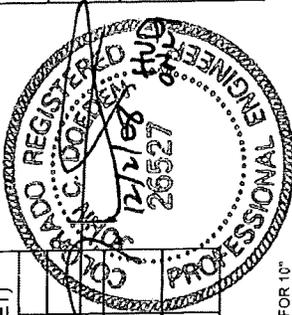
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REVISED NOTES	3/17/10		CHKD. BY:
			SCALE: NONE 21.0515

**MINIMUM PIER CAPACITY TABLES**  
**WITHOUT PERIMETER SUPPORT MAIN I-BEAM BLOCKING**

UNIT WIDTH (FEET)	ROOF LIVE LOAD (PSF)	MINIMUM PIER CAPACITY (POUNDS)			
		4'-0"	5'-4"	6'-8"	8'-0"
26'-4" UNIT WIDTH	30 PSF	3300	4490	5200	6150
	40 PSF	3540	4830	5600	6630
29'-0" UNIT WIDTH	30 PSF	3300	4490	5200	6150
	40 PSF	3540	4830	5600	6630

TABLE 3.1

- NOTES:  
 1. MAXIMUM EAVE IS (24) INCHES.  
 2. MAXIMUM SPACING OF PIERS IS 8'-0" O.C. FOR 8" I-BEAM, 10'-0" O.C. FOR 10" I-BEAM & FOR 12" I-BEAM STARTING NO MORE THAN 2'-0" FROM EACH END.  
 3. REFERENCE TABLE 6.1 FOR FOOTING SIZES CORRESPONDING TO THE LOAD DETERMINED IN THE TABLES (INCLUDES WEIGHT OF BLOCK PIER AND CONCRETE FOOTER)  
 4. LOADS BASED ON AN I-BEAM SPACING OF 121 1/2" CENTER TO CENTER.  
 5. 26'-4" and 29'-0" WIDTHS CONSIST OF 2 SECTIONS AND 39'-6" CONSISTS OF 3 SECTIONS



**RIDGE BEAM COLUMN SUPPORT**  
**(30 PSF ROOF LIVE LOAD)**

UNIT WIDTH (FEET)	ROOF LIVE LOAD (PSF)	MINIMUM PIER CAPACITY (POUNDS)								
		4 FT	8 FT	12 FT	16 FT	20 FT	24 FT	28 FT	32 FT	36 FT
26'-4" UNIT WIDTH	2125	3350	4575	5800	7025	8250	9475	10700	11930	
	2275	3620	4960	6300	7640	8980	10320	11660	13000	
39'-6" UNIT WIDTH	2125	3350	4575	5800	7025	8250	9475	10700	11930	
	2275	3620	4960	6300	7640	8980	10320	11660	13000	

TABLE 3.2

- NOTES:  
 1. THE LOADS IN THE TABLE ABOVE ARE TOTAL LOADS INCLUDING AN ASSUMED WORST CASE WEIGHT FOR THE PIER AND FOOTER.

**WITH PERIMETER SUPPORT**  
**MAIN I-BEAM BLOCKING**

UNIT WIDTH (FEET)	ROOF LIVE LOAD (PSF)	MINIMUM PIER CAPACITY (POUNDS)			
		4'-0"	5'-4"	6'-8"	8'-0"
26'-4" UNIT WIDTH	40, 60, 80 PSF	1600	2000	2400	2800
	40, 60, 80 PSF	1725	2215	2705	3200
39'-6" UNIT WIDTH	40, 60, 80 PSF	1600	2000	2400	2800
	40, 60, 80 PSF	1725	2215	2705	3200

TABLE 3.3

**PERIMETER (SIDEWALL) BLOCKING**

UNIT WIDTH (FEET)	ROOF LIVE LOAD (PSF)	MIN. PIER CAPACITY (POUNDS)		
		4'-0"	5'-4"	6'-8"
26'-4" UNIT WIDTH	40	2710	3475	4250
	60	3405	4400	5405
29'-0" UNIT WIDTH	40	2890	3725	4550
	60	3630	4705	5785
39'-6" UNIT WIDTH	40	2710	3475	4250
	60	3405	4400	5405

TABLE 3.4

- PERIMETER BLOCKING  
 MARRIAGE LINE  
 (COMMONWALL) BLOCKING

UNIT WIDTH (FEET)	ROOF LIVE LOAD (PSF)	MIN. PIER CAPACITY (POUNDS)		
		4'-0"	5'-4"	6'-8"
26'-4" UNIT WIDTH	40	4140	5380	6635
	60	5205	6800	8410
29'-0" UNIT WIDTH	40	4500	5865	7235
	60	5660	7410	9170
39'-6" UNIT WIDTH	40	4140	5380	6635
	60	5205	6800	8410

TABLE 3.5

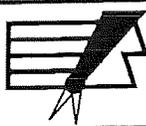
**RIDGE BEAM COLUMN SUPPORTS**

UNIT WIDTH (FEET)	ROOF LIVE LOAD (PSF)	MINIMUM PIER CAPACITY (POUNDS)									
		4 FT	8 FT	12 FT	16 FT	20 FT	24 FT	28 FT	32 FT	36 FT	40 FT
26'-4" UNIT WIDTH	40	7060	8610	10160	11710	13260	14810	16360	17905		
	60	8920	11090	13260	15430	17595	19295				
29'-0" UNIT WIDTH	40	8130	9835	11540	13250	14955	16660	18365			
	60	10175	12565	14955	17340	19295					
39'-6" UNIT WIDTH	40	7060	8610	10160	11710	13260	14810	16360	17905		
	60	8920	11090	13260	15430	17595	19295				

TABLE 3.6

- Notes:  
 1. THE LOADS IN THE TABLE ABOVE ARE TOTAL LOADS INCLUDING AN ASSUMED WORST CASE WEIGHT FOR THE PIER AND FOOTER. MAXIMUM TOTAL ALLOWED FOR A 16,000# PIER IS 19,295#.  
 2. LOADS ASSUME COLUMN PIER REPLACES A PERIMETER PIER SPACED 8'-0" O.C. MAX. (6'-3" O.C. FOR 80 PSF)  
 3. NO PIERS REQUIRED IN OPEN SPAN AREAS.

REVISIONS	DATE
REVISE FOR NEW HUD REQ.	10/8/08



**CHIEF® INDUSTRIES**  
 HOUSING DIVISION

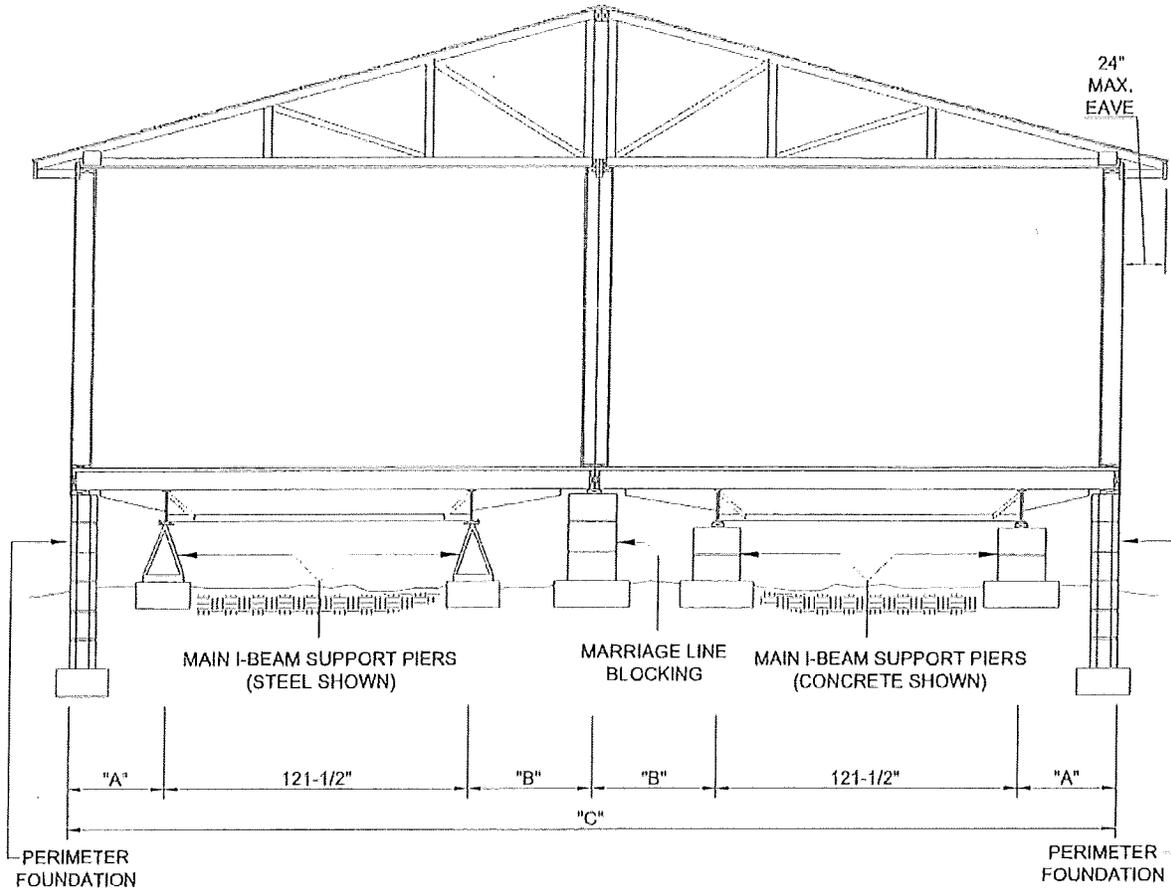
DRWG. BY:	CES	11/08/06
CHKD. BY:		
SCALE:	NONE	HUDSM16

**SECTION IV**

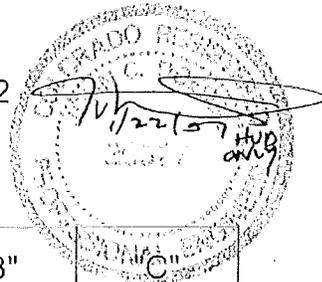
**PERIMETER FOUNDATION**

# PERIMETER FOUNDATION

121-1/2" FRAME SPAN



REFER ALSO TO FIG. 4.1 OR 4.2



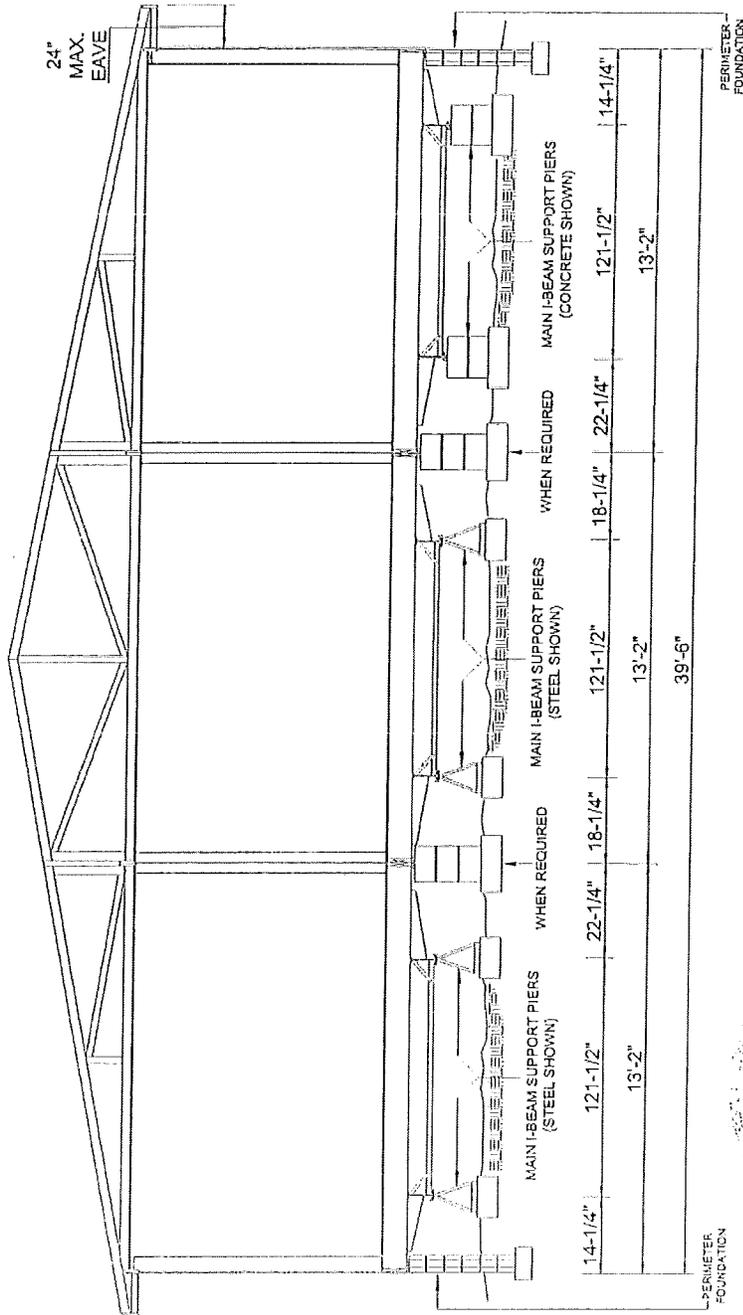
BOX SIZE	"A"	"B"	"C"
28' WIDE HOME (26'-4")	14-1/4"	22-1/4"	26'-4"
32' WIDE HOME (29'-0")	21-1/4"	31-1/4"	29'-0"

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			HOUSING DIVISION	CHKD. BY:
				SCALE: NONE HUDSM18

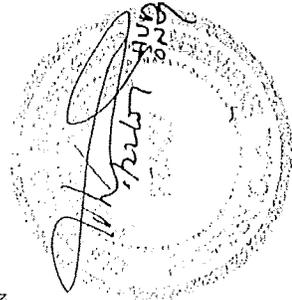
21.0518

# PERIMETER FOUNDATION

## 121-1/2" FRAME SPAN

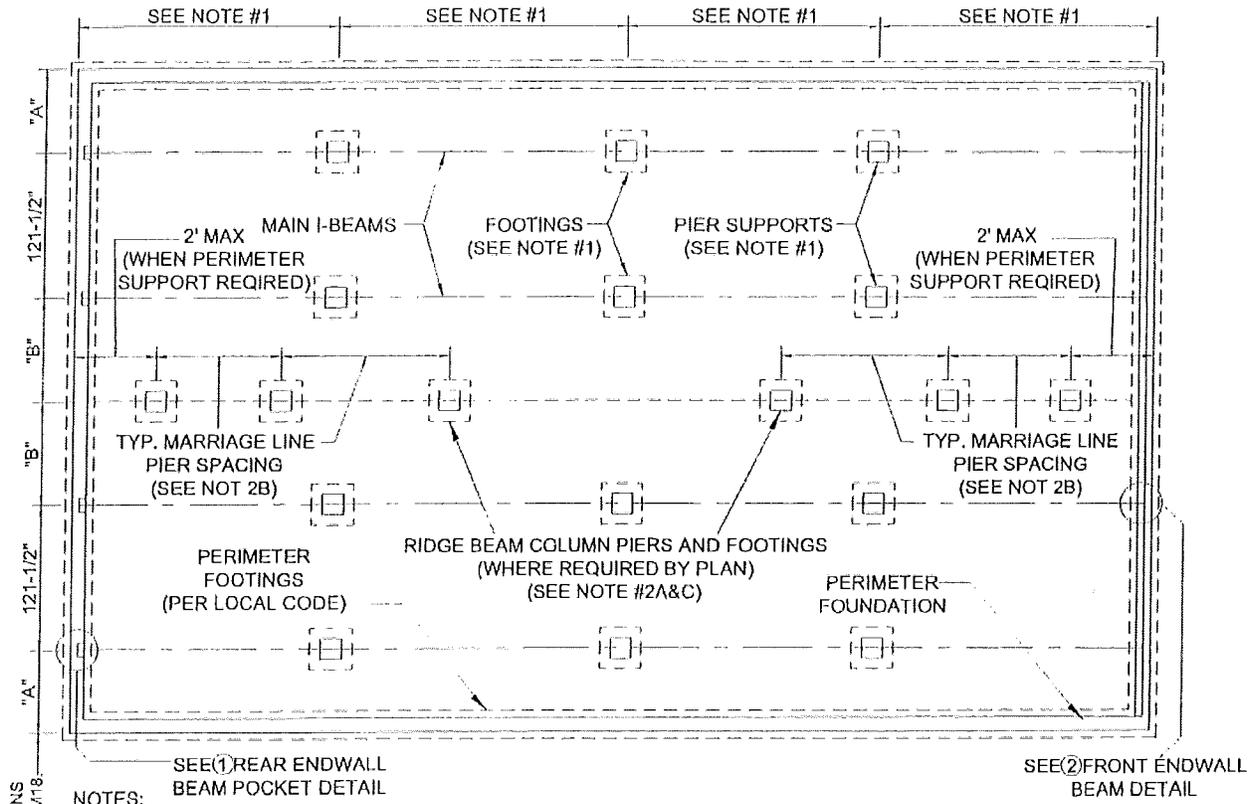


REFER ALSO TO FIG. 4.1 OR 4.2  
42' WIDE HOME



REVISIONS	DATE	 <b>CHIEF® INDUSTRIES</b> HOUSING DIVISION	DRWG. BY: CES 11/08/06
			CHKD. BY:
			SCALE: NONE HUDSM19

# TYPICAL BLOCKING LAYOUT PERIMETER FOUNDATION - STANDARD

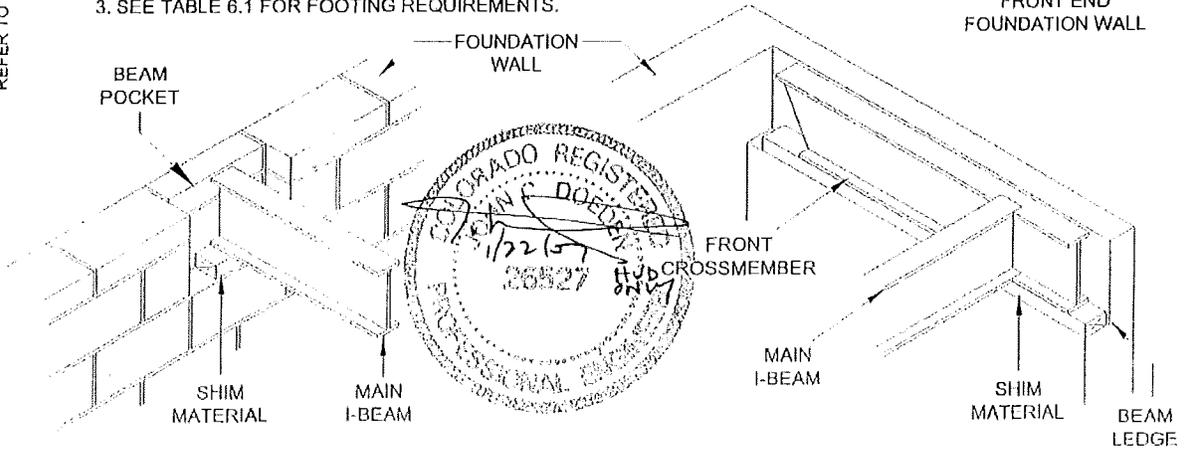


FOR "A" & "B" DIMENSIONS  
REFER TO PAGE HUDSM18

**NOTES:**

1. SEE TABLE 3.3 FOR REQUIRED PIER CAPACITY AND SPACING.
2. A. SEE TABLE 3.2 FOR REQUIRED PIER CAPACITY AND SPACING.  
B. SEE TABLE 3.5 FOR REQUIRED MARRIAGE LINE PIER CAPACITY AND SPACING.  
C. SEE TABLE 3.6 FOR REQUIRED RIDGE BEAM COLUMN PIER CAPACITY.
3. SEE TABLE 6.1 FOR FOOTING REQUIREMENTS.

\* BEAM LEDGE RUNS  
ALONG THE ENTIRE  
FRONT END  
FOUNDATION WALL



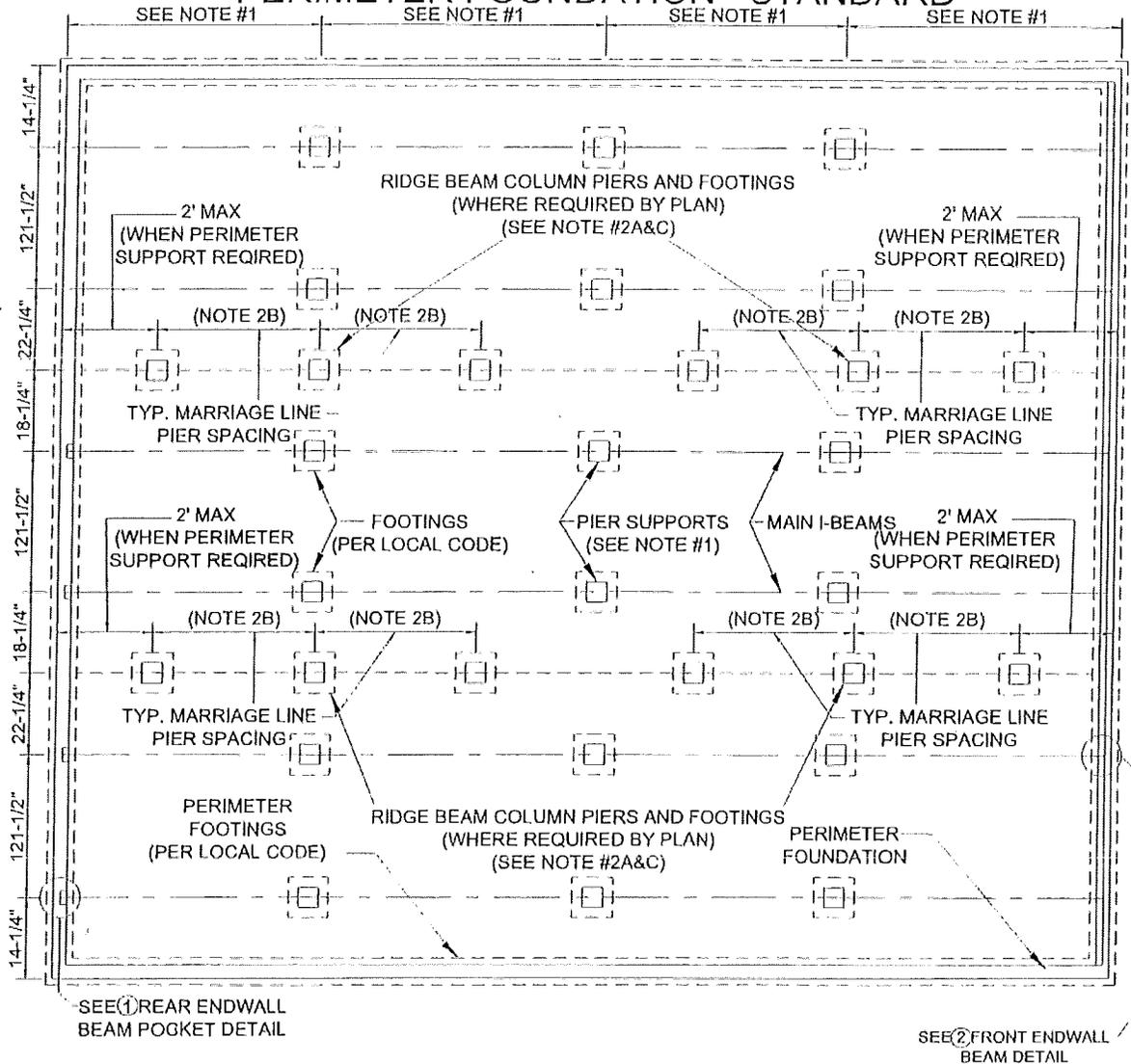
(1) REAR ENDWALL BEAM POCKET DETAIL  
(CONCRETE BLOCK WALL SHOWN)

(2) FRONT ENDWALL BEAM DETAIL  
(POURED CONCRETE WALL SHOWN)

**FIGURE 4.1**

REVISIONS	DATE	 <b>CHIEF® INDUSTRIES</b> HOUSING DIVISION	DRWG. BY: CES 11/08/06
			CHKD. BY:
			SCALE: NONE HUDSM20

# TYPICAL BLOCKING LAYOUT PERIMETER FOUNDATION - STANDARD



NOTES:

1. SEE TABLE 3.3 FOR REQUIRED PIER CAPACITY AND SPACING.
2. A. SEE TABLE 3.2 FOR REQUIRED 30# RIDGE BEAM COLUMN PIER CAPACITY AND SPACING.  
B. SEE TABLE 3.5 FOR REQUIRED MARRIAGE LINE PIER CAPACITY AND SPACING.  
C. SEE TABLE 3.6 FOR REQUIRED RIDGE BEAM COLUMN PIER CAPACITY.
3. SEE TABLE 6.1 FOR FOOTING REQUIREMENTS.

\* BEAM LEDGE RUNS ALONG THE ENTIRE FRONT END FOUNDATION WALL

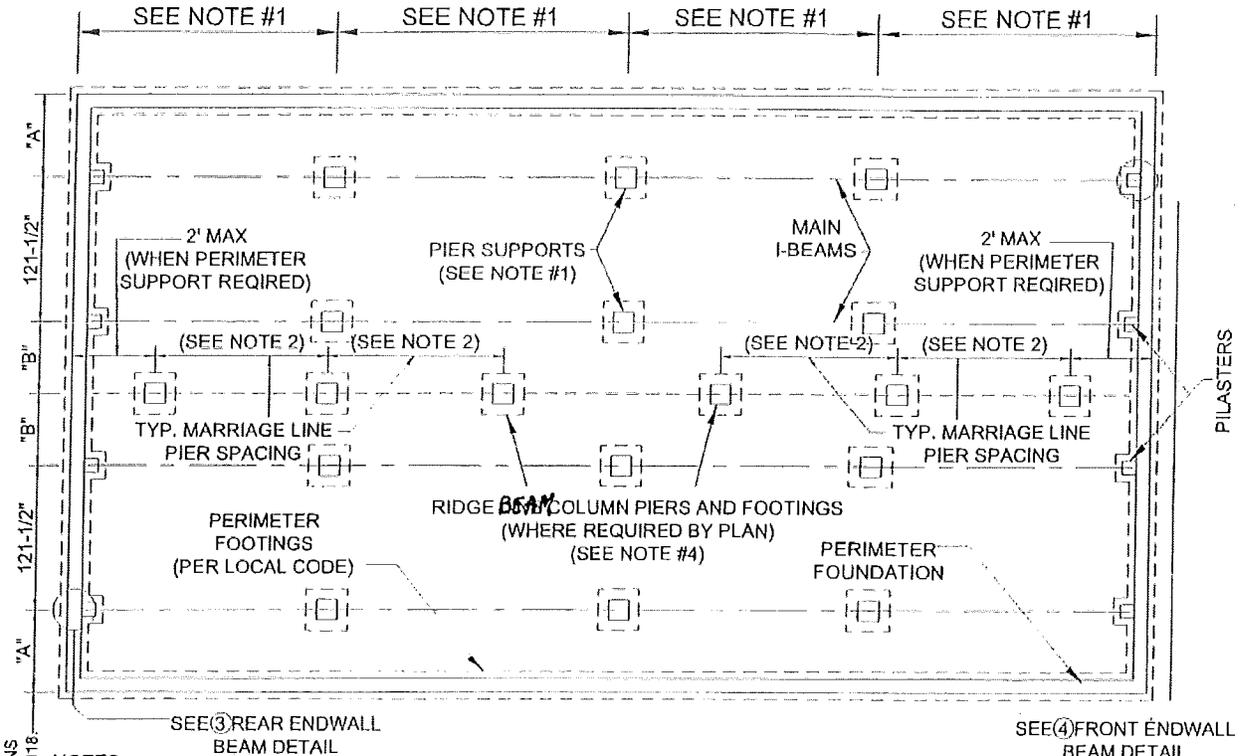


FIGURE 4.1 (cont.)

REVISIONS	DATE	 <b>CHIEF® INDUSTRIES</b> HOUSING DIVISION	DRWS BY: CES 11/08/06
			CHKD. BY:
			SCALE: NONE HUDSM21

# TYPICAL BLOCKING LAYOUT

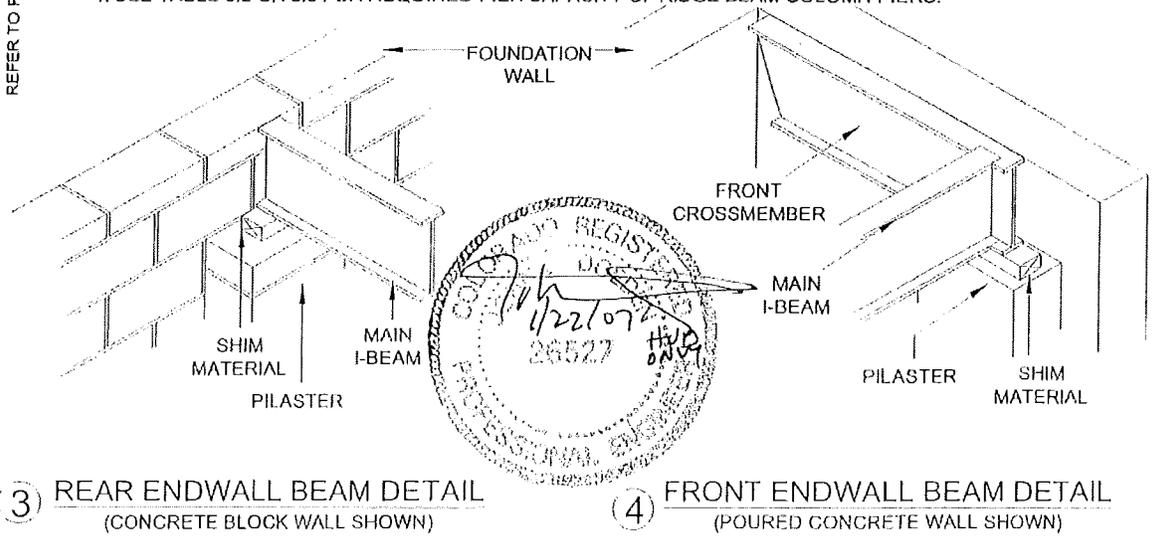
## PERIMETER FOUNDATION - 10" RECESSED FRAME



FOR "A" & "B" DIMENSIONS REFER TO PAGE HUDSM18.

**NOTES:**

1. SEE TABLE 3.3 FOR REQUIRED PIER CAPACITY AND SPACING.
2. SEE TABLE 3.5 FOR REQUIRED MARRIAGE LINE PIER CAPACITY AND SPACING.
3. SEE TABLE 6.1 FOR FOOTING REQUIREMENTS.
4. SEE TABLE 3.2 OR 3.6 FOR REQUIRED PIER CAPACITY OF RIDGE BEAM COLUMN PIERS.

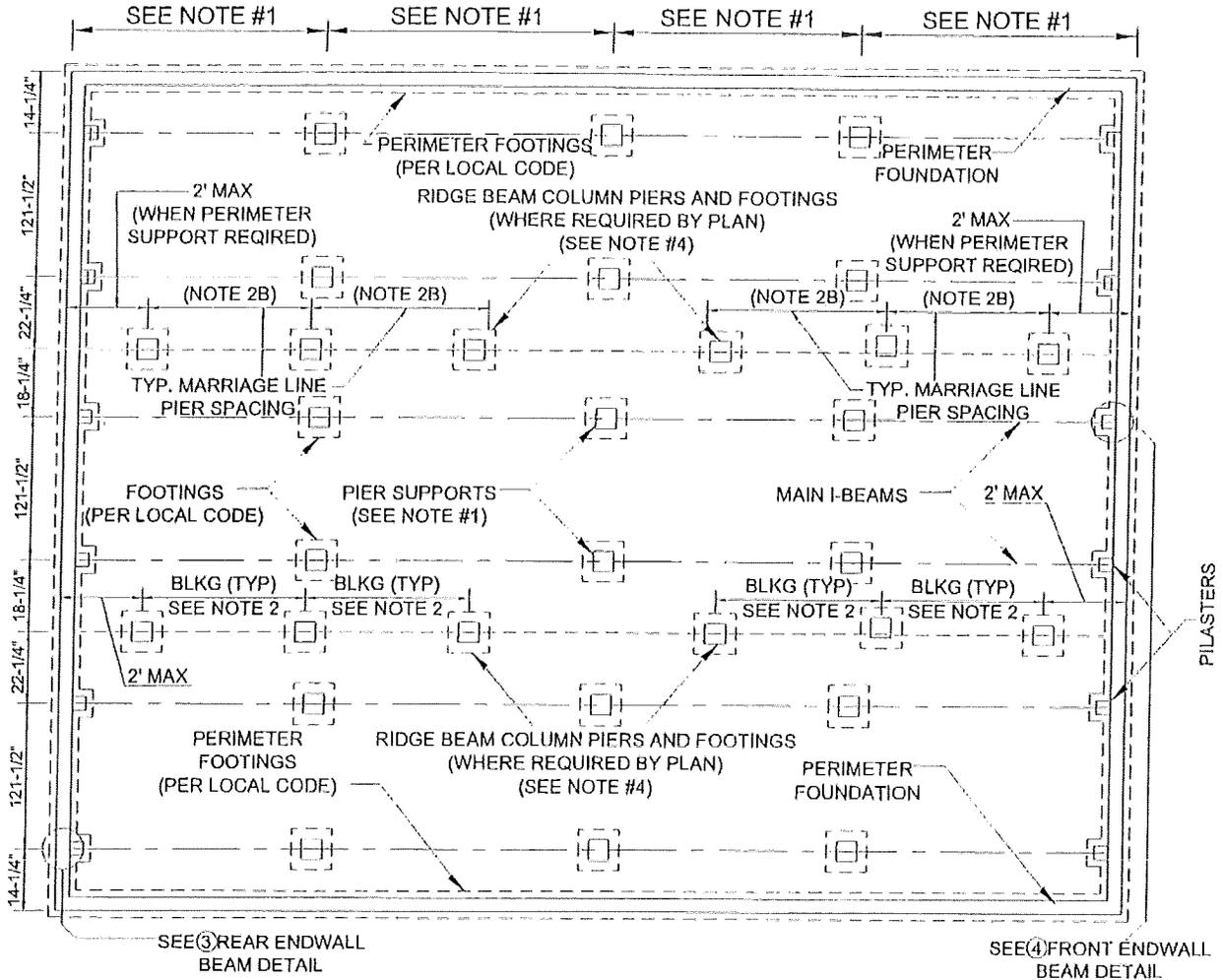


**FIGURE 4.2**

REVISIONS	DATE	 <b>CHIEF® INDUSTRIES</b> HOUSING DIVISION	DRWG. BY: CES 11/08/06
			CHKD. BY:
			SCALE: NONE HUDSM22

# TYPICAL BLOCKING LAYOUT

## PERIMETER FOUNDATION - 10" RECESSED FRAME



- NOTES:
1. SEE TABLE 3.3 FOR REQUIRED PIER CAPACITY AND SPACING.
  2. SEE TABLE 3.5 FOR REQUIRED MARRIAGE LINE PIER CAPACITY AND SPACING.
  3. SEE TABLE 6.1 FOR FOOTING REQUIREMENTS.
  4. SEE TABLE 3.2 OR 3.6 FOR REQUIRED PIER CAPACITY OF RIDGE BEAM COLUMN PIERS.

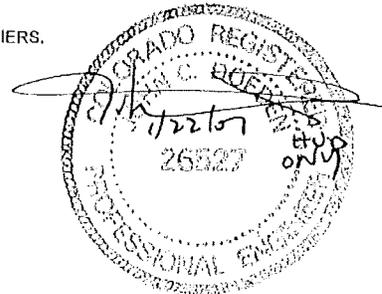


FIGURE 4.2 (cont.)

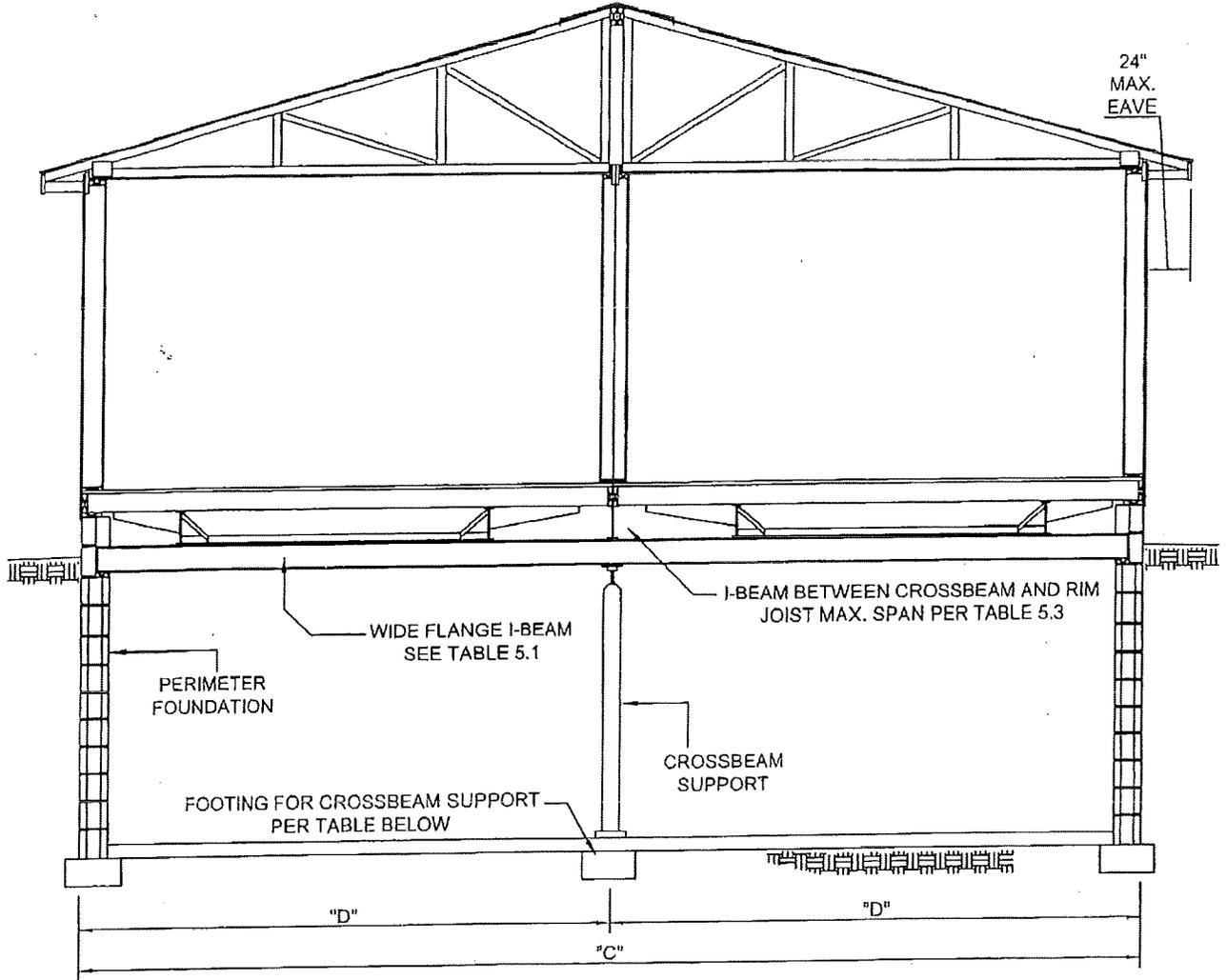
REVISIONS	DATE	 <b>CHIEF® INDUSTRIES</b> HOUSING DIVISION	DRWG. BY: CES 11/08/06
			CHKD. BY:
			SCALE: NONE HUDSM23

21.0523

**SECTION V**

**BASEMENT CONSTRUCTION**

# BASEMENT CONSTRUCTION



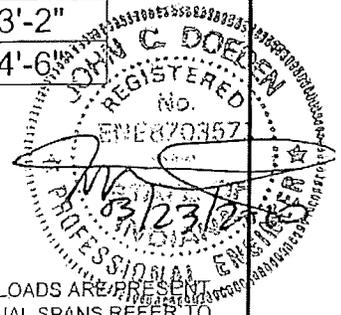
**NOTE:**  
 ALL FOUNDATION AND FOOTING DESIGN IS TO BE PROVIDED BY A REGISTERED PROFESSIONAL ENGINEER. CHIEF INDUSTRIES DOES NOT PROVIDE THIS INFORMATION DUE TO LOCAL JURISDICTION REQUIREMENTS, VARYING SOIL CLASSIFICATION, BACKFILL COMPOSITION, ETC.

BOX SIZE	"C"	"D"
28' WIDE HOME (26'-4")	26'-4"	13'-2"
32' WIDE HOME (29'-0")	29'-0"	14'-6"

**FOOTER SIZES @ 2000 PSF SOIL**

ROOF LIVE LOAD (PSF)	CROSS BEAM SPACING	
	8'-0"	9'-4"
30	28X28X8	31X31X10
40	30X30X10	32X32X10
60	32X32X10	35X35X12
80	35X35X12	37X37X12

**NOTE:** THE SPACING SHOWN ABOVE IS WITH UNIFORM ROOF AND FLOOR LOADS. WHEN CONCENTRATED LOADS ARE PRESENT (MARRIAGE WALLS OPENINGS ON MAIN FLOOR), CROSS BEAM SPACING WILL VARY. FOR ACTUAL SPANS REFER TO SPECIFIC CROSS BEAM DRAWING FOR EACH MODEL.



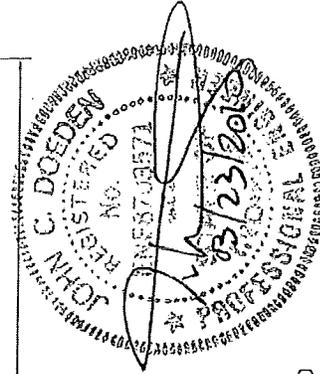
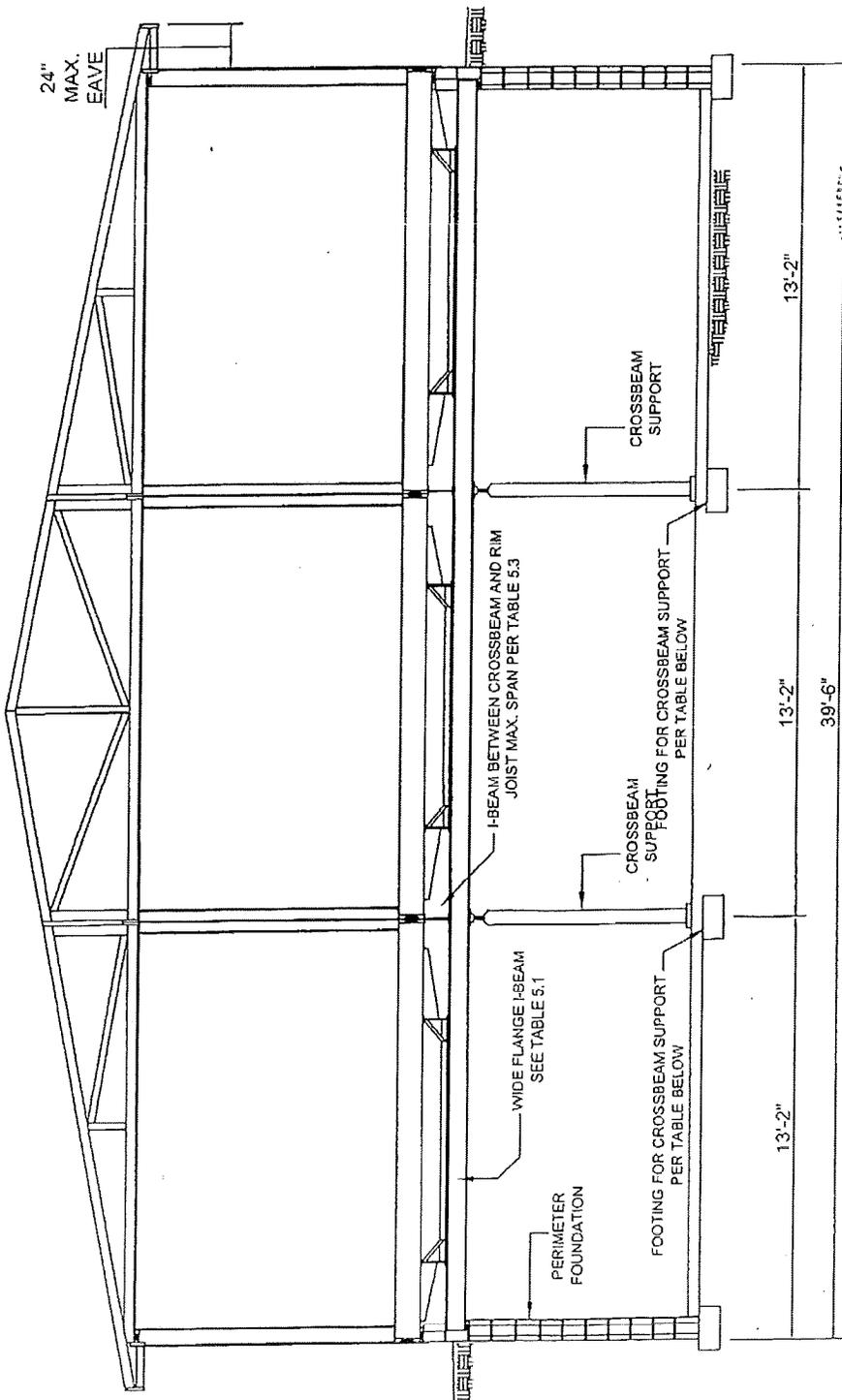
REVISIONS	DATE
REVISE FOR NEW HUD REQ.	10/8/08
ADDED NOTE	3/18/10



**CHIEF® INDUSTRIES**  
 HOUSING DIVISION

DRWG. BY: CES	11/08/06
CHKD. BY:	
SCALE: NONE	21.0525

# BASEMENT CONSTRUCTION



REFER ALSO TO FIG. 4.1 OR 4.2

## 42' WIDE HOME

FOOTER SIZES @ 2000 PSF SOIL	
ROOF LIVE LOAD (PSF)	CROSS BEAM SPACING
30	8'-0"
40	9'-4"
60	31X31X10
80	28X28X8
	30X30X10
	32X32X10
	35X35X12
	37X37X12

NOTE: ALL FOUNDATION AND FOOTING DESIGN IS TO BE PROVIDED BY A REGISTERED PROFESSIONAL ENGINEER. CHIEF INDUSTRIES DOES NOT PROVIDE THIS INFORMATION DUE TO LOCAL JURISDICTION REQUIREMENTS, VARYING SOIL CLASSIFICATION, BACKFILL COMPOSITION, ETC.

NOTE: THE SPACING SHOWN ABOVE IS WITH UNIFORM ROOF AND FLOOR LOADS. WHEN CONCENTRATED LOADS ARE PRESENT (MARRIAGE WALL OPENINGS ON MAIN FLOOR), CROSS BEAM SPACING WILL VARY. FOR ACTUAL SPANS REFER TO SPECIFIC CROSS BEAM DRAWING FOR EACH MODEL.

REVISIONS	DATE
ADDED NOTE	3/18/10

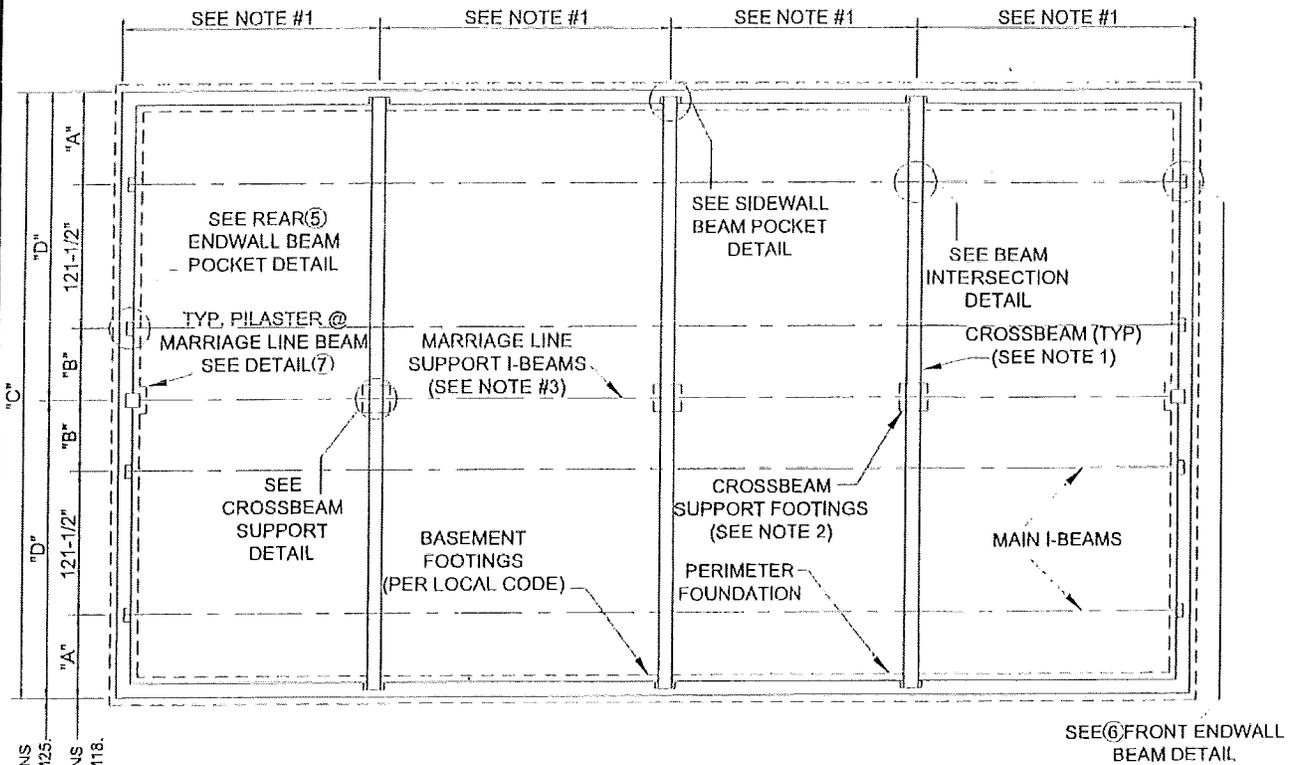


CHIEF® INDUSTRIES  
HOUSING DIVISION

DRWG. BY:	CES	11/08/06
CHKD. BY:		
SCALE:	NONE	21.0526

# TYPICAL BASEMENT LAYOUT

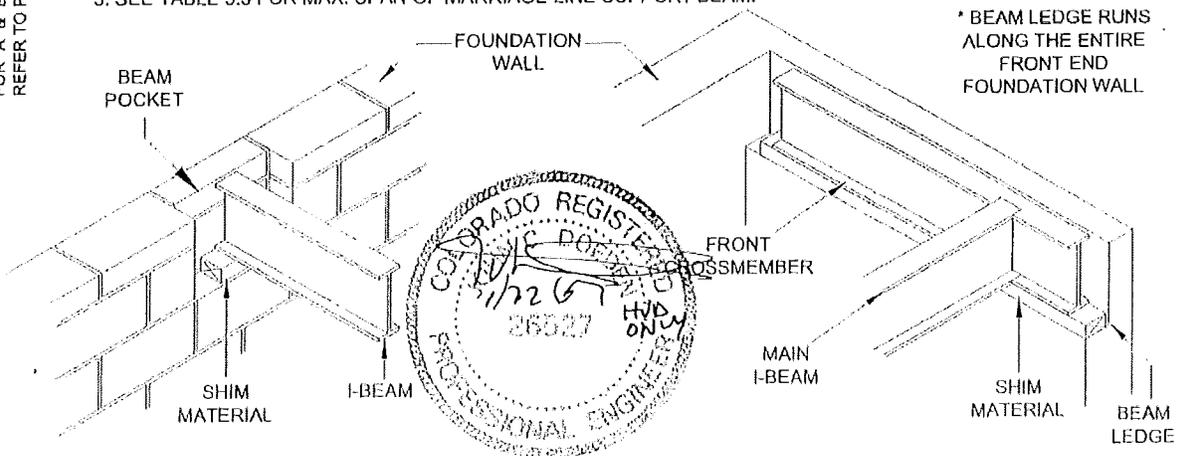
## BASEMENT CONSTRUCTION - STANDARD



FOR "C" & "D" DIMENSIONS REFER TO PAGE HUDSM25.  
FOR "A" & "B" DIMENSIONS REFER TO PAGE HUDSM18.

**NOTES:**

1. SEE TABLE 5.1 FOR REQUIRED CROSS BEAM CAPACITY AND SPACING.
2. SEE PAGE HUDSM25 FOR FOOTING REQUIREMENTS.
3. SEE TABLE 5.3 FOR MAX. SPAN OF MARRIAGE LINE SUPPORT BEAM.



(5) REAR ENDWALL BEAM POCKET DETAIL  
(CONCRETE BLOCK WALL SHOWN)

(6) FRONT ENDWALL BEAM DETAIL  
(POURED CONCRETE WALL SHOWN)

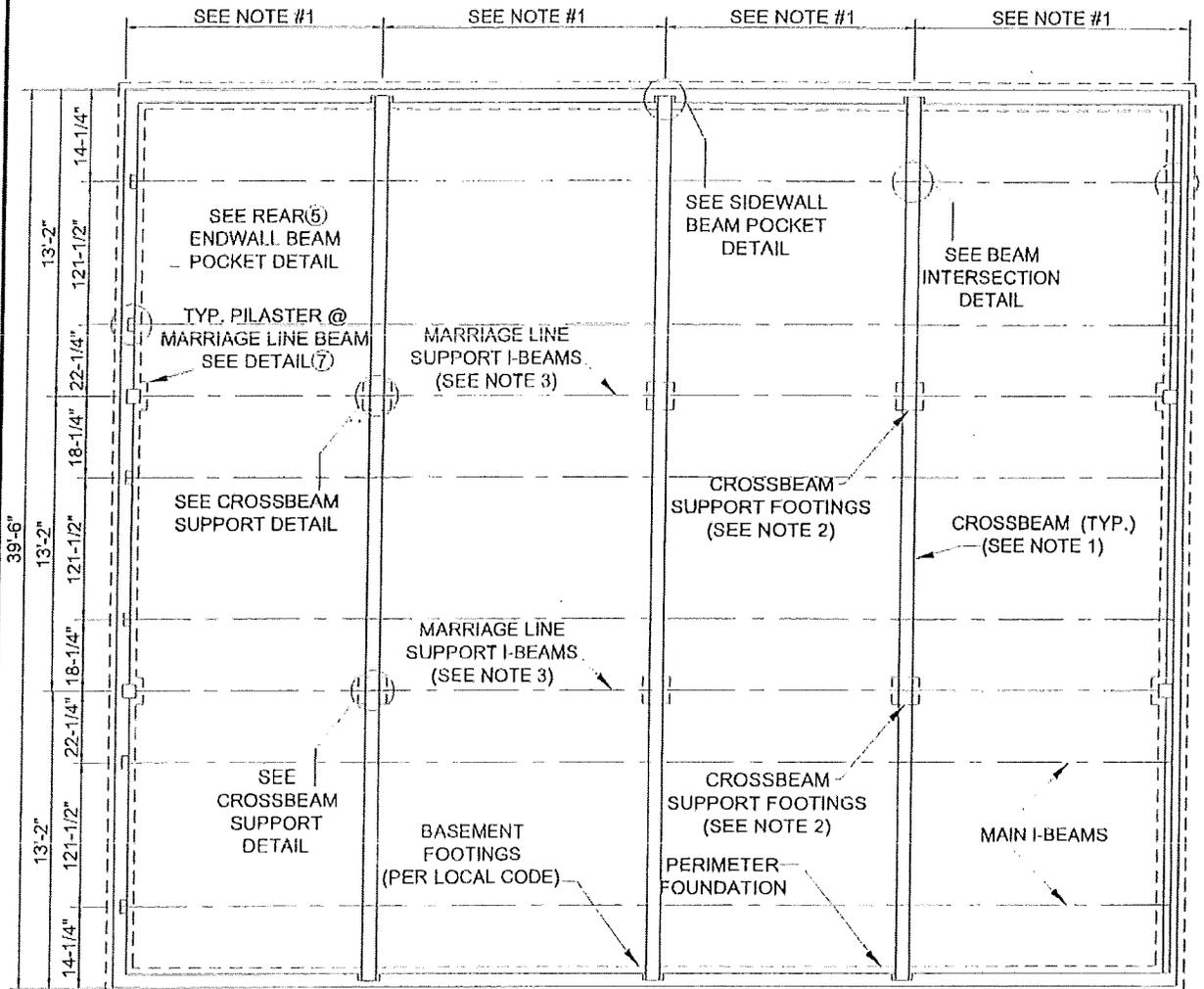
FIGURE 5.1

REVISIONS	DATE	 <b>CHIEF® INDUSTRIES</b> HOUSING DIVISION	DRWG. BY: CES 11/08/06
			CHKD. BY:
			SCALE: NONE HUDSM27

21.0527

# TYPICAL BASEMENT LAYOUT

## BASEMENT CONSTRUCTION - STANDARD



SEE (6) FRONT ENDWALL BEAM DETAIL

**NOTES:**

1. SEE TABLE 5.1 FOR REQUIRED CROSS BEAM CAPACITY AND SPACING.
2. SEE HUD SM26 FOR FOOTING REQUIREMENTS.
3. SEE TABLE 5.3 FOR MAX. SPAN OF MARRIAGE LINE BEAM.

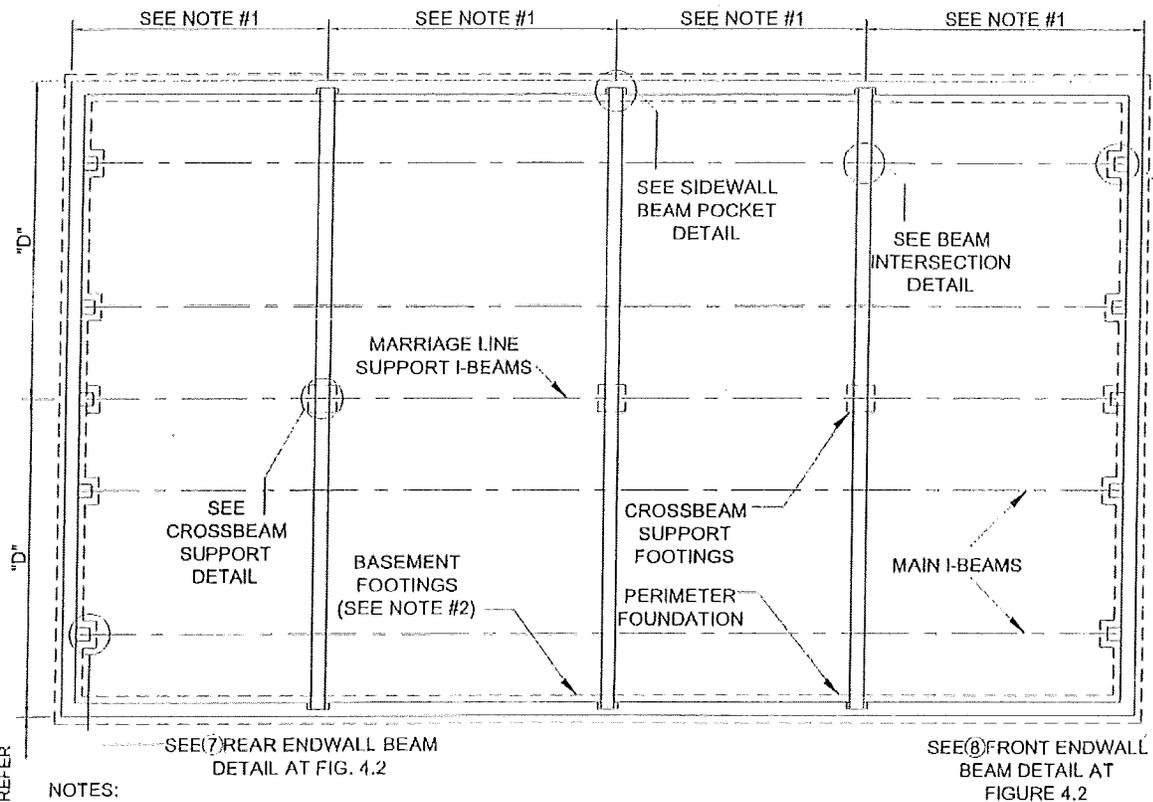


FIGURE 5.1 (cont.)

REVISIONS	DATE	 <b>CHIEF® INDUSTRIES</b> HOUSING DIVISION	DRWG. BY: CES 11/08/06
			CHKD. BY:
			SCALE: NONE HUDSM28

21.0528

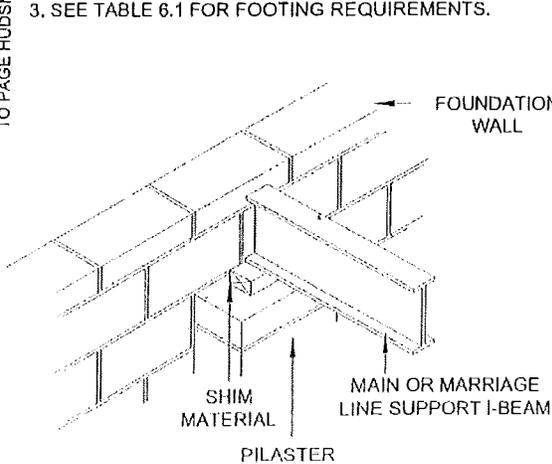
# TYPICAL BLOCKING LAYOUT BASEMENT CONSTRUCTION - 10" RECESSED FRAME



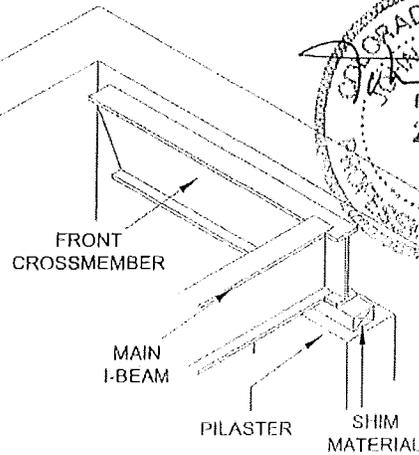
FOR "D" DIMENSIONS REFER TO PAGE HUDSM25.

**NOTES:**

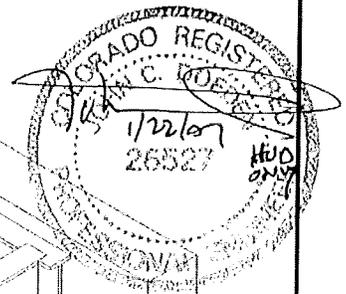
1. REFER TO PAGE HUDSM25 FOR "A" AND "B".
2. SEE TABLE 3.3 FOR REQUIRED PIER CAPACITY AND SPACING.
3. SEE TABLE 6.1 FOR FOOTING REQUIREMENTS.



**(7) REAR ENDWALL PILASTER SUPPORT DETAIL**  
(CONCRETE BLOCK WALL SHOWN)



**(8) FRONT ENDWALL BEAM DETAIL**  
(POURED CONCRETE WALL SHOWN)



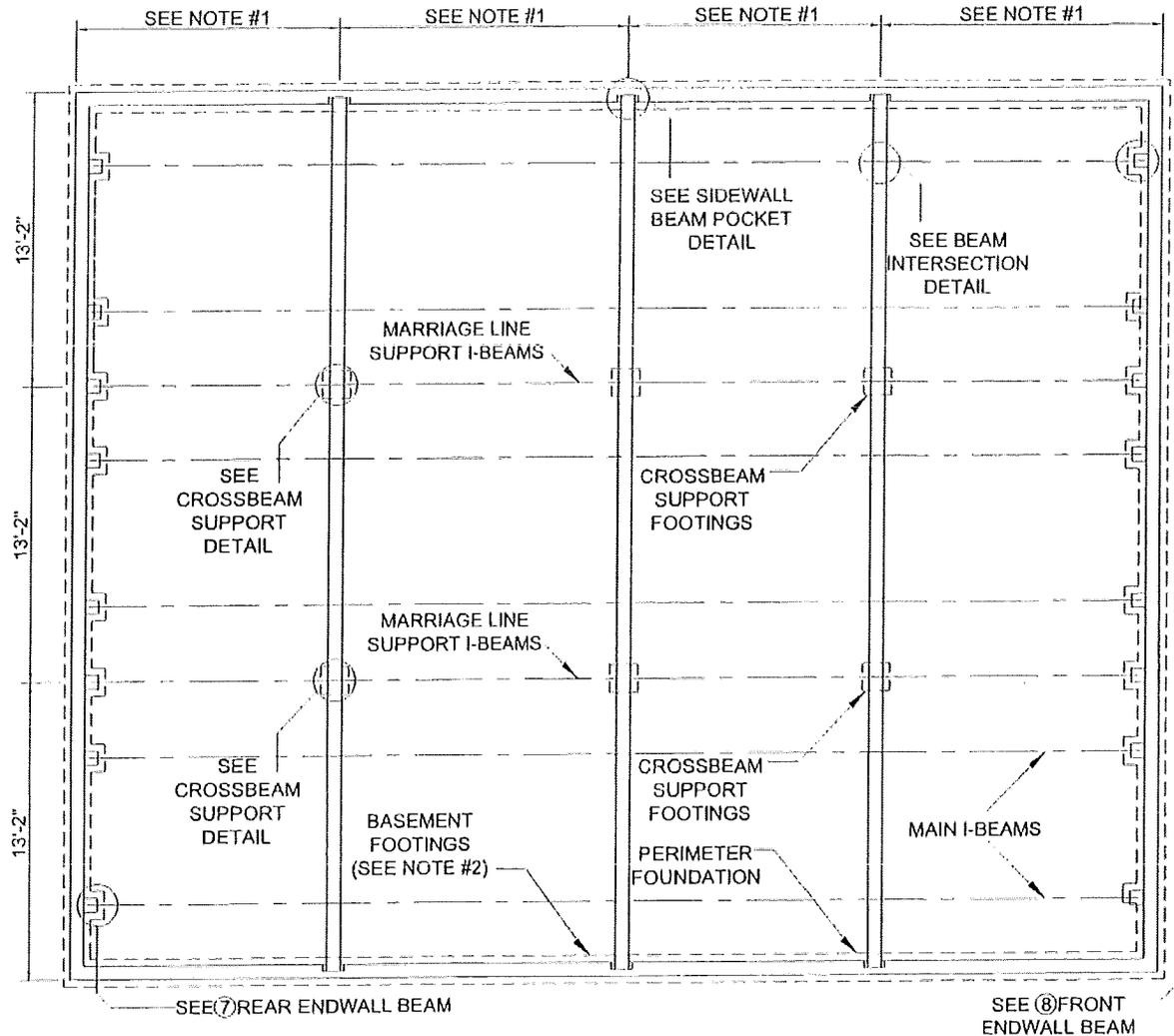
**FIGURE 5.2**

REVISIONS	DATE	 <b>CHIEF® INDUSTRIES</b> HOUSING DIVISION	DRWG. BY: CES 11/08/06
			CHKD. BY:
			SCALE: NONE HUDSM29

21.0529

# TYPICAL BLOCKING LAYOUT

## BASEMENT CONSTRUCTION - 10" RECESSED FRAME



- NOTES:
1. SEE TABLE 3.3 FOR REQUIRED PIER CAPACITY AND SPACING
  2. SEE TABLE 6.1 FOR FOOTING REQUIREMENTS

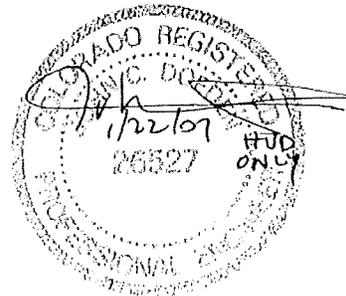


FIGURE 5.2 (cont.)

REVISIONS	DATE	 <b>CHIEF® INDUSTRIES</b> HOUSING DIVISION	DRWG. BY: CES 11/08/06
			CHKD. BY:
			SCALE: NONE HUDSM30

# TYPICAL BASEMENT

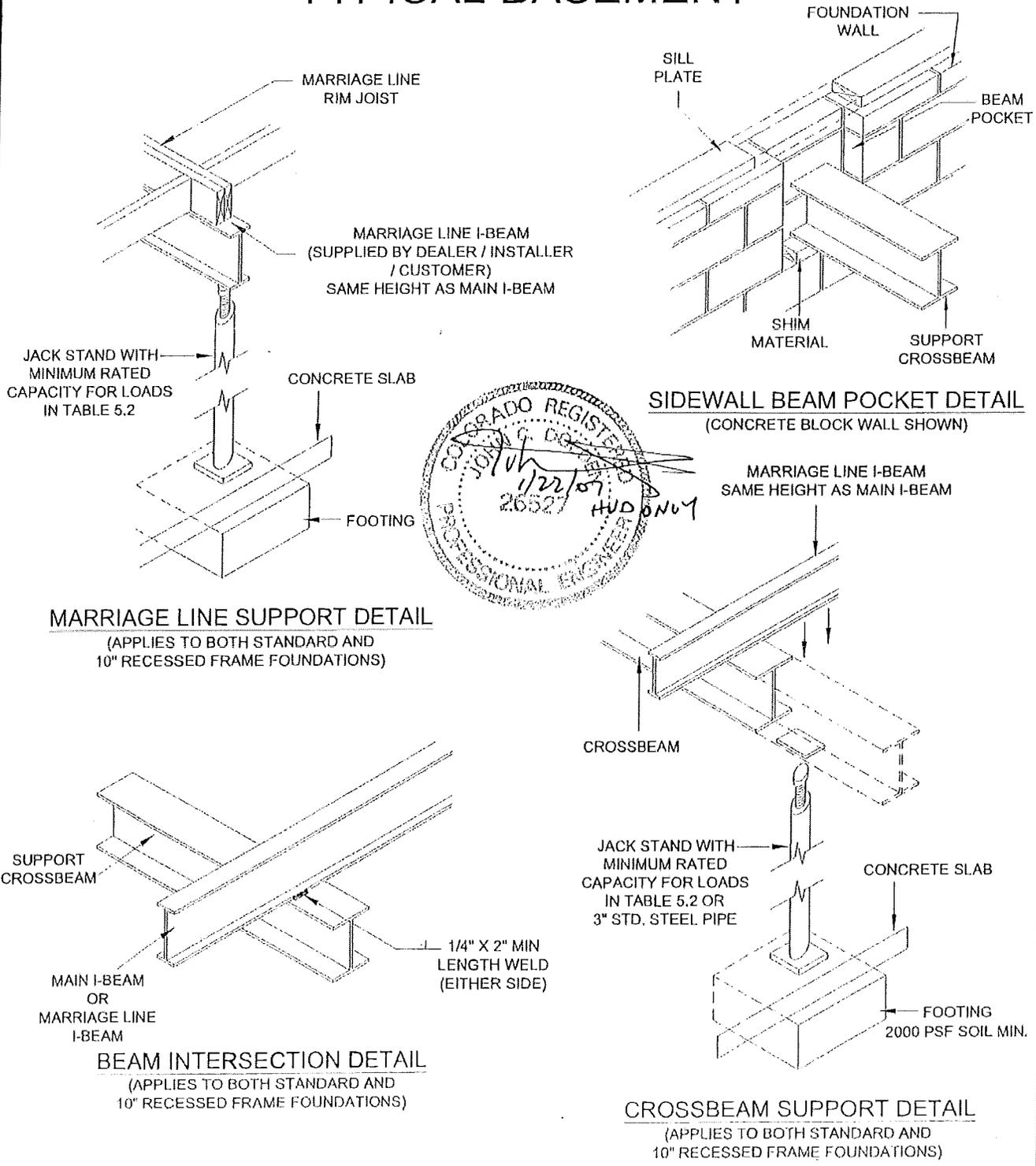


FIGURE 5.3

REVISIONS	DATE	 <b>CHIEF® INDUSTRIES</b> HOUSING DIVISION	DRWG. BY: CES 11/08/06
			CHKD. BY:
			SCALE: NONE HUDSM31

# MINIMUM CROSSBEAM SIZE TABLE

## CROSSBEAM SUPPORT

UNIT WIDTH (FEET)	ROOF LIVE LOAD (PSF)	CROSS BEAM DEPTH	MINIMUM CROSSBEAM SIZE			
			MAXIMUM CROSSBEAM SPACING (FEET)			
			8'-0"	9'-4"	10'-8"	12'-0"
26'-4" UNIT WIDTH	ALL LOADS	6"	W6X12	W6X16	W6X16	-
		8"	W8X13	W8X13	W8X15	W8X15
29'-0" UNIT WIDTH	ALL LOADS	6"	W6X16	-	-	-
		8"	W8X15	W8X17	W8X17	W8X20
39'-6" UNIT WIDTH	ALL LOADS	6"	W6X12	W6X16	W6X16	-
		8"	W8X13	W8X13	W8X15	W8X15

TABLE 5.1

1. USE ANY ONE OF THE BEAMS IN EACH CATEGORY.

## PIER AND FOOTER CAPACITY (MIN) @ CROSSBEAM SUPPORT (CENTERLINE)

NOTE: POSTS SUPPORTING CROSSBEAMS MUST BE RATED FOR THE APPROPRIATE LOAD  
FLOOR GIRDER MUST BE DESIGNED TO CARRY THE ROOF LOAD AT THE SPECIFIED SPAN

(12) = APPLIES TO ONLY  
12-1/2" MAIN I-BEAM

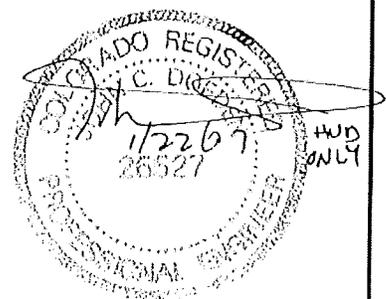
UNIT WIDTH (FEET)	ROOF LIVE LOAD (PSF)	LOAD @ EACH CROSSBEAM-CENTERLINE SUPPORT			
		CROSSBEAM SPACING (FEET)			
		8'-0"	9'-4"	10'-8"	12'-0"
26'-4" UNIT WIDTH	30	9560	11150	12750	14340
	40	10990	12820	14650	16480
	60	12900	15040	17190	19340
	80	14800	17265	19730	-
29'-0" UNIT WIDTH	30	11000	12750	14560	16375
	40	12000	14000	15950	17915
	60	14000	16330	18670	21000
	80	16050	18725	21400	-
39'-6" UNIT WIDTH	30	9895	11540	13195	14840
	40	11350	13235	15135	16300
	60	13290	15500	17725	19935
	80	15230	17770	20315	-

TABLE 5.2

## MULTI-SECTION HOMES MARRIAGE LINE SUPPORT BEAM MAXIMUM SPAN

UNIT WIDTH (FEET)	MAIN I-BEAM SIZE	ROOF LIVE LOAD (PSF)			
		30	40	60	80
26'-4" UNIT WIDTH	10"	12'-0"	12'-0"	10'-8"	9'-4"
	12"	12'-0"	12'-0"	12'-0"	10'-8"
29'-0" UNIT WIDTH	10"	12'-0"	10'-8"	9'-4"	8'-0"
	12"	12'-0"	12'-0"	12'-0"	10'-8"
39'-6" UNIT WIDTH	10"	12'-0"	12'-0"	10'-8"	9'-4"
	12"	12'-0"	12'-0"	12'-0"	10'-8"

TABLE 5.3



REVISIONS	DATE	 <b>CHIEF® INDUSTRIES</b> HOUSING DIVISION	DRWG. BY: CES 11/08/06
			CHKD. BY:
			SCALE: NONE HUDSM32

21.0532

**SECTION VI**

**TYPICAL ANCHORAGE & FOOTINGS INSTRUCTIONS**

## ADDENDUM - ANCHORAGE

Information contained on these addendum pages is to enhance and sometimes supersede the following pages that pertain to the details of the completion of the setting of your home.

After blocking and leveling, the installer must secure the home against the wind. In order for the manufactured home to be secure against high winds, it must be anchored to the ground. The homeowner is cautioned that if the manufactured home is not properly anchored, it is highly susceptible to wind damage when high wind conditions occur.

Select the number and location of straps and anchors from the appropriate chart and diagram in Section 6. Use only listed and approved ground anchors capable of resisting a minimum ultimate load of 4725 pounds and a working load of 3150 pounds as installed unless reduced capacities are specified by the anchor manufacturer. A reduced capacity of the ground anchor or strap will require a reduced tiedown strap and anchor spacing proportional to that given in the charts. However, ground anchors must not be spaced closer than the minimum spacing permitted by the listing or certification.

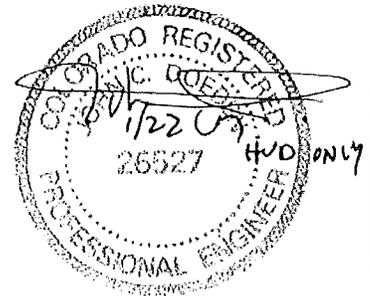
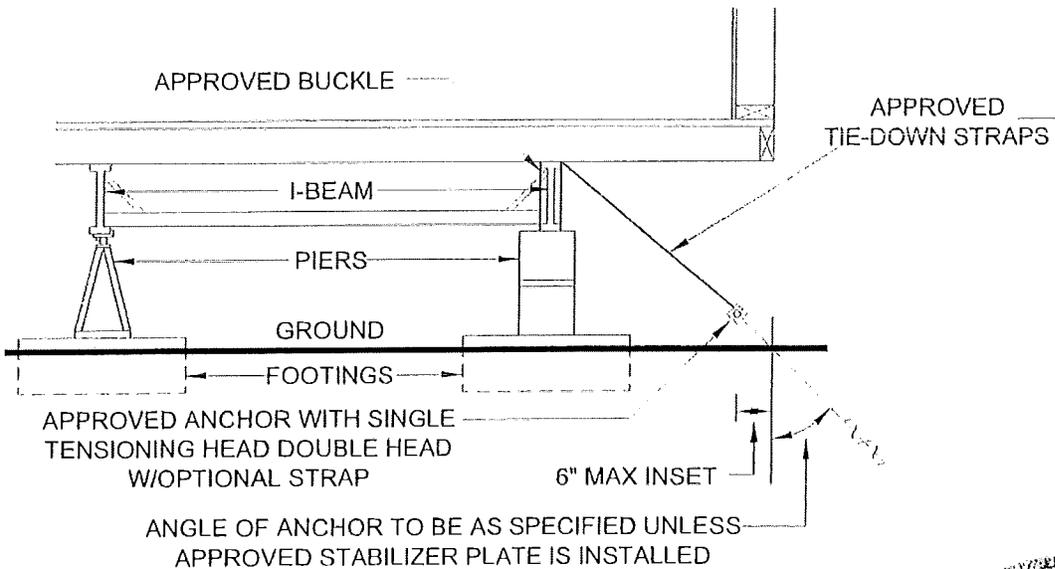
Install the anchors at the locations indicated in Section 6, following the anchor manufacturer's instructions. Install double-headed anchors at all vertical tie locations. Line up the shaft of each anchor with its strap or resultant angle between vertical tie and diagonal tie or install an approved stabilizer plate. You may want to consult a registered professional or structural engineer to determine the correct angles for the anchors. See notes in figures regarding stabilizer plate installation when this angle cannot be achieved.

If your home is re-leveled at some date after the initial tensioning of the anchoring straps, the straps should be re-tensioned as specified in the anchor manufacturer's installation instructions. Straps must be inspected periodically to assure that proper tension is provided in each strap. If straps are found to be loose, then re-tensioning of the straps must be performed.

Protection shall be provided at sharp corners such as I-beam flange, cross members, angle brackets, etc. at point of load on strap by placing an additional layer of strapping 2" long, (when possible) approximately centered between the strap and the sharp corner.

The anchor tables and designs do not consider floor or seismic loads and is not intended for use in flood or seismic hazard areas. In those areas the anchorage system is to be designed by a Registered Professional Engineer.

## TIE-DOWN STRAP AND ANCHORING POSITION INSTALLATION WITHOUT VERTICAL TIES



**NOTES:**

1. TIE-DOWN STRAPS AND DEVICES TO HAVE A MINIMUM WORKING LOAD RATING OF 3150# (OVERLOAD OF 4725#) AND MUST BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
2. PROTECTION SHALL BE PROVIDED AT SHARP CORNERS WHERE THE ANCHORING SYSTEM REQUIRES THE USE OF EXTERNAL STRAPS OR CABLES.
3. SEE FIGURE 6.2 FOR ADDITIONAL REQUIREMENTS.

FIGURE 6.1

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			CHKD. BY:
			SCALE: NONE HUDSM34

21.0534

# ANCHORAGE DETAILS

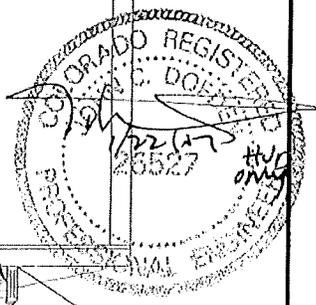
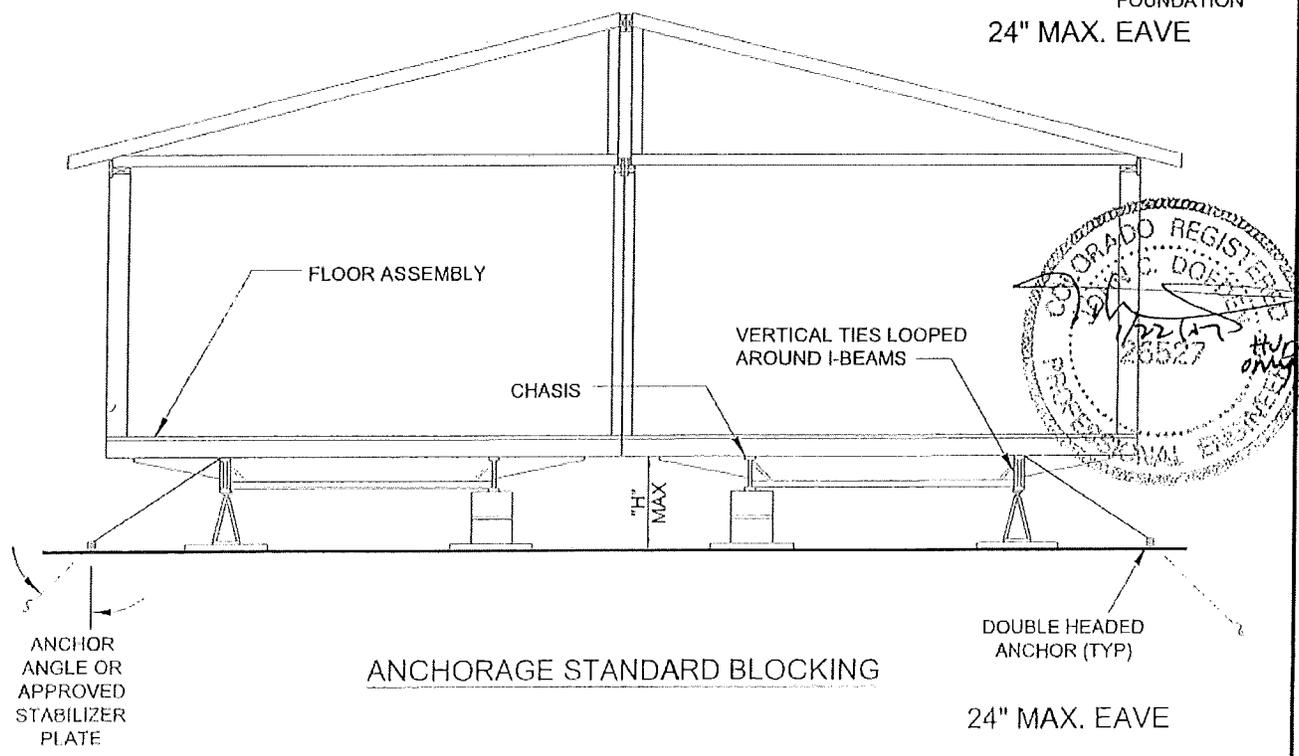
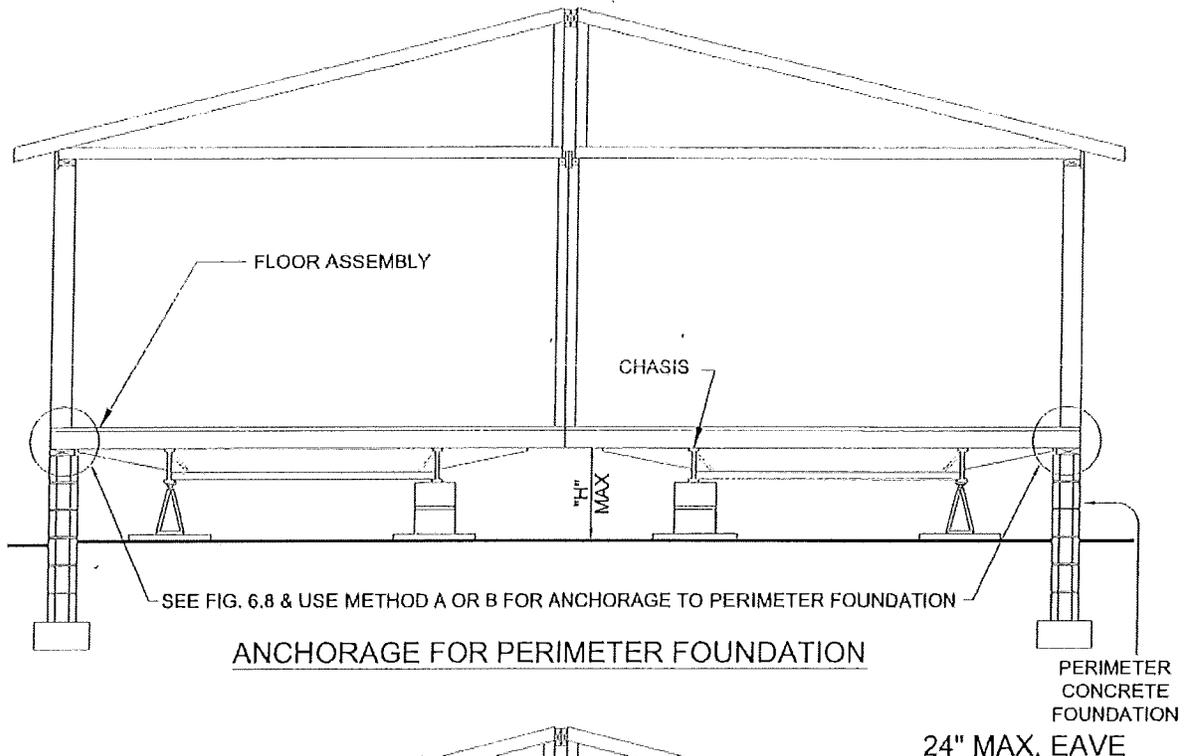
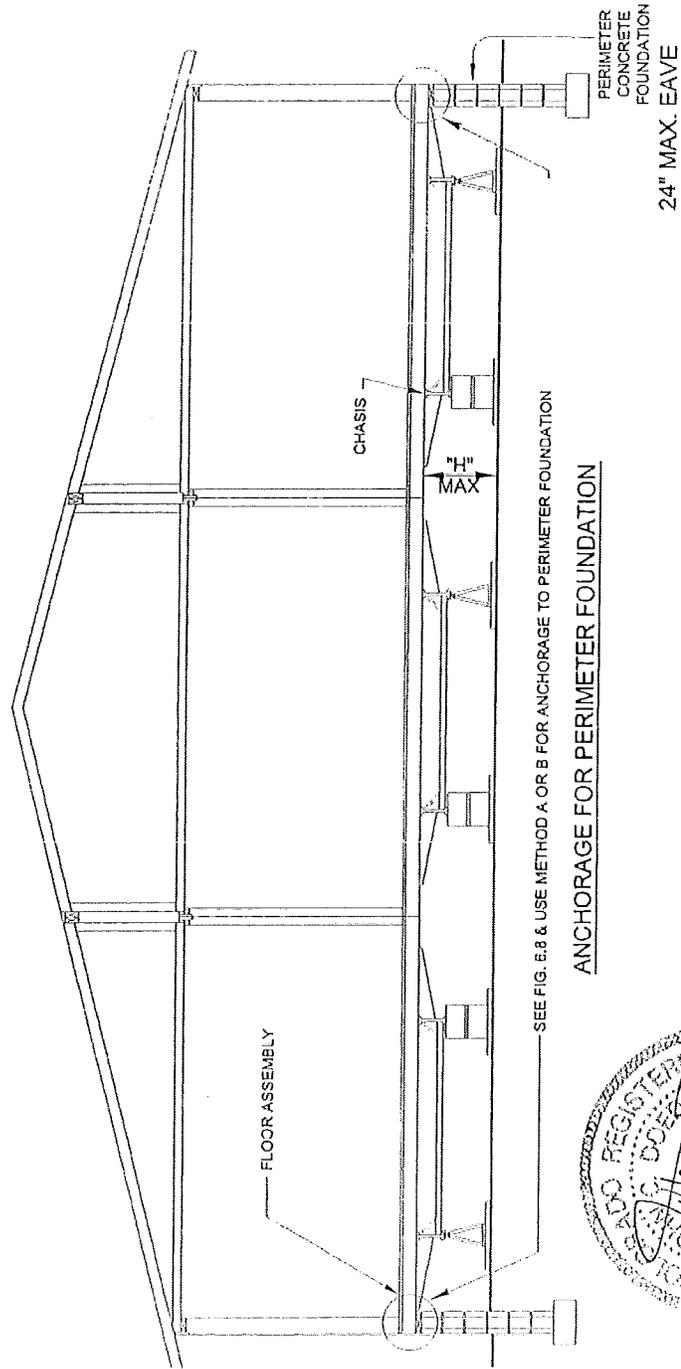


FIGURE 6.2

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			SCALE: NONE HUDSM35

# ANCHORAGE DETAILS



SEE FIG. 6.8 & USE METHOD A OR B FOR ANCHORAGE TO PERIMETER FOUNDATION

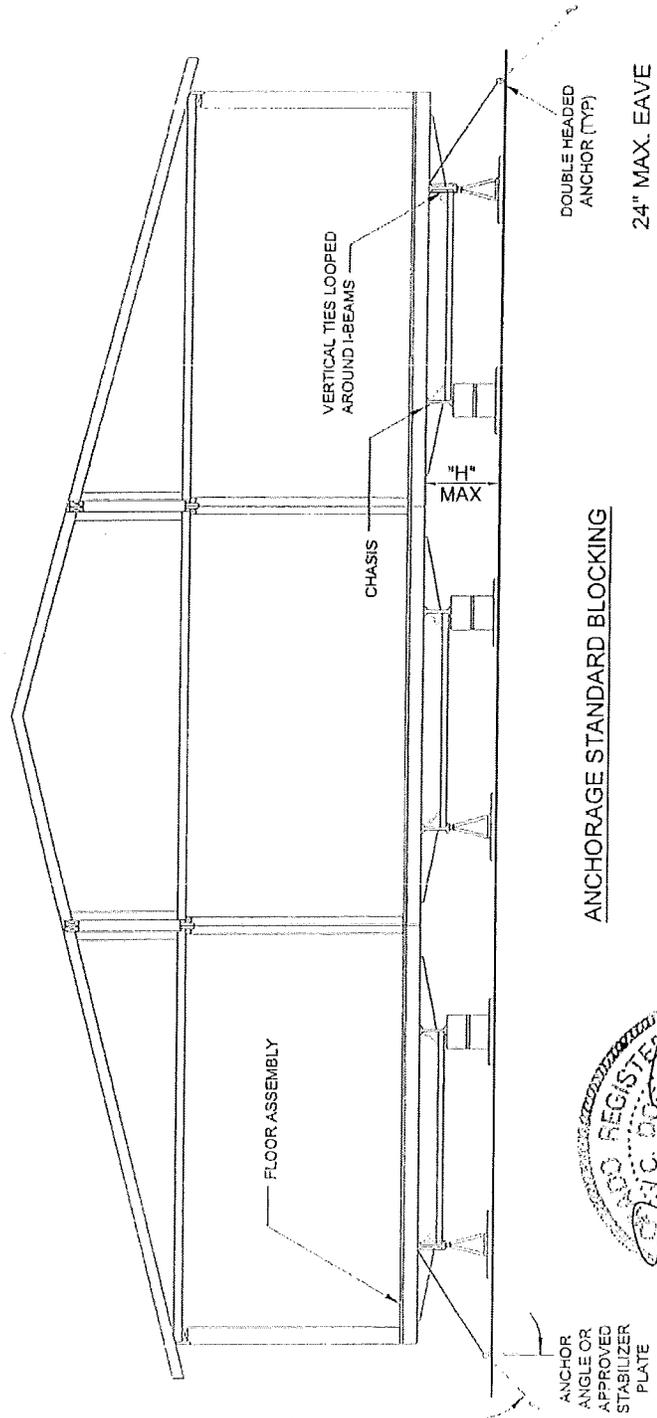
ANCHORAGE FOR PERIMETER FOUNDATION



FIGURE 6.2 (CONT.)

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# ANCHORAGE DETAILS



ANCHORAGE STANDARD BLOCKING

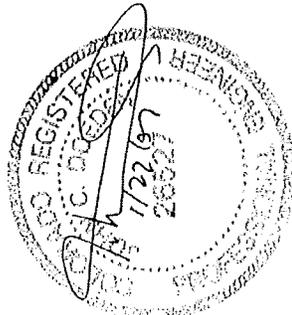


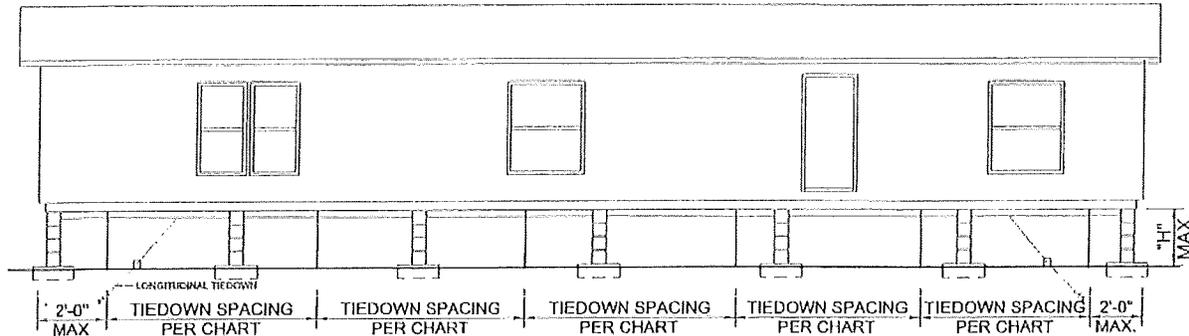
FIGURE 6.2 (CONT.)

REVISIONS	DATE	 <b>CHIEF® INDUSTRIES</b> HOUSING DIVISION	DRWG. BY: CES 11/08/06
			CHKD. BY:
			SCALE: NONE HUDSM37

# RECOMMENDED TIEDOWN SYSTEM

2.5:12, 3:12 OR 4:12 PITCH ROOF

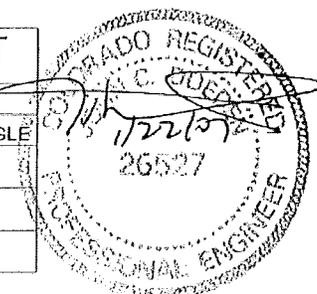
WIND ZONE 1 / 15 PSF LATERAL



TYPICAL SIDE ELEVATION SHOWING TIEDOWN SPACING

LOADS: HORIZONTAL = 15 PSF X 1.5 SAFETY FACTOR  
 UPLIFT = 9 PSF X 1.5 SAFETY FACTOR

FRAME TIE-DOWN SPACING CHART			
FLOOR WIDTH	WIND ZONE 1		
	SPACING	PIER HEIGHT "H" MAX.	ANCHOR ANGLE
26'-4" MIN.	5'-0"	34"	20° - 25°
29'-0" MIN.	7'-0"	36"	30°
39'-6" MIN.	5'-0"	34"	20° - 25°



\* GROUND ANCHORS NOT INSTALLED AT ANGLE SPECIFIED MUST HAVE AN APPROVED STABILIZER PLATE INSTALLED

NOTES:

1. FRAME TIE-DOWN SHOULD BE INSTALLED TO PROPERLY SECURE THE HOME.
2. OPTIONAL VERTICAL TIES MAY BE SECURED TO THE SAME GROUND ANCHOR AS THE DIAGONAL TIE-DOWNS WHEN DOUBLE HEADED ANCHOR IS CAPABLE OF RESISTING COMBINED LOADING. WHEN ANCHORS ARE NOT INSTALLED AT THE ANGLE SPECIFIED IN THE TABLE, A STABILIZER PLATE MUST BE INSTALLED IN ACCORDANCE WITH ANCHOR MANUFACTURER'S INSTRUCTIONS.
3. DIAGONAL TIE-DOWNS AND ANCHORS ARE NOT SUPPLIED BY CHIEF INDUSTRIES HOUSING DIVISION.
4. ALL TIE STRAPS ARE SUPPLIED BY OTHERS. ANCHORS AND END TREATMENTS ARE TO BE SUPPLIED BY OTHERS.
5. GROUND ANCHORS AND FRAME TIES SHALL BE CAPABLE OF RESISTING AN ULTIMATE TENSION LOAD OF 4,725 LBS. AND ARE TO BE INSTALLED PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS, BUT ARE NOT TO EXTEND BEYOND THE SIDEWALL OF THE HOME.
6. STEEL ANCHORING EQUIPMENT EXPOSED TO THE WEATHER SHALL BE PROTECTED WITH AT LEAST 0.30 OZ. OF ZINC PER SQUARE FOOT OF STEEL.
7. DESIGN BASED ON 121-1/2" I-BEAM SPACING AND A MAXIMUM SIDEWALL HEIGHT OF 9'-0" - MAX. EAVE = 24".
8. LONGITUDINAL TIES ARE INSTALLED JUST INSIDE I-BEAMS AT CROSSMEMBERS IN ACCORDANCE WITH THE TABLE AND NOTES 4, 6 & 7.
9. FRAME TIE-DOWNS ARE POSITIONED AT CROSSMEMBER LOCATIONS (WITHIN 3") WHEN STRAP COMES OFF FLANGE OF BEAM WITH APPROVED BUCKLE OR LOOP.
10. ANCHORS SHOULD BE CERTIFIED FOR THESE CONDITIONS BY A PROFESSIONAL ENGINEER, ARCHITECT OR A NATIONALLY RECOGNIZED TESTING LABORATORY AS TO THEIR RESISTANCE, BASED ON THE INSTALLED ANGLE OF DIAGONAL TIE AND/OR VERTICAL TIE LOADING AND ANGLE OF ANCHOR INSTALLATION AND TYPE OF SOIL IN WHICH THE ANCHOR IS TO BE INSTALLED WHEN SPECIFIED ANGLE CANNOT BE ACHIEVED.
- \*11. GROUND ANCHORS SHOULD BE EMBEDDED BELOW THE FROST LINE AND BE AT LEAST 12" ABOVE THE WATER TABLE. ANCHORS SHOULD ALSO BE INSTALLED TO THEIR FULL DEPTH AND STABILIZER PLATES INSTALLED TO PROVIDE RESISTANCE TO OVERTURNING OR SLIDING FORCES.
12. ANCHORING EQUIPMENT SHOULD BE CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER OR ARCHITECT TO RESIST THESE SPECIFIED FORCES IN ACCORDANCE WITH TESTING PROCEDURES IN ASTM STANDARD SPECIFICATION D3953-91, STANDARD SPECIFICATION FOR STRAPPING, FLAT STEEL AND SEALS.

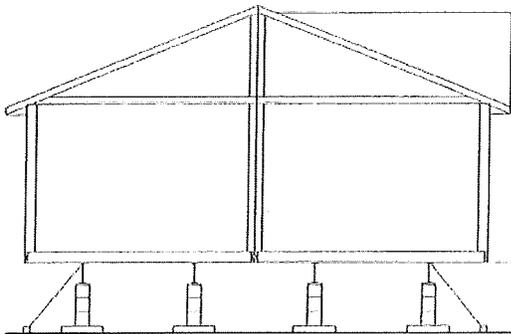
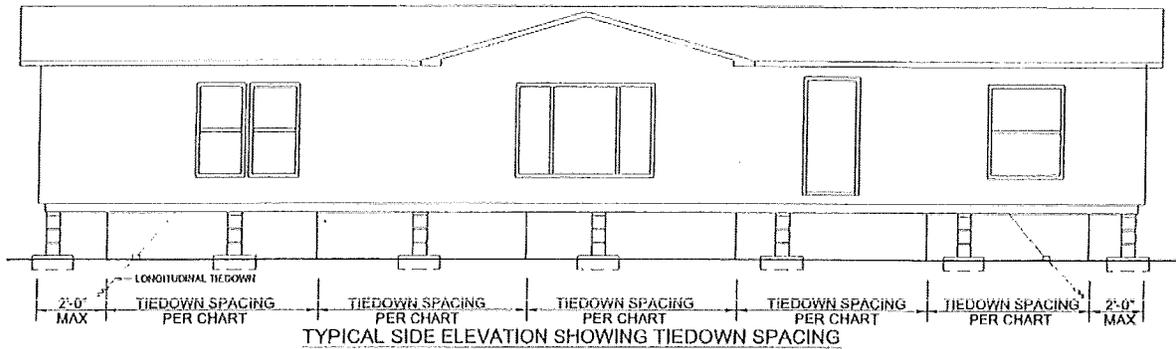
FIGURE 6.3

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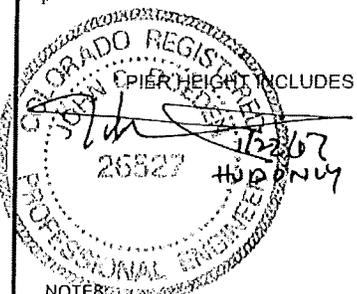
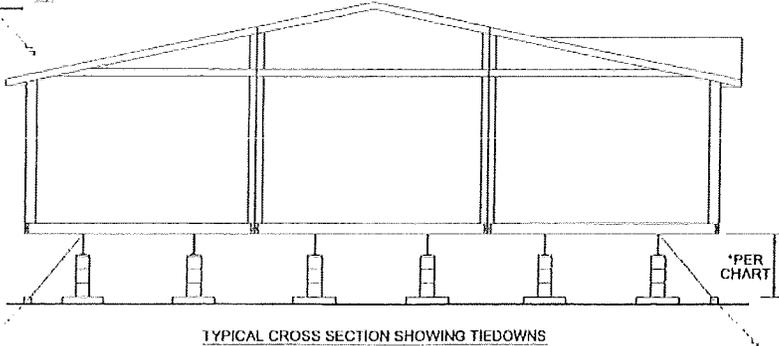
# RECOMMENDED TIEDOWN SYSTEM

## 2.5:12, 3:12 OR 4:12 ROOF WITH DORMER

### WIND ZONE 1 / 15 PSF LATERAL



FRAME TIE-DOWN SPACING CHART			
FLOOR WIDTH	WIND ZONE 1		
	SPACING	PIER HEIGHT "H" MAX.	STRAP AND ANCHOR ANGLE
26'-4" MIN.	4'-0"	34"	20° - 25°
29'-0" MIN.	5'-0"	42"	25° - 30°
39'-6" MIN.	4'-0"	34"	20° - 25°



- NOTES:**
1. FRAME TIE-DOWN SHALL BE INSTALLED TO PROPERLY SECURE THE HOME.
  2. FRAME TIE-DOWNS AND ANCHORS ARE NOT SUPPLIED BY CHIEF INDUSTRIES HOUSING DIVISION.
  3. GROUND ANCHORS AND FRAME TIES SHALL BE CAPABLE OF RESISTING AN ULTIMATE TENSILE LOAD OF 4,725 LBS. AND ARE TO BE INSTALLED PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS, BUT ARE NOT TO EXTEND BEYOND THE SIDEWALL OF THE HOME.
  4. STEEL ANCHORING EQUIPMENT EXPOSED TO THE WEATHER SHALL BE PROTECTED WITH AT LEAST 0.30 OZ. OF ZINC PER SQUARE FOOT OF STEEL
  5. DESIGN BASED ON 121-1/2" I-BEAM SPACING AND A MAXIMUM SIDEWALL HEIGHT OF 9'-0" AT HIGHEST POINT, MAX. EAVE = 24".
  6. ANCHORS SHALL BE CERTIFIED FOR THESE CONDITIONS BY A PROFESSIONAL ENGINEER, ARCHITECT OR A NATIONALLY RECOGNIZED TESTING LABORATORY AS TO THEIR RESISTANCE, BASED ON THE INSTALLED ANGLE OF DIAGONAL TIE AND/OR VERTICAL TIE LOADING AND ANGLE OF ANCHOR INSTALLATION AND TYPE OF SOIL IN WHICH THE ANCHOR IS TO BE INSTALLED.
  - \*7. GROUND ANCHORS SHALL BE EMBEDDED BELOW THE FROST LINE AND BE AT LEAST 12" ABOVE THE WATER TABLE. ANCHORS SHALL ALSO BE INSTALLED TO THEIR FULL DEPTH AND STABILIZER PLATES INSTALLED TO PROVIDE RESISTANCE TO OVERTURNING OR SLIDING FORCES, WHEN SPECIFIED ANCHOR ANGLE CANNOT BE ACHIEVED.
  8. ANCHORING EQUIPMENT SHALL BE CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER OR ARCHITECT TO RESIST THESE SPECIFIED FORCES IN ACCORDANCE WITH TESTING PROCEDURES IN ASTM STANDARD SPECIFICATION D3953-91, STANDARD SPECIFICATION FOR STRAPPING, FLAT STEEL AND SEALS.
  9. STRAPPING TO BE TYPE 1, FINISH B, GRADE 1 STEEL STRAPPING, 1-1/4" WIDE AND .035 INCHES IN THICKNESS, CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER OR ARCHITECT AS CONFORMING WITH ASTM STANDARD SPECIFICATION FOR STRAPPING, FLAT STEEL AND SEALS.
  10. THE CHART ABOVE IS ONLY APPLICABLE TO THE VAULTED PORTION OF THE UNIT, FOR TIEDOWN SPACING AND PIER HEIGHTS BEYOND THIS PORTION, REFER TO STANDARD TIEDOWN DESIGNS.

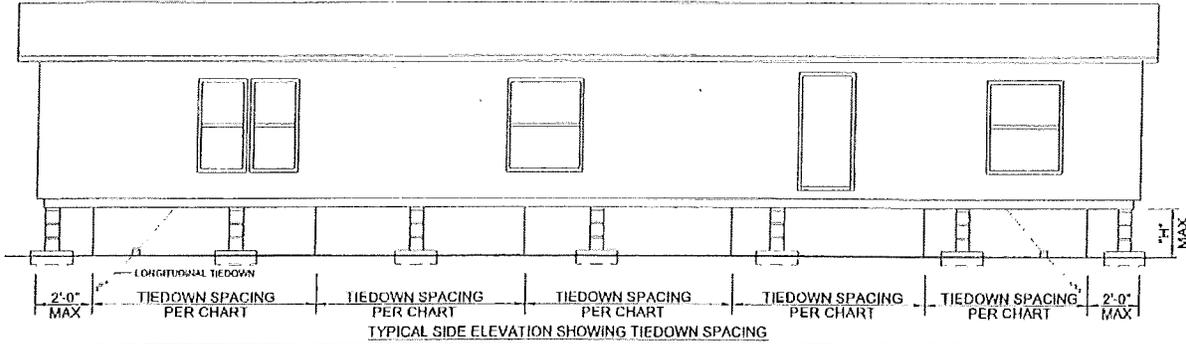
FIGURE 6.4

REVISIONS	DATE	 <b>CHIEF® INDUSTRIES</b> HOUSING DIVISION	DRWG. BY: CES 11/08/06
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# RECOMMENDED TIEDOWN SYSTEM - 6:12 PITCH ROOF

## WIND ZONE 1 / 15 PSF LATERAL

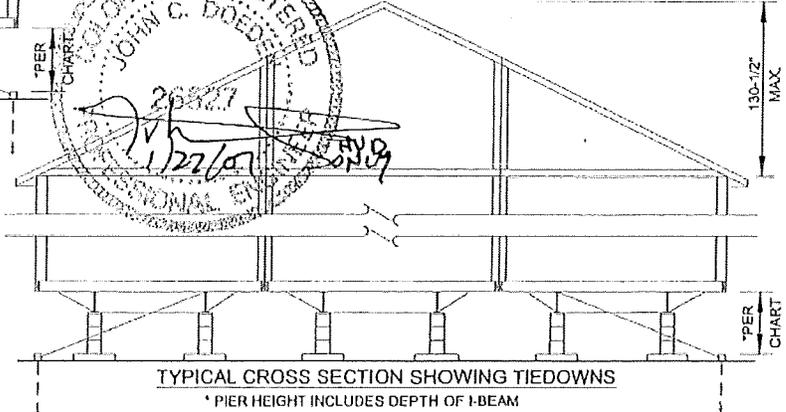
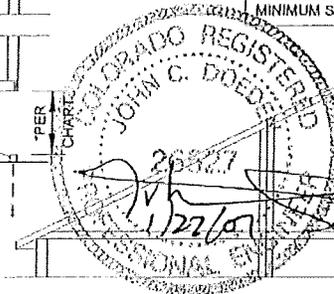
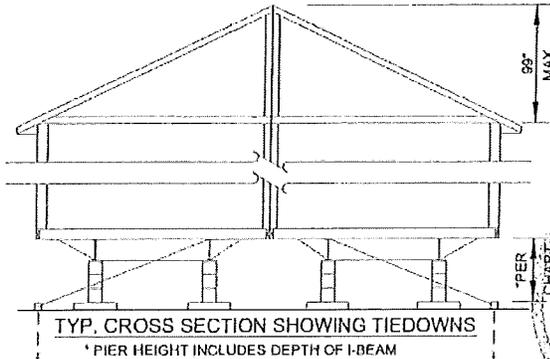
### (121-1/2" BEAM SPAN)



FRAME TIE-DOWN SPACING CHART		
FLOOR	WIND ZONE 1	
WIDTH	SPACING	MAX. PIER HEIGHT (H MAX)
26'-4"	7'-6"	34"
29'-0"	7'-6"	38"
39'-6"	6'-6"	38"

6:12 ROOF SLOPE (ALTERNATE WITH BLOCK PIERS*)			
FLOOR WIDTH	MINIMUM UNIT LENGTH		NUMBER OF LONGITUDINAL TIES TOTAL EACH END
	SINGLE STACK	DOUBLE STACK	
26'-4"	N/A	66'-0"	0
	58'-0"	48'-0"	
29'-0"	72'-0"	60'-0"	0
	29'-0"	29'-0"	
39'-6"	N/A	66'-0"	0
	64'-0"	56'-0"	

\* FOR USE IN ABOVE TABLES  
 SINGLE STACK BLOCK PIERS = 24" MAXIMUM HEIGHT  
 DOUBLE STACK BLOCK PIERS = 56" MAXIMUM HEIGHT  
 MINIMUM STRAP ANGLE (DEGREES) = 40°



6:12 ROOF SLOPE		
FLOOR WIDTH	MIN QTY EACH END EACH SECTION	MIN STRAP ANGLE (DEGREES)
26'-4"	2	40°
29'-0"	2	44°
39'-6"	2	44°

\* MAY REDUCE TO 0 OR 1 LONGITUDINAL TIE PER HALF WITH PIER RESTRICTIONS PER CHART ABOVE

**NOTES:**

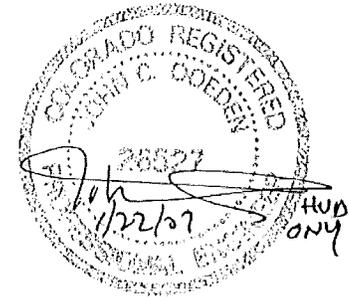
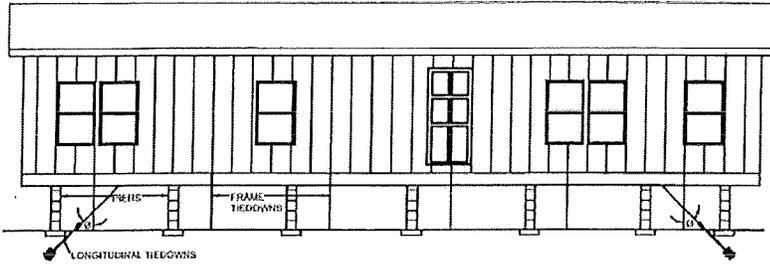
1. FRAME TIE-DOWN SHALL BE INSTALLED TO PROPERLY SECURE THE HOME.
2. FRAME TIE-DOWNS AND ANCHORS ARE NOT SUPPLIED BY CHIEF INDUSTRIES HOUSING DIVISION.
3. GROUND ANCHORS AND FRAME TIES SHALL BE CAPABLE OF RESISTING AN ULTIMATE TENSILE LOAD OF 4,725 LBS. AND ARE TO BE INSTALLED PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS, BUT ARE NOT TO EXTEND BEYOND THE SIDEWALL OF THE HOME.
4. STEEL ANCHORING EQUIPMENT EXPOSED TO THE WEATHER SHALL BE PROTECTED WITH AT LEAST 0.30 OZ. OF ZINC PER SQUARE FOOT OF STEEL.
5. DESIGN BASED ON 121-1/2" I-BEAM SPACING AND A MAXIMUM SIDEWALL HEIGHT OF 9'-0", MAX. EAVE = 24".
6. ANCHORS SHALL BE CERTIFIED FOR THESE CONDITIONS BY A PROFESSIONAL ENGINEER, ARCHITECT OR A NATIONALLY RECOGNIZED TESTING LABORATORY AS TO THEIR RESISTANCE, BASED ON THE INSTALLED ANGLE OF DIAGONAL TIE AND/OR VERTICAL TIE LOADING AND ANGLE OF ANCHOR INSTALLATION AND TYPE OF SOIL IN WHICH THE ANCHOR IS TO BE INSTALLED.
7. GROUND ANCHORS SHALL BE EMBEDDED BELOW THE FROST LINE AND BE AT LEAST 12" ABOVE THE WATER TABLE. ANCHORS SHALL ALSO BE INSTALLED TO THEIR FULL DEPTH, AND STABILIZER PLATES INSTALLED TO PROVIDE RESISTANCE TO OVERTURNING OR SLIDING FORCES, WHEN SPECIFIED ANCHOR ANGLE CANNOT BE ACHIEVED.
8. ANCHORING EQUIPMENT SHALL BE CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER OR ARCHITECT TO RESIST THESE SPECIFIED FORCES IN ACCORDANCE WITH TESTING PROCEDURES IN ASTM STANDARD SPECIFICATION D3953-91, STANDARD SPECIFICATION FOR STRAPPING, FLAT STEEL AND SEALS.
9. STRAPPING TO BE TYPE 1, FINISH B, GRADE 1 STEEL STRAPPING, 1-1/4" WIDE AND .036 INCHES IN THICKNESS, CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER OR ARCHITECT AS CONFORMING WITH ASTM STANDARD SPECIFICATION FOR STRAPPING, FLAT STEEL AND SEALS.
10. ANCHOR TO BE INSTALLED WITH AN APPROVED STABILIZER PLATE OR COLLAR.
11. WHEN INTERFERENCES EXIST IN BELLY BETWEEN I-BEAMS PREVENTING THE DIAGONAL TIE TO BE PROPERLY INSTALLED (TAUT) AT THE TOP OF THE OPPOSITE BEAM AS SHOWN, THE STRAP MAY ALTERNATELY COME OFF THE BOTTOM OF THE BEAM PROVIDED WITHIN 3" OF A CROSSMEMBER.

FIGURE 6.6

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			SCALE: NONE HUDSM40

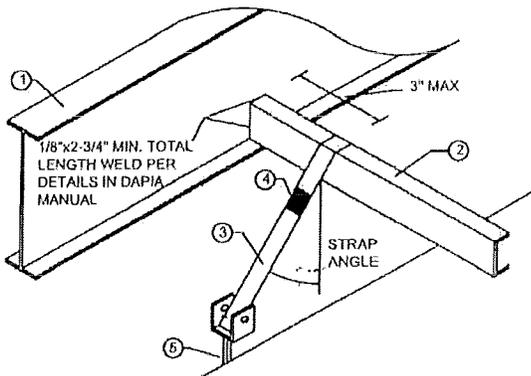
# WIND ZONE 1 (15 PSF LATERAL) RECOMMENDED TIEDOWN SYSTEM (ALTERNATIVE) LONGITUDINAL TIEDOWN REQUIREMENTS

TYPICAL SIDE ELEVATION SHOWING TIEDOWN SPACING



**ATTACHMENT DETAIL**

- 1: TYPICAL LONGITUDINAL I-BEAM
- 2: TYPICAL FRAME CROSSMEMBER (1-1/2"x2"x1-1/2"x13 GA. MINIMUM)
- 3: TIEDOWN STRAP
- 4: BANDING SEAL
- 5: GROUND ANCHOR - INSTALLED TO FULL DEPTH OF ANCHOR HEAD



**NOTES:**

1. SEE OTHER DRAWINGS FOR FRAME TIEDOWN REQUIREMENTS. THIS DETAIL IS FOR LONGITUDINAL TIEDOWN DESIGN ONLY.
2. WHEN ANCHORS ARE NOT INSTALLED AT THE ANGLE SPECIFIED IN THE TABLE A STABILIZER PLATE MUST BE INSTALLED IN ACCORDANCE WITH ANCHOR MANUFACTURER'S INSTRUCTIONS.
3. LONGITUDINAL TIEDOWNS AND ANCHORS ARE NOT SUPPLIED BY THE KARSTEN COMPANY.
4. GROUND ANCHORS AND FRAME TIES SHALL BE CAPABLE OF RESISTING AN ULTIMATE TENSION LOAD OF 4725# & ARE TO BE INSTALLED PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS, BUT ARE NOT TO EXTEND BEYOND THE SIDEWALL OF THE HOME.
5. STEEL ANCHORING EQUIPMENT EXPOSED TO THE WEATHER SHALL BE PROTECTED WITH AT LEAST 0.30 OZ. OF ZINC PER SQUARE FOOT OF STEEL.
6. DESIGN BASED ON A MAXIMUM SIDEWALL HEIGHT OF 9'-0" AND 121-1/2" I-BEAM SPACING.
7. LONGITUDINAL TIES ARE INSTALLED JUST INSIDE I-BEAMS AT CROSSMEMBERS IN ACCORDANCE WITH THE TABLE AND NOTES 3, 4, 5, 13 & 14.
8. ANCHORS SHALL BE CERTIFIED FOR THESE CONDITIONS BY A PROFESSIONAL ENGINEER, ARCHITECT OR A NATIONALLY RECOGNIZED TESTING LABORATORY AS TO THEIR RESISTANCE, BASED ON THE INSTALLED ANGLE OF DIAGONAL TIE AND/OR VERTICAL TIE LOADING AND ANGLE OF ANCHOR INSTALLATION AND TYPE OF SOIL IN WHICH THE ANCHOR IS TO BE INSTALLED.
9. GROUND ANCHORS SHALL BE EMBEDDED BELOW THE FROST LINE AND BE AT LEAST 12" ABOVE THE WATER TABLE.
10. GROUND ANCHORS SHALL BE INSTALLED TO THEIR FULL DEPTH AND STABILIZER PLATES SHOULD BE INSTALLED TO PROVIDE ADDED RESISTANCE TO OVERTURNING OR SLIDING FORCES.
11. ANCHORING EQUIPMENT SHALL BE CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER OR ARCHITECT TO RESIST THESE SPECIFIED FORCES IN ACCORDANCE WITH TESTING PROCEDURES IN ASTM STANDARD SPECIFICATION D3593-91, STANDARD SPECIFICATION FOR STRAPPING, FLAT STEEL AND SEALS.
12. STRAPPING TO BE TYPE 1, FINISH B, GRADE 1 STEEL STRAPPING, 1-1/4" WIDE AND .035 INCHES IN THICKNESS, CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER OR ARCHITECT AS CONFORMING WITH ASTM STANDARD SPECIFICATIONS D3593-91, STANDARD SPECIFICATION FOR STRAPPING, FLAT STEEL AND SEALS.
13. SELECT A CROSSMEMBER WHERE PIERS DO NOT INTERFERE WITH THE REQUIRED ANGLE OF THE STRAP. INSTALL THE STRAP JUST INSIDE THE MAIN BEAMS LOOPED AROUND THE CROSSMEMBER AND TIE TO AN ANCHOR LOCATED DIRECTLY UNDER THE MAIN BEAM AT THE ANGLE SPECIFIED IN THE CHART BELOW (SEE DETAIL)
14. WHEN THIS ANCHOR ANGLE IS NOT ATTAINABLE INSTALL ANCHOR PER MANUFACTURER'S INSTRUCTION WITH AN APPROVED STABILIZING PLATE.
15. LONGITUDINAL TIES ARE INSTALLED JUST INSIDE I-BEAM AT CROSSMEMBERS AT EACH END AND CANNOT BE DOUBLED.

**FIGURE 6.7**

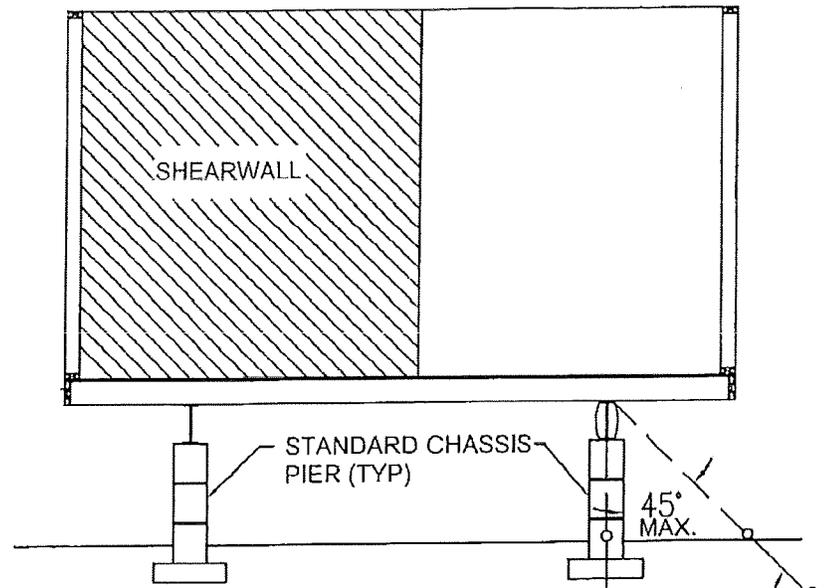
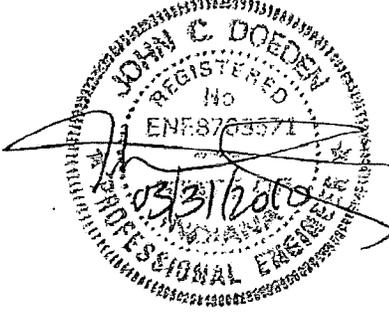
ROOF SLOPE NOT EXCEEDING 20 DEGREES (ALTERNATE WITH BLOCK PIERS*)				ROOF SLOPE NOT EXCEEDING 20 DEGREES NO RESTRICTION AS TO PIER TYPE OR HEIGHT (EXCEPT AS LIMITED BY OTHER DETAILS)		
FLOOR WIDTH	MINIMUM UNIT LENGTH		NUMBER OF LONGITUDINAL TIES (TOTAL EACH END)	FLOOR WIDTH	MINIMUM QUANTITY EACH END OF EACH SECTION	MINIMUM STRAP ANGLE (DEGREES)
	SINGLE STACK	DBL STACK				
26'-4" DOUBLE WIDE	58'-6"	50'-0"	0	158" DBL WIDE*	2	35°
	18'-0"	18'-0"	2			
29'-0" DOUBLE WIDE	73'-0"	62'-0"	0	174" DBL WIDE*	2	40°
	29'-0"	29'-0"	2			
39'-6" TRIPLE WIDE	62'-0"	54'-0"	0	158" TRIPLE*	3	38°
	32'-6"	28'-9"	2			

\* FOR USE IN ABOVE TABLE:  
SINGLE STACK BLOCK PIERS = 24" MAX. HEIGHT  
DOUBLE STACK BLOCK PIERS = 56" MAX. HEIGHT  
MINIMUM ANGLE OF STRAP = 40 DEGREES

\*\* THIS INCLUDES  
TAG UNITS

\* MAY REDUCE TO (0) OR (1) LONGITUDINAL TIE PIER HALF WITH PIER RESTRICTIONS PER CHART TO LEFT

REVISIONS	DATE		<b>CHIEF® INDUSTRIES</b> HOUSING DIVISION	DRWG. BY: CES 11/08/06 CHKD. BY: SCALE: NONE HUDSM41
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NOTE: TO FACILITATE ANCHOR INSTALLATION AFTER HOME IS SET A HOLE MAY BE DUG, 8" DIAMETER MAX. BACKFILL HOLE AND COMPACT TO ORIGINAL DENSITY AFTER ANCHOR INSTALLATION.

GROUND ANCHOR WITHIN 12" OF SHEARWALL

ALTERNATE APPLICATION\*  
TIEDOWN STRAP AND ANCHOR AT I-BEAM OPPOSITE SIDEWALL TO WHICH SHEARWALL IS ATTACHED.

\* MAXIMUM SHEARWALL DSV FOR ALTERNATE APPLICATION IS 320 PLF FOR 84" SIDEWALLS, 300 PLF FOR 90" SIDEWALLS, 280 PLF FOR 96" SIDEWALLS AND 250 PLF FOR 108" SIDEWALLS.

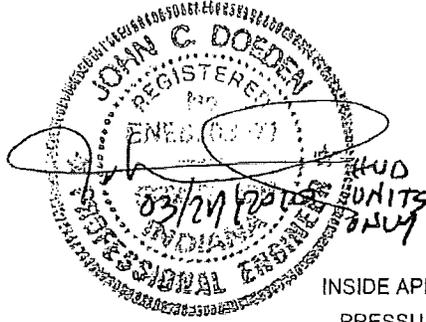
NOTES:

1. SHEARWALL LOCATIONS ARE IDENTIFIED BY FACTORY INSTALLED TAGS OR PAINT OR SHIP LOOSE FLOOR PLANS.
2. FOR SINGLE WIDE ZONE 1 UNITS THE END SHEARWALL TIEDOWN STRAP SHOWN ON THIS DETAIL AT THE I-BEAM MAY BE OMITTED AT A FULL DEPTH CROSSMEMBER LOCATION.

TYPICAL SHEARWALL TIEDOWN INSTALLATION  
WIND ZONE I

REVISIONS	DATE		CHIEF® INDUSTRIES	DRWG. BY: Hdg 03/31/10
			HOUSING DIVISION	CHKD. BY:
				SCALE: NONE 21.0541.1

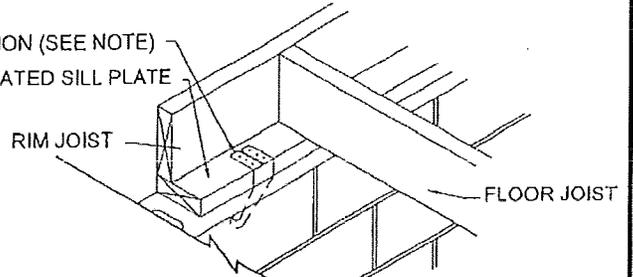
# Sill Plate Connections (Method A, B & C)



**NOTE:**

FOR UNITS CONTAINING NO INTERIOR SHEARWALLS OR WHEN THEY ARE OTHERWISE ANCHORED, AND EXCEPT AT ENDWALLS, SIMPSON MAS (OR EQUIVALENT) CONNECTORS MAY BE INSTALLED ON INSIDE OF SILL PLATE (BOTH SIDEWALLS). WHEN THESE CONDITIONS ARE MET MAX SPACING ALONG EACH SIDEWALL MAY BE 58" O.C.

INSIDE APPLICATION (SEE NOTE)  
PRESSURE TREATED SILL PLATE



**Method C**

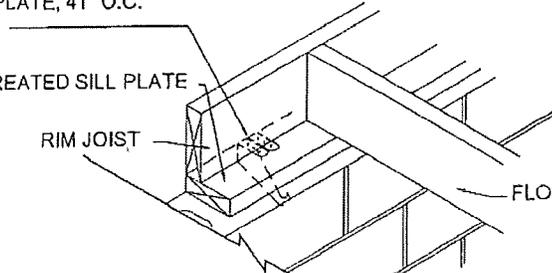
(SIDEWALL ONLY)

2-10d @ SIDE & 6-10d (0.148" x 1-1/2") @ TOP NAILS AT EACH MUD SILL ANCHOR SIMPSON MAS OR MASB (OR EQUIVALENT) INTO SILL PLATE, 41" O.C.

PRESSURE TREATED SILL PLATE

RIM JOIST

FLOOR JOIST

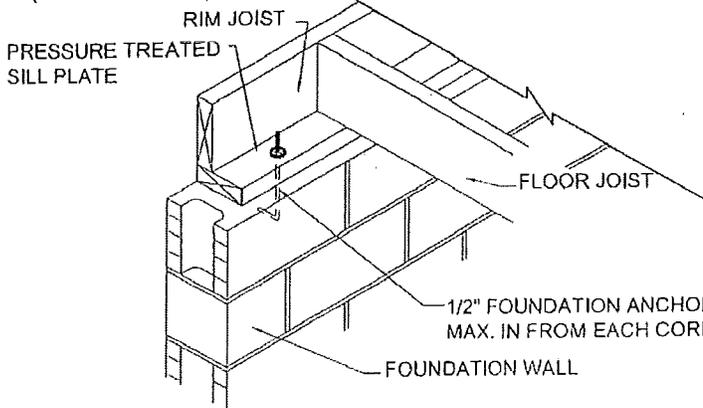


**Method B**

(SIDEWALL ONLY)

**Method A**

(SIDEWALL ONLY)



\* THESE DETAILS APPLY TO BOTH PERIMETER FOUNDATION WITH PIERS & BASEMENT CONSTRUCTION.

\* ANCHORAGE DESIGNED FOR STANDARD WIND ZONE 1 (15 PSF HORIZONTAL, 9 PSF UPLIFT X 1.5 SAFETY FACTOR)

**NOTES FOR METHOD A & B:**

- 1) ROOF PITCH UP TO 6/12, MAX. SIDEWALL HEIGHT = 9'-0", MAX. EAVE = 24", MAX. UNIT WIDTH = 14'-6".
- 2) ALL FASTENERS (INCLUDING ANCHOR BOLTS & WASHERS) IN CONTACT WITH PRESSURE TREATED SILL PLATE TO BE G185 COATED.
- 3) ANCHOR BOLTS & WASHERS TO BE GALVANIZED TO G185 (Z MAX) COATING, MIN. MINIMUM EMBEDMENT INTO CONCRETE IS 7" & MIN INTO MASONRY IS 15". WASHER IS 1-3/4" DIA. MIN.
- 4) SEE METHODS D THRU F FOR FLOOR TO SILL CONNECTIONS.

REVISIONS

DATE



**CHIEF® INDUSTRIES**

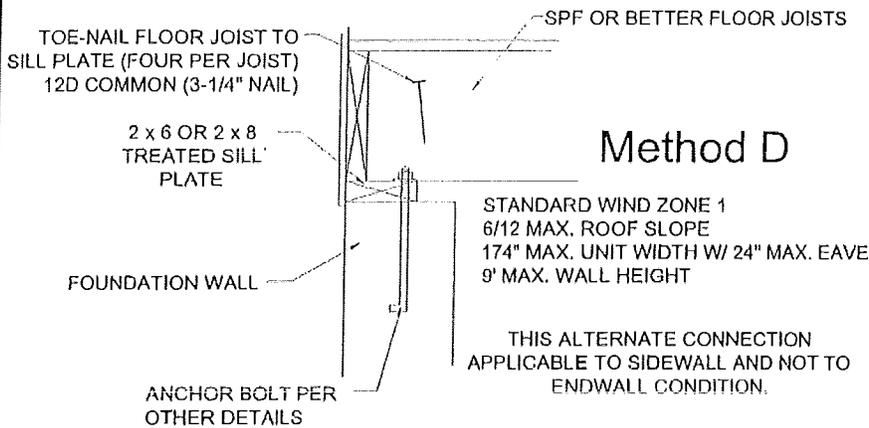
HOUSING DIVISION

DRWG. BY: CES 11/08/06

CHKD. BY:

SCALE: NONE 21.0542

# Joist to Sill Plate Connections (Method D, E & F)



**Method D**

\* THESE DETAILS APPLY TO BOTH PERIMETER FOUNDATION WITH PIERS & BASEMENT CONSTRUCTION.

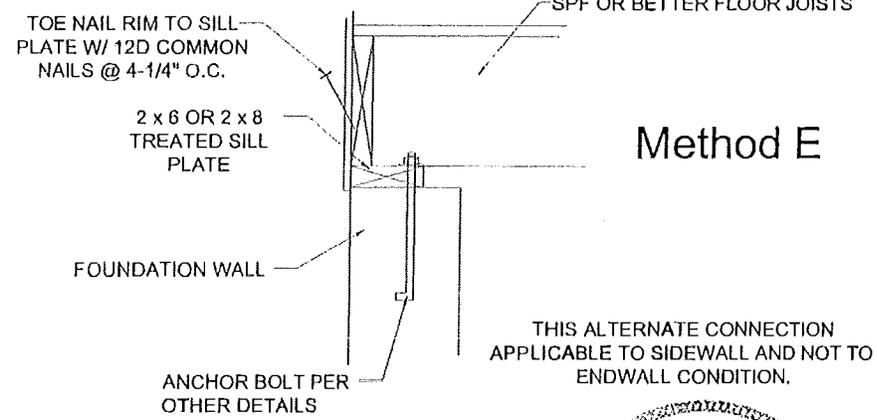
\* ANCHORAGE DESIGNED FOR STANDARD WIND ZONE 1 (15 PSF HORIZONTAL, 9 PSF UPLIFT X 1.5 SAFETY FACTOR)

NOTES FOR METHOD A, B & C:  
 1) ROOF PITCH UP TO 6/12, MAX. SIDEWALL HEIGHT = 9'-0", MAX. EAVE = 24".  
 2) ALL FASTENERS (INCLUDING NAILS) IN CONTACT WITH PRESSURE TREATED SILL PLATE TO BE G185 COATED.

STANDARD WIND ZONE 1  
 6/12 MAX. ROOF SLOPE  
 174" MAX. UNIT WIDTH W/ 24" MAX. EAVE  
 9' MAX. WALL HEIGHT

THIS ALTERNATE CONNECTION APPLICABLE TO SIDEWALL AND NOT TO ENDWALL CONDITION.

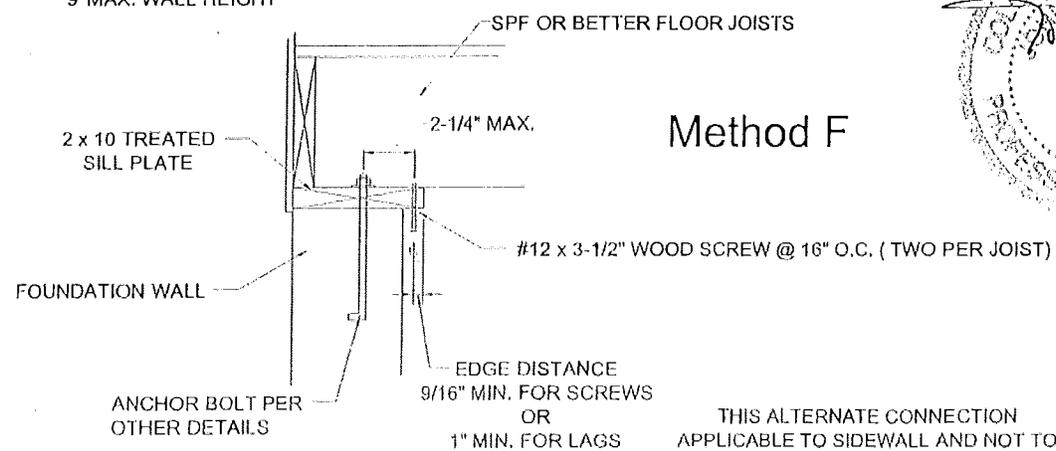
STANDARD WIND ZONE 1  
 6/12 MAX. ROOF SLOPE  
 174" MAX. UNIT WIDTH W/ 24" MAX. EAVE  
 9' MAX. WALL HEIGHT



**Method E**

THIS ALTERNATE CONNECTION APPLICABLE TO SIDEWALL AND NOT TO ENDWALL CONDITION.

STANDARD WIND ZONE 1  
 6/12 MAX. ROOF SLOPE  
 174" MAX. UNIT WIDTH W/ 24" MAX. EAVE  
 9' MAX. WALL HEIGHT



**Method F**

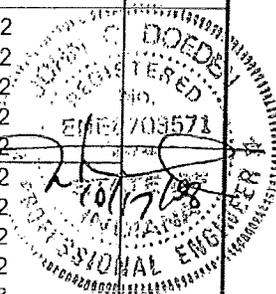
THIS ALTERNATE CONNECTION APPLICABLE TO SIDEWALL AND NOT TO ENDWALL CONDITION.



REVISIONS	DATE	 <b>CHIEF® INDUSTRIES</b> HOUSING DIVISION	DRWG. BY: CES 11/08/06
			CHKD. BY:
			SCALE: NONE HUDSM43

# MINIMUM FOOTING SIZE (OR EQUAL AREA) (INCHES)

PIER CAPACITY (POUNDS)	SOIL BEARING CAPACITY (PSF)				
	1000	1500	2000	4000	
600	12x12	12x12	12x12	12x12	SINGLE STACK CMU
800	12x12	12x12	12x12	12x12	
1000	12x12	12x12	12x12	12x12	
1500	15x15	12x12	12x12	12x12	
2000	17x17	14x14	12x12	12x12	
2500	19x19	15x15	13x13	12x12	
3000	21x21	17x17	15x15	12x12	
3500	22x22	18x18	16x16	12x12	
4000	24x24	20x20	17x17	12x12	
4500	25x25	21x21	18x18	13x13	
5000	27x27	22x22	19x19	13x13	
5500	28x28	23x23	20x20	14x14	
6000	29x29	24x24	21x21	15x15	
6500	31x31	25x25	22x22	15x15	
7000	32x32	26x26	22x22	16x16	
7500	33x33	27x27	23x23	16x16	
8000	34x34	28x28	24x24	17x17	
8500	35x35	29x29	25x25	17x17	
9000	36x36	29x29	25x25	18x18	
9500	37x37	30x30	26x26	19x19	
10000	38x38	31x31	27x27	19x19	
11000	40x40	32x32	28x28	20x20	
12000	42x42	34x34	29x29	21x21	
13000	43x43	35x35	31x31	22x22	
14000	45x45	37x37	32x32	22x22	
15000	46x46	38x38	33x33	23x23	
16000	48x48	39x39	34x34	24x24	
17000	49x49	40x40	35x35	25x25	
18000	51x51	42x42	36x36	25x25	
19000	52x52	43x43	37x37	26x26	
20000	54x54	44x44	38x38	27x27	
21000	55x55	45x45	39x39	28x28	
22000	57x57	46x46	40x40	28x28	
23000	58x58	47x47	41x41	29x29	
24000	59x59	48x48	42x42	30x30	
25000	60x60	49x49	43x43	30x30	



SINGLE STACK CMU

DOUBLE STACKED CMU

SPECIAL DESIGN

**NOTES:**

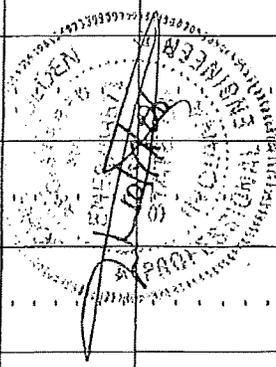
1. FOOTING SIZES SHOWN ARE FOR SQUARE PADS AND ARE BASED ON THE AREA (SQUARE INCHES) REQUIRED FOR THE LOAD. OTHER FOOTING CONFIGURATIONS, SUCH AS RECTANGULAR, MAY BE USED PROVIDED THE AREA (SQUARE INCHES) IS EQUAL TO OR GREATER THAN THE AREA OF THE SQUARE FOOTING SHOWN IN THE TABLE. FOR EXAMPLE, A 12"x22" (288 SQ. IN.) FOOTING MAY BE USED IN PLACE OF A 16"x16" (256 SQ. IN.) FOOTING. ALSO, TWO 12"x24" PADS MAY BE USED IN PLACE OF ONE 24"x24" PAD. PROJECTION SHALL NOT EXCEED "P".
2. THE FOLLOWING TABLE SPECIFIES THE MAXIMUM FOOTING SIZE FOR VARIOUS FOOTING THICKNESSES. THIS TABLE IS BASED ON UNREINFORCED FOOTINGS. REINFORCED FOOTINGS MAY REQUIRE A SMALLER THICKNESS THAN THAT LISTED BUT MUST BE DESIGNED BY A LICENSED ENGINEER.
3. THE FOOTING CAPACITIES TABULATED ARE FOR TOTAL LOAD. THE GRAVITY LOADS PRESENTED IN THE TABLES IN THIS MANUAL INCLUDE THE WEIGHT OF THE PIER AND FOOTER AND NO FURTHER ADJUSTMENT IS REQUIRED. HOWEVER, WHEN ADDITIONAL LOAD CALCULATIONS ARE REQUIRED THE LOAD MUST INCLUDE THESE WEIGHTS. PIER CMU BLOCKS TYPICALLY WEIGH APPROXIMATELY 30 POUNDS APIECE AND CONCRETE FOOTERS WEIGH APPROXIMATELY 150 PCF (EXAMPLE: 24x24x6 FOOTER WEIGHS 300#)

TABLE 6.1      FOOTING SIZES

REVISIONS	DATE	 <b>CHIEF® INDUSTRIES</b> HOUSING DIVISION	DRWG. BY: CES 11/08/06
REVISE FOR NEW HUD REQ.	10/8/08		CHKD. BY:
			SCALE: NONE HUDSM44

MINIMUM THICKNESS OF FOOTERS FOR SINGLE AND DOUBLE STACKED PIERS (INCHES)  
SOIL BEARING CAPACITY (PSF)

PIER FOOTING SIZE	1000		1500		2000		2500		3000		3500		4000	
	SINGLE	DOUBLE	SINGLE	DOUBLE	SINGLE	DOUBLE	SINGLE	DOUBLE	SINGLE	DOUBLE	SINGLE	DOUBLE	SINGLE	DOUBLE
	16 x 16	4	4	4	4	4	4	4	4	4	4	4	4	4
17 x 17	4	4	4	4	4	4	4	4	4	4	4	4	4	4
18 x 18	4	4	4	4	4	4	4	4	4	4	4	4	4	4
19 x 19	4	4	4	4	4	4	4	4	4	4	4	4	4	4
20 x 20	4	4	4	4	4	4	4	4	4	4	4	4	4	4
21 x 21	6	6	6	6	6	6	6	6	6	6	6	6	6	6
22 x 22	6	6	6	6	6	6	6	6	6	6	6	6	6	6
23 x 23	6	6	6	6	6	6	6	6	6	6	6	6	6	6
24 x 24	6	6	6	6	6	6	6	6	6	6	6	6	6	6
25 x 25	6	6	6	6	6	6	6	6	6	6	6	6	6	6
26 x 26	6	6	6	6	6	6	6	6	6	6	6	6	6	6
27 x 27	6	6	6	6	6	6	6	6	6	6	6	6	6	6
28 x 28	6	6	6	6	6	6	6	6	6	6	6	6	6	6
29 x 29	6	6	6	6	6	6	6	6	6	6	6	6	6	6
30 x 30	6	6	6	6	6	6	6	6	6	6	6	6	6	6
31 x 31	6	6	6	6	6	6	6	6	6	6	6	6	6	6
32 x 32	6	6	6	6	6	6	6	6	6	6	6	6	6	6
33 x 33	6	6	6	6	6	6	6	6	6	6	6	6	6	6
34 x 34	6 1/8	6	6	6	6	6	6	6	6	6	6	6	6	6
35 x 35	6 3/8	6	6	6	6	6	6	6	6	6	6	6	6	6
36 x 36	6 1/2	6	6	6	6	6	6	6	6	6	6	6	6	6
37 x 37	6 3/4	6	6	6	6	6	6	6	6	6	6	6	6	6
38 x 38	7	6	6	6	6	6	6	6	6	6	6	6	6	6
39 x 39	7 1/4	6	6	6	6	6	6	6	6	6	6	6	6	6
40 x 40	7 3/8	6	6	6	6	6	6	6	6	6	6	6	6	6
41 x 41	7 3/4	6	6	6	6	6	6	6	6	6	6	6	6	6
42 x 42	7 7/8	6 1/8	6	6	6	6	6	6	6	6	6	6	6	6
43 x 43	8 1/8	6 3/8	6	6	6	6	6	6	6	6	6	6	6	6
44 x 44	8 3/8	6 1/2	6	6	6	6	6	6	6	6	6	6	6	6
45 x 45	8 5/8	6 3/4	6	6	6	6	6	6	6	6	6	6	6	6
46 x 46	8 3/4	7	6	6	6	6	6	6	6	6	6	6	6	6
47 x 47	9	7 1/4	6	6	6	6	6	6	6	6	6	6	6	6
48 x 48	9 3/8	7 3/8	6	6	6	6	6	6	6	6	6	6	6	6
49 x 49	9 1/2	7 3/4	6	6	6	6	6	6	6	6	6	6	6	6
51 x 51	10	8 1/8	6	6	6	6	6	6	6	6	6	6	6	6
52 x 52	10 1/4	8 3/8	6	6	6	6	6	6	6	6	6	6	6	6
54 x 54	10 5/8	8 3/4	6	6	6	6	6	6	6	6	6	6	6	6
55 x 55	10 7/8	9	6	6	6	6	6	6	6	6	6	6	6	6
57 x 57	11 3/8	9 1/2	6	6	6	6	6	6	6	6	6	6	6	6
58 x 58	11 5/8	9 3/4	6	6	6	6	6	6	6	6	6	6	6	6
59 x 59	11 3/4	10	6	6	6	6	6	6	6	6	6	6	6	6
60 x 60	12	10 1/4	6	6	6	6	6	6	6	6	6	6	6	6



NOTES:  
 1. THE THICKNESSES IN THE CHART ABOVE ARE DESIGNED FOR SINGLE AND DOUBLE STACKED CONCRETE BLOCKS (CMU'S) CENTERED ON THE FOOTER.  
 2. POURED FOOTERS ARE TO HAVE A 3000 PSI COMPRESSIVE STRENGTH AT 28 DAYS. MINIMUM THICKNESS OF POURED FOOTERS IS 6".  
 3. THIS TABLE IS BASED ON UNREINFORCED FOOTINGS. REINFORCED FOOTINGS MAY ALLOW FOR A SMALLER THICKNESS THAN THAT LISTED BUT MUST BE DESIGNED BY A REGISTERED PROFESSIONAL ENGINEER.

TABLE 6.2  
MINIMUM FOOTING THICKNESSES

REVISIONS	DATE	<b>CHIEF® INDUSTRIES</b> HOUSING DIVISION	DRWG. BY: CFS 11/08/06
REVISE FOR NEW HUD REQ.	10/8/08		CHKD. BY:
			SCALE: NONE HUDSM45



**SECTION VI**

**SITE ASSEMBLY INSTRUCTIONS**

## ADDENDUM – SITE PREPARATION

Information contained on these addendum pages is to enhance and sometimes supersede the following pages that pertain to the details of the completion of the setting of your home.

Grade the home site to permit water to drain from under the home. All drainage at the home site must be diverted away from the home and must slope a minimum of  $\frac{1}{2}$ " per foot away from the foundation for the first ten feet.

Cover the entire area under the home using a polyethylene sheeting or its equivalent, at least six mils thick. Overlap it at least 12" at all joints with adhesive at all joints. Where soil and frost conditions permit placement of footings at grade level, place the sheeting directly beneath them. Sheeting shall be sealed or caulked at all penetration for piers, utility connections or other items. Repair any voids or tears in the retarder by patching with like material, maintaining a 12" minimum overlap and sealing joints with mastic.

If the crawlspace under the home is to be enclosed with skirting or other material you must provide ventilation of this space. Skirting installed around the home should have non-closing vents located at or near each corner and as high as possible to cross-ventilate the entire space under the home. Vent free area should be equal to at least one square foot for every 150 square feet of the home's floor area. This area should be further increased when insect screens, slats, etc. are used over the open vent area. When a 6 mil plastic vapor retarder is installed under the home, the ventilation requirement may be reduced to one square foot per every 1500 square feet of floor area. In freezing climates, install skirting so as to accommodate 1 – 2 inches of frost heave uplift to prevent buckling of floors. Take care that rainwater cannot be channeled or trapped between the skirting and siding. Skirting is to be installed in such a manner that the vinyl will be allowed to slide (expand and contract)

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## Summary

## General

### Introduction

Thank you for choosing Chief® Industries as your home builder. We hope your new home brings you comfort and pleasure for many years to come. This home was engineered, constructed and inspected to comply with the *Federal Manufactured Homes Construction and Safety Standards* in effect on the date of construction. Minimal specifications are required from national standards for the design, construction, thermal protection, heating systems, plumbing systems and electrical systems for HUD homes intended for residential use.

Our intent is to produce a safe and comfortable home for you. Our company standards surpass compliance with national standards. Chief® Industries has highly qualified plant personnel to inspect these standards throughout the construction process.

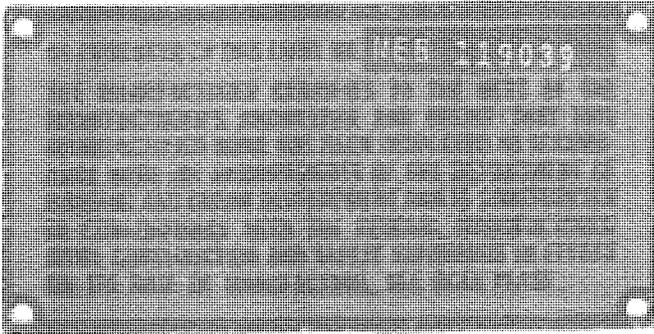
Before set up can even begin, you must contact the building officials in your area for necessary permits, licenses and inspections required for installation of this home. It is extremely important in preparing your home for its occupancy that it be properly blocked, set and leveled by an experienced HUD home mover, dealer or installer. Correct procedures in setting your home could prevent any costly future reconstruction.

The following step-by-step instructions were designed to assist you with the installation of your home. *Due to changes that are brought about by Chief® Industries continuing effort to improve our product and provide our customers with a wide variety of features; there may be products in or on your home that are not thoroughly covered by this manual. Before starting the set up process, you should go completely through your home owner's information carefully to see if there are supplemental details before any attempt is made in setting your home.*

Data describing the roof and wind loads for which your home was designed may be found on the data plate in your home. Load zone maps of the United States showing roof load, wind load and thermal zones are also included in the Homeowners Manual. The support system must resist all vertical loads from the weight of your home, plus temporary extra roof loading and it must resist side loads imposed on the structure by wind gust.

All HUD home installers shall comply with the requirements of local zoning ordinances and conditional use permits established by local authorities pertaining to any health and/or safety codes.

**IMPORTANT: The HUD label attached to the exterior of the home needs to remain visible. Do not obstruct the view and/or permanently remove. If siding needs to be repaired or replaced make sure to reattach the HUD label in the same or equivalent method. The HUD label should be located on the endwall at the rear of the home (12) inches in from the left side and (12) inches up from the bottom of the home. The label looks like the picture following:**



### Set Up Responsibility

Many local codes require that your home must be set up by a dealer, installer or home mover specially licensed for this procedure. If your dealer is not licensed himself, he will make the arrangements with a contractor who is licensed. It is strongly recommended that the home be set and leveled by professional persons experienced in the construction of HUD homes.

### Site Implications

When selecting a site some items to be considered are as follows:

- Is your site suitable for its intended use?
- Does this intended use act in accordance with any jurisdiction over it? (Federal, State and Local laws)
- Have you considered inherent potential hazards?
  - Considering such things as:
    - proximity to flood plains or water features; these might cause flooding, excessive humidity, erosion and sediment deposition.
    - proximity to noise and air pollution such as industrial sites, construction sites, landfills, traffic ways and airports.
    - "hidden" factors such as groundwater table level, soil composition and bearing capacity, frost line and possible termite infestation.

Once all problems encountered on your site are addressed with corrective work, you will be able to begin site preparation.

## Home Installation

### Site Preparation

The process of supporting your home for occupancy has three initial steps -- site preparation, setting and blocking and leveling. These are the first of many important steps to be seriously adhered to in order to prevent costly reconstruction measures you may encounter in the future. If you intend to

place the home on a site of your own, some work will be necessary.

Normally, the area of the site where you will locate the home should be relatively level. However, the area beneath the home should have enough slope to allow for good water drainage. The recommended slope is one (1) inch for every four (4) feet. The rest of the site should be graded in a manner that rainwater and melting snow will be diverted from the support or foundation of the house. A vapor barrier, such as a layer of polyethylene plastic sheeting or similar material must be placed on the ground under the home. Supports must rest on undisturbed soil or on fill that has been compacted and fully settled.

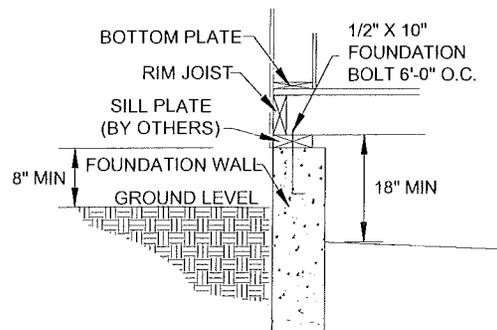
In addition, provision for utilities must be made before the home is set. Installation of lines and equipment supplying water, electricity and fuel, plus sewage disposal systems must be completed and ready for connection in accordance with all local codes and regulations. Your county engineer, building inspector or local utility company officials can advise you on the requirements in your community.

### Foundations & Piers

Proper support for your home includes footings and blocking. The purpose of supports is to distribute the load of your home as evenly as possible on the footings and to provide a sturdy base. The footings carry and distribute the weight of the home placed on the blocking. Piers are usually built or appropriate support stands on individual footings. We recommend two (2) types of piers: concrete block or steel jacks. These piers can also be used in combination with a concrete perimeter foundation.

Support piers are generally constructed of standard (8" x 8" x 16") concrete blocks. Blocking must be tall enough to raise the under side of the frame at least (12) inches off ground level and to keep the under sides of the floor joist at least (18) inches off the ground. On sloped sites where tall piers are unavoidable, many codes require a permanent supporting structure, such as piers of poured or block concrete.

Adjustable steel jacks make excellent supports and simplify the job of leveling. Any manufactured supports that you use should be listed and labeled by an approved testing agency. Your setup contractor or your local building inspector can advise you on the best supports to use.



TYPICAL PERIMETER FOUNDATION

The perimeter foundation could be constructed of either poured or block concrete. This type of perimeter support allows the I-Beam piers to be spaced at larger intervals. This versatile foundation setup allows for either a crawlspace setup or a basement application.

Even though Chief® recommends footings installed below frost level, shallow frost free footings may be installed. They must be designed and approved by a Registered Architect or Professional Engineer. Chief® Industries does not provide design of shallow frost free footings. You will have fewer problems maintaining a level home if the footings lie below the frost line in your community. This minimizes the heave and fall of the piers during the freeze and thaw cycle. **BonnaVilla® Homes is not responsible for foundation design. Foundation and piers are to be designed per local jurisdiction requirements by an Engineer or Architect.** Refer to the respective sections in this manual dealing with these areas.

Pre-cast footings can be substituted for poured concrete footings. They simplify the process of blocking. These should be listed and labeled by an approved testing agency.

*\*\*This next set of instructions is specifically for finishing a tip-up roof application. This feature is an option and is not included with a standard specification house.\*\**

### Tip-Up Roof Trusses & Dormer Completion

Instructions for setting up Tip-Up roof truss and/or Dormer completion are included in separate section enclosed with this Installation manual. Refer to the appropriate section if this applies to your home.

*\*\*This next set of instructions is specifically for a snow load roof option. This is an option and is not included with a standard specification house.\*\**

### Snow Load Designed Roofs

In order to support the snow load applied to the home, perimeter blocking becomes a necessity. To accommodate this additional blocking prints are provided with your installation manual.

- 1) The blocking prints provided will demonstrate proper pier spacing for your situation. Refer to the appropriate section for information on the foundation type that you have chosen.
- 2) Pier size and construction are also listed on the charts for pier loading.
- 3) Continue set up per foundation type.

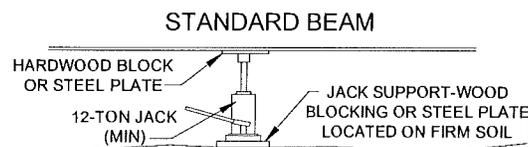
### Lifting Considerations

By following this information you will minimize the setup related problems you may have during the installation of your home.

**WARNING:** Sitting under a manufactured home when it is suspended on jacks is dangerous. If the home slips off of the jack(s), you or someone could be seriously or even fatally injured.

If it is ever necessary to be underneath the home, make sure that there is sufficient blocking to safely carry the load of the home. If the home is being moved by rollers, beams or craning make sure there are timbers or other safety blocking material supports in place so as to safely limit the distance the home can fall or unexpectedly move. Never suspend a home more than four (4) inches above safety supports. Always follow the six (6) **minimum** safety precautions when lifting a home:

- 1) Use only jacks in good condition with a (12) ton minimum rating.
- 2) Provide a firm support such as wood blocking or a steel plate underneath the jack bases to prevent them from tipping.
- 3) Leave tires and axles on the unit until all blocking is in place in order to reduce the hazard from collapse.
- 4) Using a minimum of three (3) jacks along each length of I-Beam distribute the concentrated loads created by the jacks by using (3/8" x 4" x 12") steel plates or (4" x 4" x 12") hard wood blocks between the jacks and the main I-Beam.



### SAFE JACK SUPPORT



**WARNING:** Never apply the jack directly to the I-beam or other structural member.

Such a concentrated load may cause the I-Beam or structural member to fail resulting in the home sliding off the jack.

- 5) Position safety support beneath solid members such as I-Beams or floor joists and never under an axle or other spring-mounted member.
- 6) Avoid overstressing structural members.

### Craning Method

Another method of placing the home sections onto a foundations is with the use of a crane(s), otherwise referred to as "slinging a home." The procedure involves lifting each home section with slings suspended from a crane. The slings should always be secured to a spreader bar at the lifting point to prevent damaging the homes exterior components (see **Figure 1**). Typically, two (2) cranes are used to locate the slings at the correct position lengthwise. Slinging homes has the benefit of the ability to set the home in a quicker time span and allow adaptation to current property and landscape restrictions. Unfortunately, there are some negative aspects to this system as well. In some cases, if slings

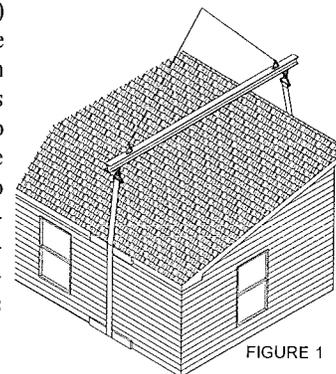
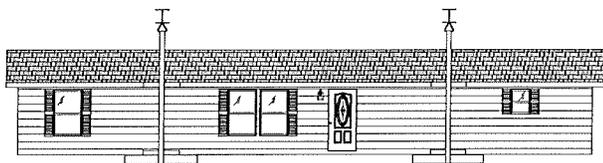


FIGURE 1

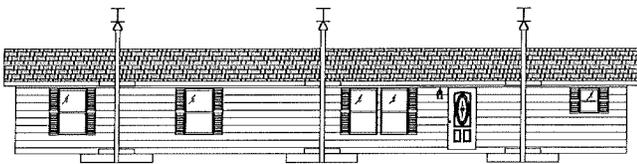
are not located in structurally sound locations of the home, damage to the framing and wall finish can occur. To determine the capacity of the cranes needed contact a BonnaVilla® Homes Salesperson or Engineering Department representative for typical home weights. This information can also be found on the BonnaVilla® Homes website in the Dealer Section.

The initial steps of preparing the home for craning will be no different from those requirements described in "Lifting Considerations" section of the Installation Manual. Chief® Industries, Inc. recommends the use of synthetic flat straps rather than the cable slings. In addition, removable shipping walls on the marriage lines of the home are to remain in place until the units are set. Finally, all set-up materials (siding, shingles, lumber, etc.) will need to be removed from the units prior to craning, as this will provide maximum strength of the unit with the least amount of weight during the craning process, then the slings should be placed in the lifting locations (these locations shall be reinforced with lumber to resist penetration of the structure and/or damage to exterior siding). These locations are based on several factors: First, the location should be spaced according to **Figure 2** and **Figure 3** to balance the weight of the home.



64' (60' floor) or less

**Figure 2**

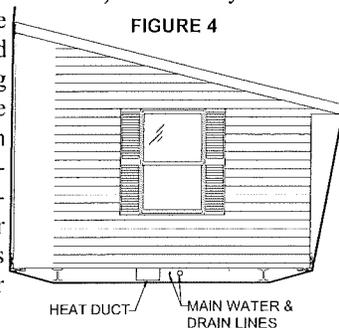


68' (64' floor) or more

**Figure 3**

Secondly, the straps should be located in an area where a minimum of four (4) foot of exterior and marriage wall occurs. This would be away from window, door and archway locations, if possible. A final consideration is **two (2) slings are required as a minimum on a 64' home (60' floor actual size) and three (3) slings are required as a minimum on 68' home (64' floor actual size) or longer.** Thirdly, the slings should be placed over a framing member (floor joist, exterior wall stud and marriage wall stud) - mandatory.

When the slings are placed, lumber shall be placed under each sling and each sling shall be placed on the outside of the steel frame (as shown in **Figure 4**), this is the responsibility of the **installer** to follow this procedure to clear such structures. The structures are as listed: drain lines, water lines, electrical

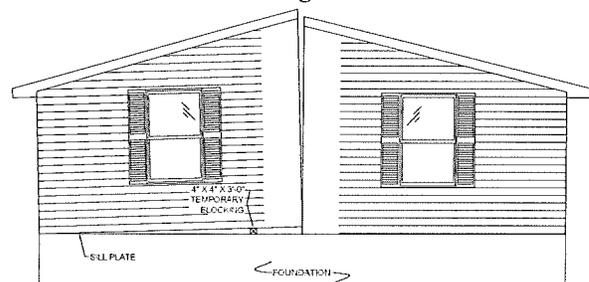


wiring and all HVAC ductwork. Provision should be made on the foundation for the removal of the slings once the home is set. One method is to leave a masonry block out wherever a sling will be located. If the perimeter wall is constructed of poured concrete, the sill plate can be cut at locations of the slings. Once the home is placed drive the sill plates back into position and seal properly with a quality silicone caulk.

Lift the first section of the home and place into location. Lower the home onto foundation slowly to allow for correct placement. After the first section has been set, remove slings only after section has been adequately supported at the marriage line.

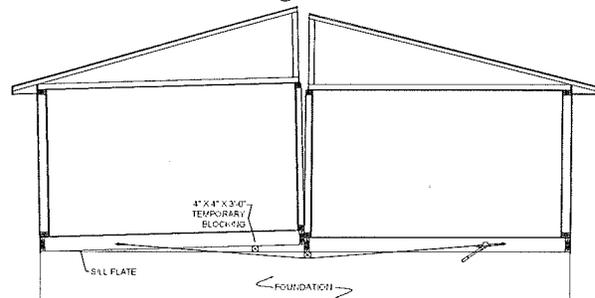
At this time, additional section(s) are ready to be set using the same procedures as described above. As subsequent units are placed on the foundation, a (4" x 4") block should be placed on the endwall foundation within four (4) foot of the previously placed unit (see **Figure 5**). Since the unit is on an

**Figure 5**

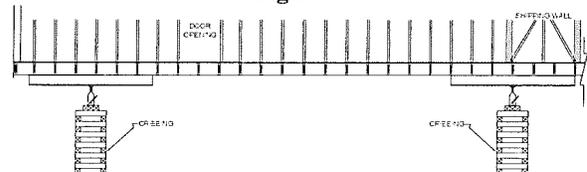


angle, the sling can be removed at the marriage line easier while still keeping the units as tight as possible. Once the slings have been removed, an eye bolt or large lag screw should be installed on a floor joist of each unit at two (2) different points. A come-along is to be attached to each unit to the minimum gap at the marriage wall. At this time, using cribbing and a floor jack, remove the (4" x 4") block and lower the mating wall to the foundation (see **Figure 6** and **7**).

**Figure 6**



**Figure 7**



At all times, maintain constant tension on the units with the come-along to minimize the gap between sections. One point to remember is to align ends of the home and not the interior archways. It is much easier to shim

finish material on archways than it is for endwalls.

Another design consideration is locating slings where porches are constructed. Porches are constructed strictly with floor loads and will not withstand the force when a sling is placed in this area.

**WARNING:** Some homes have designs that do not lend itself to point loads (slinging). Such cases are porches, recessed decks, and chamfered corners. When placing slings, avoid locating in these areas. Additional supports (beams, lumber, etc.) may be required if a sling must be located in one of these areas. Chief® Industries is not responsible for damage to the home as a result of sling or beam placement during the set process.

The home may now be completed as described in the remainder of this manual.

### Pre-Foundation Home Set-Up

Any items which could be difficult to place after the home is set should be dealt with now. If you are using only the Crawlspace with Standard Blocking, it is much easier to place the moisture barrier before the house is set. It can be left folded up and then unfolded after pads and support piers have been positioned under the frame members.

## Setting, Blocking & Positioning

### General

If the wheels are going to be left in place, it should be determined at this time. Any other items which could be difficult to install after the home is positioned such as ground anchors installed at an angle, should be placed in the proper locations. It is more convenient to place the moisture barrier under the house before it is set. It can be left folded up and then unfolded after pads and support piers have been positioned under the frame members.

**NOTE:** Excessive nonuniform lifting during the leveling process can cause the home to be racked and twisted. This could result in serious structural damage to the home, thus voiding your warranty.

**\*\*\*This next section involves lists for setting your home on its foundation. There are three (3) different sets of instructions for their corresponding foundation types, you must find the set that is descriptive of your particular circumstance. At the end of these set of lists, there will be a checklist for post-foundation or finish setup.\*\*\***

It is imperative that you provide a legal drain tile or other approved method for draining water away from the foundation footing. You must also provide a means of interior support for a basement wall until the backfilled earth on the exterior of the wall has stabilized. It is the responsibility of the homeowner to see that this support is done and not removed until the proper time.

**NOTICE:** These are Chief's® recommended lists for home setup. Other methodology may be employed, provided

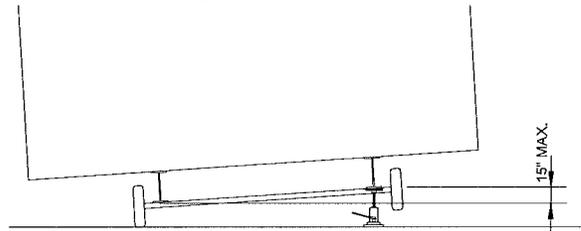
that these allow for complete structural integrity during the entire setting process.

### List of Sets:

- Crawlspace with Standard Blocking
- Crawlspace with Perimeter Foundation
- Perimeter Foundation with Crossbeam

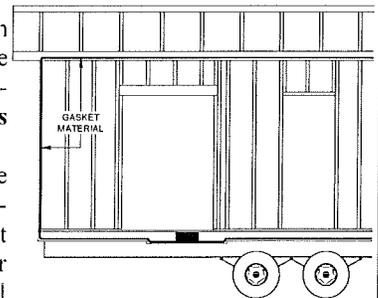
### Crawlspace with Standard Blocking

- 1) The support footings must be completed.
- 2) Carefully remove plastic material covering the marriage wall from both halves. Make certain the marriage wall gasket material on the one half remains firmly secured around the perimeter of the living area. Should this material be loose, it should be reattached to the home using (1-1/4) inch roofing nails.



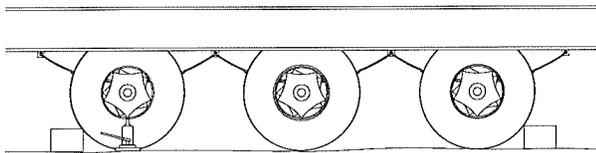
### HOME LEVELING

- 3) Appropriately position the first section of home by aligning the main I-Beams over the support footings. Once the section is aligned longitudinally and over the support footings, block the sets of tires at the front and rear to prevent the unit from moving.
- 4) Along one of the main I-Beams, place your jacks one (1) in from each end approximately ten (10) feet with the remaining jacks spaced evenly between the end jacks. **On longer homes, you will be better served by using four (4) jacks along each beam.** When attempting to evenly space your jacks, should a location be in an axle area, place the jack just outside of the axles.
- 5) Operating these jacks simultaneously, raise the I-Beam to a position approximately two (2) inches higher than its final position. Concrete or metal piers should now be placed into position under the beam and on top of the footings, adhering to the specified spacing. Level each pier and slowly lower each beam onto the support piers. Some methods for leveling are listed at the end of this section.
- 6) Once the first beam has been set, move the jacks to the other I-Beam, repeating **steps 4 and 5.**
- 7) Before moving the second half into position, make certain that the connection seal for the duct system as well as the marriage wall gasket is in place prior to joining the two (2) halves.



**CAUTION:** The joint formed by the connection of the two (2) halves should be tight to resist any air infiltration. Special care should be taken to assure that this step is performed.

- 8) To prevent damage to electrical wiring and interior floor coverings (carpet and linoleum) in marriage wall openings, temporarily fasten away from edge of home to prevent material from being caught between the sections.
- 9) Move the second section of the home into position along side of the first (within approximately 10" - 12"). It is recommended that a dollie device utilizing steel rollers to be used for this purpose. The dollies are constructed to carry hydraulic jacks that can be positioned under the frame members in order to produce less resistance moving the house laterally. Most service crews and installers have this equipment. It will minimize any possibility of frame damage which could void your warranty. After the two (2) sections are side by side, the dollie devices are placed behind the axles and approximately midway in the front span. **If the floor length of your house is 60'-0" or longer, we recommended the use of three (3) beams for setting the house.**
- 10) Repeat steps 5 through 6 for second half.
- 11) By using a hand winch attached to the main I-Beams the two (2) sections can be pulled tightly together.
- 12) **When aligning halves keep exterior endwalls flush, DO NOT judge by interior doorways.** This will allow the exterior endwalls to be sided with minimal shimming.
- 13) If the tires and axles are going to be removed, this should now be done once the unit is set in it's final position. It would be wise to position a jack or a support under each end of the axle before removing the bolts from the spring hangers to keep them from a sudden drop that could end in an injury.



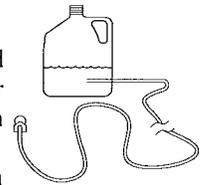
JACK PLACEMENT FOR AXLE REMOVAL

- 14) Piers should be placed under the rim joist of the side-walls wherever there are exterior doors. This is to be done so as to provide greater support for your floor system to ensure long-term, proper operation of your doors. This type of pier should be placed at the hinge side of any steel, swinging door and on both sides of any sliding glass or swinging patio doors.
- 15) Depending on the design of your home, there may be the need for pier supports along the marriage line rim joist. These are piers that provide support for concentrated loads created by large openings in the marriage wall. The foundation/blocking plan, provided by BonnaVilla® Homes will locate these piers should there be a need for any.

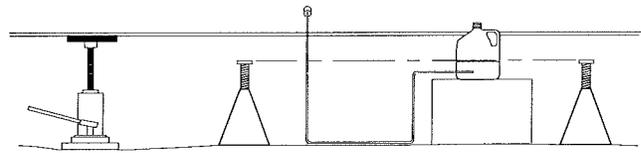
## Leveling

There are many commonly accepted methods for leveling homes. One of our recommended methods of leveling is: a "water level" system.

A "water level" system is simply a plastic reservoir holding colored water with



WATER LEVEL



WATER LEVEL SYSTEM

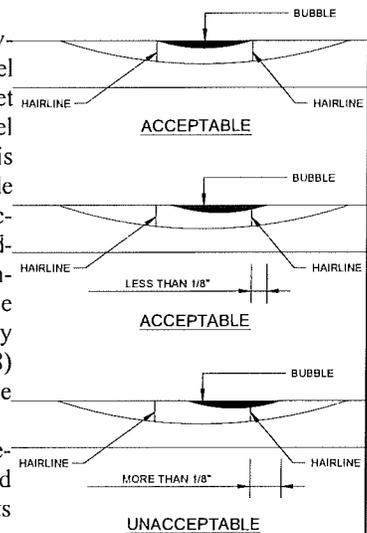
approximately (75) feet of plastic hose attached. This device operates on the principle that water seeks its own level.

Position the water level in the reservoir exactly at the height of the bottom of the steel frame when it will be in its final position. By placing a shut-off valve at the end of the plastic tubing, the liquid will be prevented from escaping when the hose is placed below the level of the fluid in the reservoir. Pull the end of the plastic tube to the first pier and holding the end well above the top of the pier, open the valve. When this operation is complete, then each succeeding pier is leveled in the same manner.

Another method of leveling is using a bubble level that is at least four (4) feet long. A deviation from level where part of the bubble is less than (1/8) inch outside one hairline, is usually acceptable as long as the reading is not the aforesaid consistently throughout the length of the home. Any deviation greater than (1/8) inch would suggest that the house should be relevelled.

To achieve the best results, your home must stand as level as possible on its supports. If it does not, here are some of the problems that can result:

- Walls, partitions and floors that buckle.
  - Leaks around windows, doors, seams in the roof, ceiling and walls.
  - Cabinet doors and drawers won't shut properly.
  - Loose materials on walls, partitions and ceilings.
  - Floor covering can wrinkle.
  - Floor structure can loosen enough to feel soft and spongy under foot.
  - Exterior siding can wrinkle or crack.
  - Piping and wiring can snap under tension.
- To prevent these non-warranted problems, your setup



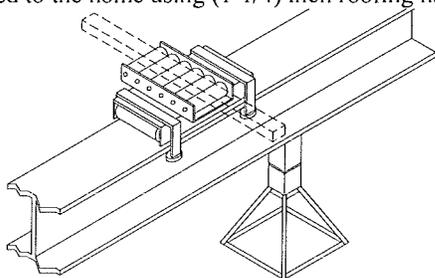
BUBBLE LEVEL READING

contractor should check and adjust the level of your home during the entire blocking process.

Keep in mind that you are obligated to check the level of your home once a month for the first three (3) months and twice a year thereafter. Check after the spring thaw (when frost is out of the ground) and check again when the ground refreezes. The freeze-thaw cycle could cause your home to heave or settle.

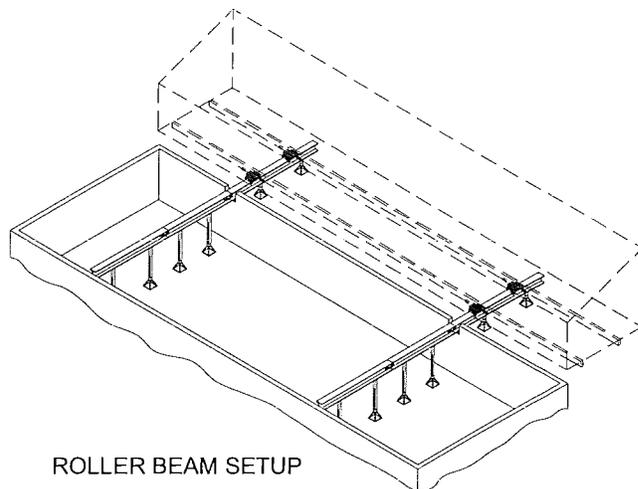
### Perimeter Foundation with Crossbeams

- 1) The perimeter foundation and support footings must be completed prior to setting the home. A (2 x 8) pressure treated sill plate must be secured to the foundation wall with one (1) - (1/2" x 10") foundation anchor bolt every six (6) feet on center beginning one (1) foot (maximum) from each corner.
- 2) Carefully remove the plastic material covering the marriage wall from both halves. If applicable, remove temporary flooring over stairwell area. Make certain the marriage wall gasket material on the one half remains firmly secured around the perimeter of the living area. Should any of this material be loose, it should be reattached to the home using (1-1/4) inch roofing nails.



ROLLER DEVICE ON BEAM

- 3) Set up the "Roller Beam" or I-Beam within the foundation walls per *Setting System* manufacturer guidelines. Place roller devices on the proper devices to help distribute the weight of the home evenly. Make sure that appropriate jacks or temporary blocking is spaced as listed. **If the floor length of your house is 60'-0" or longer, we require the use of three (3) beams for setting the house.** Space the beams along the length of the house.
- 4) Move and align the appropriate half of house parallel to the foundation wall.
- 5) Using the method described in steps 4 and 5 of crawlspace with standard blocking, raise the house high enough to slide "Roller Beam" under the frame leaving a height allowance for the roller device used for sliding the home. Also leave enough room for the "building support" that will disperse the weight of the home evenly on the rollers. In order to prohibit excess shear stress to the main structural members, distribute concentrated loads by using plate or smaller beam.
- 6) Lower the home onto the support beams.
- 7) Slide section to final position over foundation.



ROLLER BEAM SETUP

- 8) To prevent damage to electrical wiring and interior floor coverings (carpet and linoleum) in marriage wall openings, temporarily fasten away from edge of home to prevent materials from getting caught between the two (2) sections.
- 9) Before moving the second half into position, make certain that the connection seal for the duct system as well as the marriage wall gasket is in place to joining the two (2) halves. **CAUTION: The joint formed by the connection of the two halves should be tight to resist any air infiltration.** Special care should be taken to assure that this step is performed.
- 10) Repeat steps 4 - 10 for the second half of home. Slide the second section to within a few inches of the first section.
- 11) Pull halves as tight as possible together with hand winch.
- 12) **When aligning halves keep exterior endwalls flush DO NOT judge by interior doorways.** This will allow the exterior endwalls to be sided with minimal shimming. (Before proceeding to next step use the method described in 13 and 14 of crawlspace with standard blocking, removing axles and tires.
- 13) Lower sections simultaneously to the foundation.
- 14) Secure flooring system to sill plate in one (1) of these manners: (refer to details on pages HUDSM49 & HUDSM50)
  - a) Along the sidewalls, toenail two (2) - (12d) common nails from each floor joist into sill plate. At the endwalls, toenail one (1) - (12d) common nail every eight (8) inches on center along the length of each front and rear rim joist. Toenails should be driven at an angle of approximately (30) degrees with the joist. Start the nailing from the end of the joist.
  - b) For this method of nailing floor system to sill plate, the home must be ordered with the lower siding trim shipped loose. After the home has been set into place, toenail one (1) - (12d) common nail every eight (8) inches on center around the entire perimeter of the home from the rim joist into the foundation sill plate.) Lag together the rim joist located directly underneath the marriage wall. "method de-

scribe”

- 16) Place columns along marriage wall line spaced as shown on the *Foundation* print. After columns have been placed as outlined, then remove the temporary house supports.

### Anchorage Instructions

In accordance with the *Federal Manufactured Housing Construction and Safety Standard* in effect on date of construction, the following anchorage requirements for all Wind Zones are in addition to any requirements covered under the previous standard:

Design of anchors should be certified for their installation by a professional engineer of a nationally recognized testing laboratory as to their resistance based on the installed angle of diagonal tie and/or vertical tie loading and type of soil in which the anchor is to be installed.

Ground anchors should be embedded below the frost line and be at least (12) inches above the water table and should be installed to their full depth and stabilizer plates should be installed to provide added resistance to overturning or sliding forces.

Anchoring equipment should be certified by a registered engineer or architect to resist these specified forces in accordance with testing procedures in ASTM specification D3953-91; “Standard Specification for Strapping, Flat Steel and Seals.” Tie Downs must start no more than two (2) feet from each end of unit.

Protections shall be provided at sharp corners where the anchoring system requires external straps or cables.

Strapping to the Type 1, Finish B, Grade 1 steel strapping, 1.25 inches wide and .035 inches in thickness, certified by a registered professional engineer or architect as conforming with aforesaid ASTM specifications.

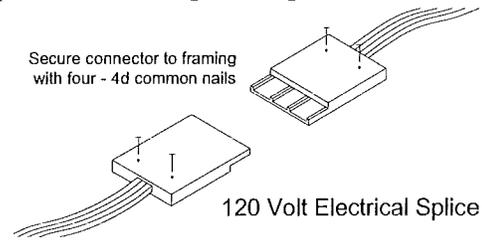
The tie down straps should now be installed around the frame members and the ground anchors in accordance with the ground anchor manufacturer’s installation instructions. Recommendations and illustrations for this tie down procedure are included in another section of this manual.

### Crawlspace Completion

Keep in mind when completing the skirting around the perimeter of the home (if it is not set on a perimeter foundation) that you must allow for ventilation underneath the house. There should be vents as close to the corners as possible to prevent “dead air pockets.” One (1) square foot of venting is required for every (150) square feet of floor space.

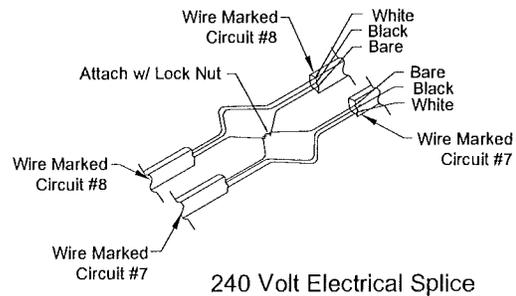
Example: a (32’ x 80’) house with actual dimensions of (29’-0” x 76’-0”) equals 2204 square feet. Divide 2204 square feet by (150) which equals 14.69 square feet. Round up to (15) square feet of venting area within the crawlspace skirting.

- 1) Each 120V wire that crosses the marriage line has been fitted with a special cable splicing device. Orient the splices so the mating ends align.



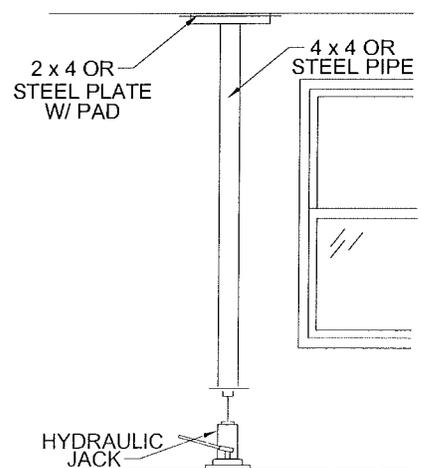
- WARNING: Before connecting the electrical wires, be positive the power has been disconnected.**

Slide the splices together until the locking latch is engaged. Once coupled, the splices are NOT to be uncoupled. Finally, nail the coupled splices to a floor joist with four (4) - 4d common nails. **CAUTION!! Do not use oversized nails or drive nail heads into the splice!!**



- 2) Each 240V wire that crosses the marriage line has been fit into a covered junction box. Using a cutting blade, split the cable sheathing back approximately (1-1/8) inch. Remove the sheathing back to the cable split. Attach the two (2) “black” wires together with locknut. Repeat this step for the two (2) “red” wires, two (2) “white” wires and the two (2) “bare” wires. Remember to replace junction box cover after wiring completion.

- 3) To level all ceiling sections set a jack at the lower section. Carefully raise the jack until the two (2) ceiling sections are flush. Then finish fastening the two (2) ridge beams together in the attic space of the home with (#10 x 3-1/2”) woodscrews at (12) inches on center, for the entire length of the home. This procedure should be followed at each location if one

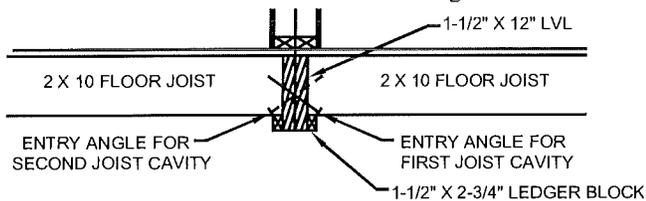


Interior Jack Placement

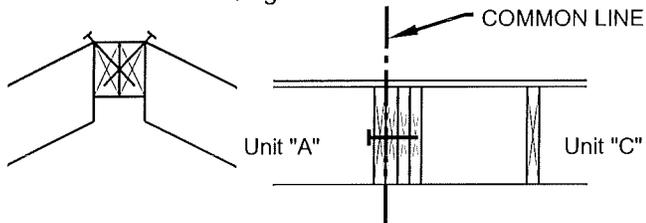
### Post Foundation (Finish) Setup

part of the ceiling is low. By carefully inspecting the ceiling or using a straight edge, low points can be determined. To raise the low portion, use a wood member such as a 4 x 4 or a steel pipe placed on the top of a hydraulic jack. A second piece of 2 x 4 properly padded is placed on top of the vertical posts and directly underneath the low point.

- 4) Remove shipping walls. Be aware of the potential damage when the studs fall. **(Do not remove prior to setting home.)**
- 5) The ceiling panels and the endwalls on each half must align on the inside of the house. If the halves are not in proper alignment they may be adjusted by raising the back corner on one half. It should be noted that the opposite end of the home should be blocked while raising one end. This lift will cause the ceiling to move forward.

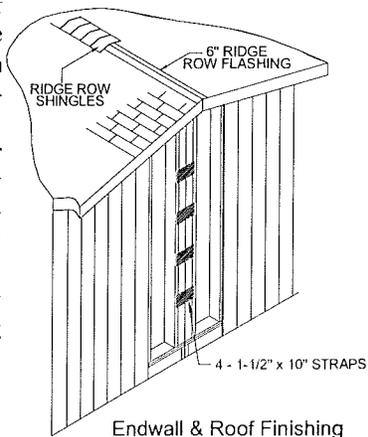


#### Securing Floor Sections



#### Ridge Connection

- 6) Align the floor sections. Sections should fit tightly together. Gapping between sections may occur, however, the gaps should be no more than one (1) inch. If spacing between section is less than (1/2) inch, no fill material necessary. Should the spacing be (1/2) inch to one inch fill with lumber. Use (3/8" x 5-1/2") lag screws at (16) inches on center throughout the length of the home. Alternate angles for every screw installed ensuring the screws run through any fill material that may be used. After completion of this task, repair the moisture barrier with the sealing tape provided.

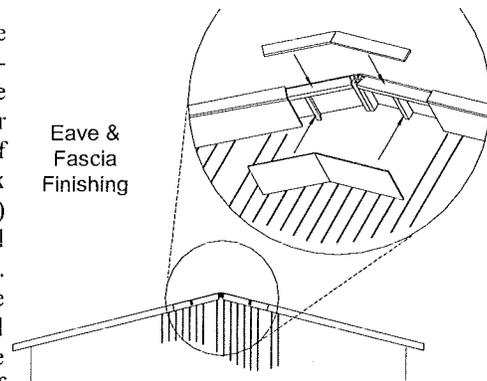


Endwall & Roof Finishing

- 7) The front and rear endwalls should now be fastened and finished. The home will be shipped to you with the endwall sheathing or hardboard siding held back from the marriage line approximately (16) inches.

To secure the sections, use the four strips of (1-1/2" x 10") metal strips. Space the metal

#### Eave & Fascia Finishing

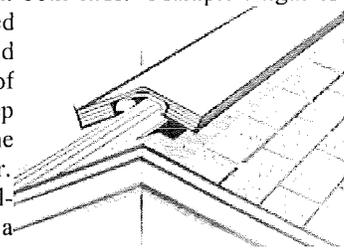


along the height of the endwall, fastening to the studs with (1-1/4) inch galvanized roofing nails every eight (8) inches along both edges. To finish securing, cut a piece of sheathing or siding large enough to cover the remaining uncovered portion of the endwall. With OSB sheathing, leave about an (1/8) inch gap at the seams to allow for expansion.

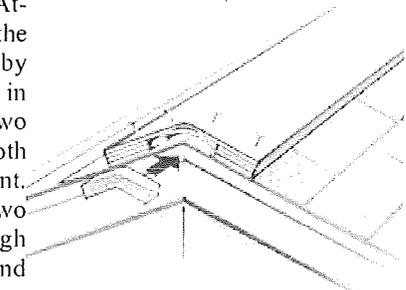
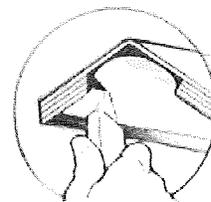
- 8) Once the home is set in it's final position, fasten at (12) inches on center the 6" x 10' pieces of angled ridge metal along the ridge line with the galvanized roofing nails provided. Next, apply roofing underlayment the entire length of the home. After this, complete the ridge by fastening ridge row shingles. For finishing asphalt shingled roofs, secure ridge shingles with galvanized roofing nails provided. Start at the end and overlap the shingles until they meet the opposite end. Complete eave by securing the fascia near the ridge.

#### 9) Optional Vented Ridge Cap

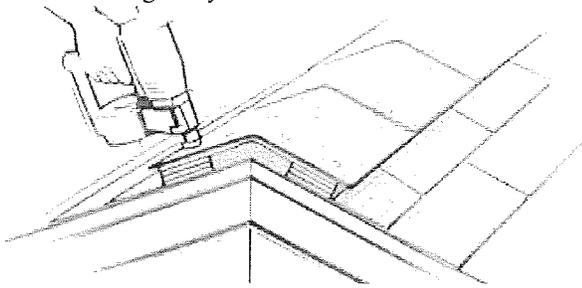
- a) Roll out the vent, Storm Stop fabric side down, along entire length of slot also covering the 6" minimum uncut ridge on both ends. Multiple length of vent can be joined by inserting an end cap at the end of each roll (see step #2) and butting the rolls tightly together.



- b) For End Cap Installation, pull apart a precut section of the foam end cap found between the layers of roll. Using a utility knife, make a cut in the Storm Stop material each side of the vent, back from the end of the roll. (See illustration) Attach vent to the roof deck by driving a nail in each of the two corners on both ends of the vent. Also, drive two (2) nails through the vent and

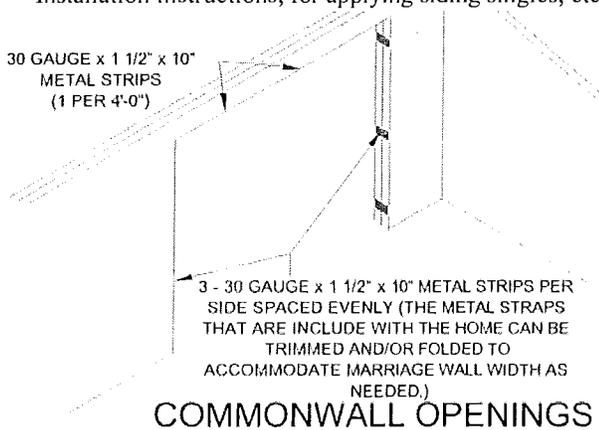


foam end cap to hold foam in place on the ends of the ridge only.



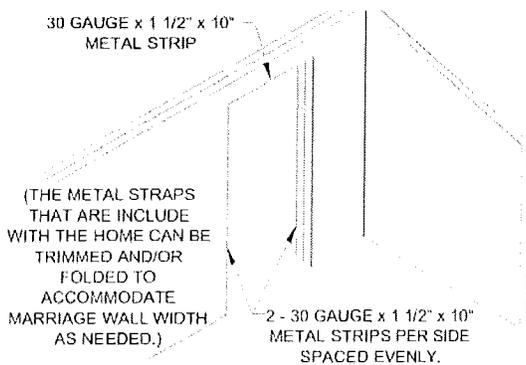
c) Nail ridge cap shingles with 1-1/2" roofing nails in a common overlapping pattern. It is important when installing this vent that you maintain the pitch of the roof. The vent has been installed properly if the bottom of the vent is flat on the roof and the peak is slightly rounded.

10) For Siding & Shingles--- see enclosed Manufacturer's Installation instructions, for applying siding singles, etc.



COMMONWALL OPENINGS

11) All openings in the commonwall should be secured with 1/2" x 10" strips of 30 gauge metal. The metal should be secured with 1-1/4 inch galvanized roofing nails. One (1) strip of metal per four (4) feet of opening should be used for the top of the archway as well as three (3) pieces on each side.



DOOR OPENING IN COMMONWALL

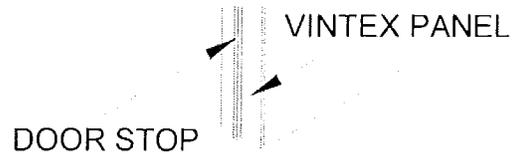
12) Openings that have a door installed should be secured

with 1-1/2" x 10" straps. Three (3) on the side jambs and a piece on the top jamb.

NUMBER OF STRAPS

OPENING SIZE	PER SIDE OF OPENING	TOP OF OPENING	TOTAL
4'-0" & UNDER	2	1	5
4'-1" & 5'-0"	2	2	6
5'-1" & 8'-0"	3	2	8
8'-1" & 12'-0"	3	3	9
12'-1" & 16'-0"	3	4	10
16'-1" & 18'-0"	3	5	11

13) Doors in the marriage wall that have been installed will now be completed. After securing opening, as outlined in step 12, apply the 10" x 1/2" MDF Particle Board or *Ash trim jamb assembly* directly to stud on hinge side of opening. Now mount door on hinge side of opening, allowing ample space on top and bottom of door. After door has been mounted, apply the 10" x 1/2" MDF Particle Board or *Ash trim jamb assembly* directly to the remaining side, shimming where necessary. This will complete the sides of the door framing. Now complete top of door framing with the same steps as for the side jambs. After door jambs have been completely installed, locate and secure molding to be used as a door stop, except if your home has *Ash trim option*. Finally trim the doorway with molding provided.



\*\* EXCEPTION: ASH TRIM JAMB ASSEMBLY

14) All archway openings should now be sheetrocked and bullnosed with the material provided. These openings will then need to be taped and textured.

15) Completion of all plumbing should be made. Check all work for leaks, improper sizing or slope with instructions provided in Owners Manual.

16) The electrical system should be wired to supply and then checked for operation.

Anchorage Instructions

In accordance with the *Federal Manufactured Housing Construction and Safety Standard* in effect on date of construction, the following anchorage requirements for all Wind Zones are in addition to any requirements covered under the previous standard:

Design of anchors should be certified for their installation by a professional engineer of a nationally recognized testing laboratory as to their resistance based on the installed angle of diagonal tie and/or vertical tie loading and type of soil in which the anchor is to be installed.

Anchoring equipment should be certified by a registered

engineer or architect to resist these specified forces in accordance with testing procedures in ASTM specification D3953-91; Standard Specification for Strapping, Flat Steel and Seals.

Tie Downs must start no more than two (2) feet from each end of unit.

Protections shall be provided at sharp corners where the anchoring system requires external straps or cables.

Strapping to the Type 1, Finish B, Grade 1 steel strapping, 1.25 inches wide and .035 inches in thickness, certified by a registered professional engineer or architect as conforming with aforesaid ASTM specifications.

## Utility Connections

### General

Before connecting any utility systems, it is recommended that local, county and state authorities be consulted for compliance with local requirements.

**CAUTION:** It must be possible to gain access to utility hookups, either by removable sections of skirting or through access doors.

### Heating, Ventilation and Air Conditioning

It is imperative that you read and understand the Owner's Manual provided by the manufacturer of each piece of equipment in the house. In the event that there is a discrepancy between this manual and the appliance manufacturers' provided manual, follow the instructions given by the manufacturer of the appliance.

It is mandatory that the combustion air and flue tube assembly be fully engaged at back sides and front and combustion air tube securely fastened to the furnace with sheet metal screws in the screw holes provided.

**CAUTION:** Vent piping must be insulated with R-5 insulation if it will be subjected to freezing temperatures such as routing through unheated areas.

The combustion air pipe should also be insulated when it passes through a warm, humid space.

### Installation of Exterior Roof Jack Extension

- 1) Remove weather cover. Remove the three (3) screws that secure the weather cover to the roof jack barrel. Remove and discard the cover.
- 2) Install crown assembly. Slide the crown assembly over the roof jack barrel. Secure with the three (3) screws previously removed from the weather cap, using the pre-punched holes as guides.
- 3) Remove upper and lower caps. Remove the two (2) screws that secure the upper cap to the crown assembly base and remove the upper cap. Next, remove the three (3) screws that secure the lower cap to the crown assembly base. Set both caps aside for later use.
- 4) Install Extension. Place the roof jack extension on top of the crown assembly base, pushing down firmly to assure a snug fit.

**IMPORTANT:** Make sure that the pipes are connected. Using the four (4) holes at the base of the extension as a guide, drill four (4) holes (1/8) inch in diameter into the crown assembly base. Secure the extension to the crown assembly base with the four (4) screws provided.

- 5) Reinstall Upper and Lower Cap to Extension. Install the lower cap on top of the extension so that the center pipe sticks through the hole in the lower cap. Using the three (3) screws removed in Step 3, attach the lower cap to the extension bracket. Install the upper cap over the center pipe of the extension. Using the two (2) holes located at the base of the upper cap as guides, drill two (2) holes (1/8) inch diameter into the center pipe. Finally, attach the upper cap to the center pipe using the two (2) screws removed in Step 3 to center the pipe.

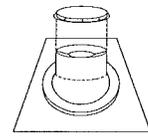
Use (1/2) inch blunt or sharp end metal screws to fasten roof jack combustion air pipe to furnace combustion air collar. Screw holes are provided in the pipe and collar. Excessively long screws may extend to the flue pipe and puncture it. Screws are not to exceed (1-1/2) inches in length.

Combustion air tube and flue pipe are part of the same assembly. Only the combustion air tube need be fastened to the furnace.

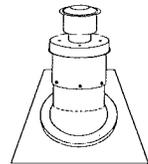
- 1) Check to be certain that the flue pipe and combustion air tube are present.

- 2) Pull the telescoping flue tube and combustion air tube assembly down from the roof jack. Slide the flue tube/combustion air tube assembly down firmly over the furnace outlet and combustion air collar. Insure that the back side, and front of combustion air tube collar is fully engaged. Fasten the combustion air tube to the furnace combustion air collar using two (2) - (1/2) inch sheet metal screws. (Screw holes are provided in combustion air tube and furnace combustion air collar.)

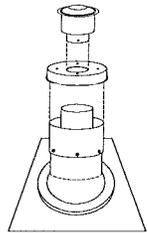
At this time have all the gas connections checked for air pressure and the flue checked for tightness. A serviceman can then light the pilot. Change the furnace filter as often as needed. Clean the air distribution system regularly to prevent the motor from overheating. Keep up maintenance on the air distribution system as defined in the manufacturer's instructions. Check the flue



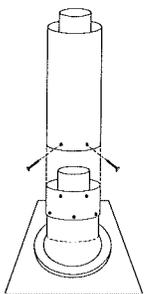
STEP 1



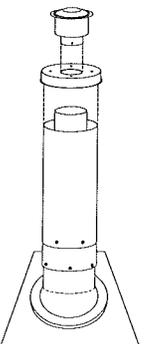
STEP 2



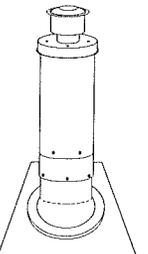
STEP 3



STEP 4



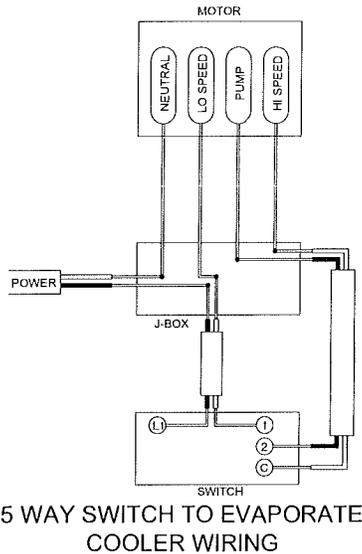
STEP 5



STEP 6

pipe regularly for soot, rust or corrosion.

On multi-section homes, the flow of heat from one section to the other is accomplished by a crossover duct system. This crossover system consists of a rigid duct that connects the two (2) main duct trunks. This rigid crossover duct is sealed together at the commonwall line with insulation. Be sure that the commonwall insulation that is placed when setting the house is not constricting the air flow between the two (2) halves.



**OPTIONAL:** Branch circuits are installed at the factory for the purpose of energizing an exterior air conditioning panel through the floor. You must connect the air conditioning equipment according to the instructions given in the Owners Manual provided by the equipment manufacturer. The supports or slab built for the air conditioner must be free-standing. The condensation tubing for the air conditioner must drain to the exterior of the house.

Check all air intakes and outlets regularly to make sure that they are completely free from any constrictions. Be sure to check the return air filter which must also be kept clean.

Your home may have a 5 way switch installed for an optional 14 x 14 fan. The above diagram shows the proper wiring of such switch.

#### Water Heater Side Wall Air Inlet Set - For Field Installation Over Basement or Crawl Space ONLY!

**WARNING:** This is a Direct Vent Appliance and care must be taken to ensure that the installation of the water heater and this kit are airtight!

1. **LOCATE AIR DIVERTER:** Determine which outside wall the Air Diverter Base will be located on.

**CAUTION:** Location of the Air Diverter Base must take into consideration the (16) foot maximum length of Flexible Duct allowed between the Air Diverter Base and Air Inlet Plenum. The Air Diverter Assembly must be located a minimum of (12) inch from ground level. Refer to Figure 3. The Flexible Duct must be run

reasonably straight (no turns).

2. **AIR INLET ASSEMBLY:** Remove the screws, which attach the wind baffle to the existing air inlet vent pipe located underneath the home. Refer to Figure 1. Discard the wind baffle and screws as they are no longer required with this field installation set.

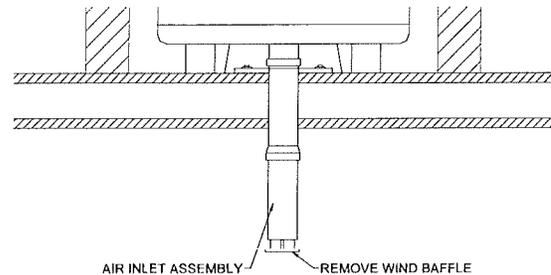


FIGURE 1

3. **CHECK LENGTH OF AIR INLET PIPE:** It may be necessary to trim the length of the three (3) inch air inlet pipe so that the pipe fits into the plenum box without touching the bottom of the box. The three (3) inch air inlet pipe should fit into the plenum box about two (2) inch from the bottom of the box. Refer to Figure 3 below.

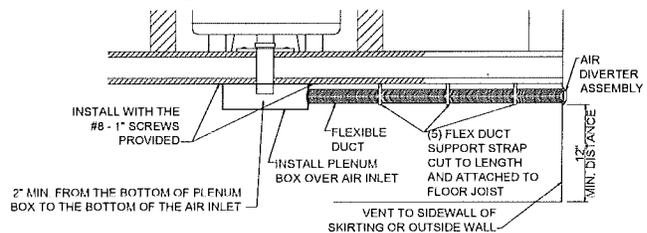


FIGURE 3

4. **ATTACH FLEX DUCT TO PLENUM:** Place one (1) of the clamps provided over one end of the five (5) inch flex duct and attach flex duct to air inlet plenum box five (5) inch diameter collar. Ensure that the flex duct wire is pulled over and past the collar flush with the wall of the air inlet plenum box. Tighten the clamp to secure the flex duct to the collar. Tighten securely but do not over tighten.
5. **ATTACH PLATE (3-1/8" HOLE) TO PLENUM BOX:** Make sure plate covers (5-7/8) inch hole with flange on inside of plenum box. Attach plate with (3 - 1/8) inch hole to plenum box using the four (4) - (#8 - 1/2") sheet metal screws provided.
6. **POSITION PLENUM:** Align the (3-1/8) inch hole in the plenum box with three (3) inch air inlet vent pipe located underneath the home. Position the air inlet plenum box so that the five (5) inch diameter collar faces the proposed direction of the air inlet diverter.
7. **INSTALL PLENUM:** The air inlet plenum box side flanges should be positioned so that they can attach to the underside of the floor joists. Once in place, securely attach the air inlet plenum box to the underside of the floor joists using the (#8 - 1) inch

self-tapping screws provided through the flanges into the floor joists. (Use at least three (3) screws on each side of the plenum box.)

8. **AIR DIVERTER BASE:** Cut a five (5) inch to (5-1/2) inch opening in sidewall of skirting or outside wall to allow entrance of air diverter tailpiece and five (5) inch flexible duct. Attach air diverter base to outside wall using the (#8 - 1) inch screws provided. Be sure that the screw holes are aligned so that the air diverter cap can be installed with screw holes on top. The air diverter base must be located a minimum of (12) inch from ground level.
9. **CUT FLEX DUCT TO LENGTH:** Extend flex duct from the collar of the air inlet plenum box to the outside wall location of the air diverter base must be located a minimum of (12) inch from ground level.
10. **JOINTS AND SEAMS:** Joints and seams of sheet metal and factory-made flexible ducts, including trunks, branches, risers, crossover ducts, and crossover duct plenums, shall be mechanically secured and made substantially airtight. Slip joints in sheet metal ducts shall have a lap of at least one inch and shall be mechanically fastened. Tapes or caulking compounds shall be permitted to be used for sealing mechanically secure joints. Sealants and tapes shall be applied only to surfaces that are dry and dust-, oil-, and grease-free. Tapes and mastic closure systems for use with factory-made rigid fiberglass air ducts and air connectors shall be listed in accordance with UL Standard 181B-1995, with 1998 revisions.
10. **SUPPORT FLEXIBLE DUCT:** Support must be provided for the flexible duct at a minimum of four (4) foot intervals. Use the one (1) inch wide support strap and fasten with screws, staples or nails to support the duct.
11. **ATTACH AIR DIVERTER CAP:** Attach the air diverter cap to the air diverter base using the tamper proof fasteners provided.
12. **INSPECT COMPLETE ASSEMBLY:** Inspect the complete assembly to ensure that all procedures have been completed.

#### Collar Installation through Exterior

Determine the location of the opening in the rim joist and cut a (3-3/4) inch hole 30 or 40 gallon or (4-3/4) inch hole 50 gallon through the rim joist.

The three (3) inch or four (4) inch PVC, ABC or CPVC Schedule 40 vent pipe, whichever is the most convenient, can be run from the water heater. The vent pipe must extend a minimum of (1-1/2) inch through the exterior wall. Note that the inside collar must be slipped over the vent piping before locating the pipe through the wall. Before securing the inside and the outside collars to the wall, use a silicone sealer between the pipe and opening to insure a water tight seal.

**WARNING:** A gas water heater cannot operate properly without the correct amount of air for combustion. Provide ventilation and combustion air by

means of floor and wall openings as shown in the drawing. Never obstruct the flow of combustion and ventilation air. If you have any doubts or questions at all, call your gas company. Failure to provide the proper amount of combustion air can result in a fire or explosion and can cause property damage, serious bodily injury, or even death.

#### Water Heater Side Wall Drainage for Pan - For Field Installation Over Basement or Crawl Space ONLY!

1. **LOCATE DRAIN FROM WATER HEATER PAN:** Locate where the Air Diverter is on the exterior wall and connect the drain pan to the exterior in same general location. (Note: Drain pan is required to be corrosion-resistant.)

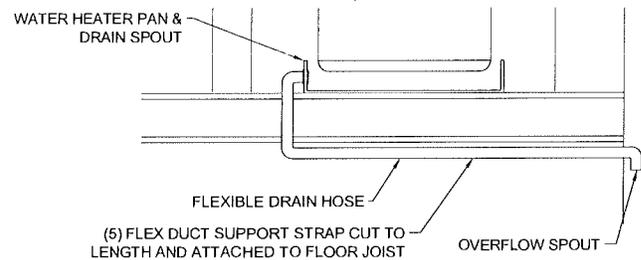


FIGURE 1

2. **OVERFLOW SPOUT:** Cut a one (1) inch to (1-1/2) inch opening in sidewall of skirting or outside wall to allow entrance of overflow spout. Attach to drain from water heater pan with flexible pipe.
3. **CUT FLEX PIPE TO LENGTH:** Extend flex pipe from the drain spout on the water heater pan to the outside wall location near the air diverter base.
4. **SUPPORT FLEXIBLE DUCT:** Support must be provided for the flexible pipe at a minimum of four (4) foot intervals. Use the one (1) inch wide support strap and fasten with screws, staples or nails to support the pipe.
5. **INSPECT COMPLETE ASSEMBLY:** Inspect the complete assembly to ensure that all procedures have been completed.

#### Air Quality Improvement System

Federal standards require that a whole house ventilation system be installed to all prospective home purchasers. The Blend Air system is included in the Chief® Industries product line.

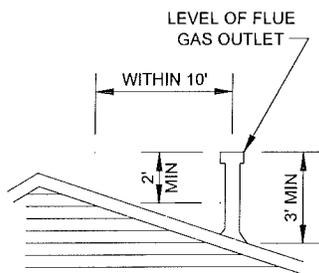
The operation of the Blend Air system installed in your home is completely automatic. The Blend Air Environmental System is designed to work in conjunction with the home's heating system to introduce fresh air to the living area. Federal standards require that a mechanical air quality device have the capacity to introduce fresh air to the living area. Federal standards require that a mechanical air quality device have the capacity to introduce a minimum of (25) cubic feet of air per minute (cfm) into the living area. The Blend Air Environmental System can help reduce the level of humidity in your home. There is a general consensus that higher levels of humidity can result in higher levels of indoor air pollution.

The Blend Air Environmental System should be main-

tained as outlined in the Owners Manual provided by the manufacturer of the furnace. The control to this Blend Air system is a switch on the furnace.

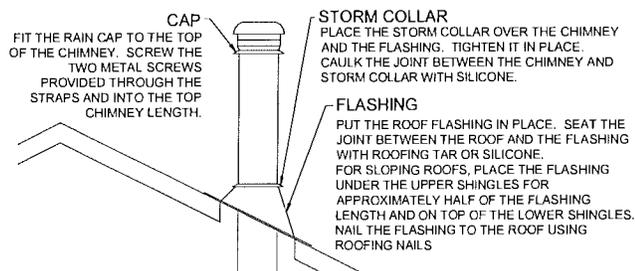
### Fireplace Installation

Once the home is set and leveled, finish the chimney for the fireplace. All chimney extensions must extend a minimum of three (3) feet above the highest point where it passes through the roof and must be at least two (2)



### CHIMNEY CLEARANCES

feet above the roof peak if within a (10) foot horizontal span from the peak. **IMPORTANT: If an exposed portion of chimney is greater than four (4) feet above the roof line, use support wires to keep chimney secure.**



The support wires may be attached to the outer pipe of the chimney with screws, provided the screws do not penetrate the inner flue pipe.

When starting a fire in the fireplace remember to fully open the glass doors and flue damper for sufficient air combustion. Always keep the fire from coming into contact with the glass doors. Clean the glass with any commercial glass cleaner or soap and water. Do **NOT** use any abrasive material to clean glass. Do **NOT** clean glass with cool water if it is still hot from fire.

The damper control lever should be located inside the fire chamber. Pull down to close, push up to open. The damper must be open when lighting a fire, not doing so will cause smoke spillage into the room. When the fireplace is not in use, close the damper to prevent downdrafts to enter the room.

The grate in the fire chamber is there to provide air combustion space beneath the solid fuel. Remember to keep the ashes cleaned out for this reason.

### Electrical System

Your home is typically designed to be connected to an electrical supply source rated at 240V, 3 pole, 4-wire including ground system. If an option was purchased for an overhead mast or meter hub, refer to name plate on exterior of home to determine type of system.

In making the feeder connections to this power source, it is extremely important that wire of the correct size be used.

If the wire is incorrectly sized, the ampacity for that wire may be exceeded and you will experience a voltage drop to your home. Ampacity is the safe carrying capacity of a wire expressed in amperes. The greater the amperes flowing, the greater the heat produced.

SERVICE AMPS	WIRE SIZE			CONDUIT SIZE
	FEEDER	GROUNDING CONDUCTOR	GROUNDING ELECTRODE CONDUCTOR	
100	#4	#8	#8	1-1/2"
150	#1	#6	#6	2"
200	#2/0	#4	#4	2"
225	#3/0	#4	#4	2"

COPPER CONDUCTOR TYPES: RH-, RHH, -RHW, -THHN, -THW, -THWN, -XHHN

Moreover, if the amperage is allowed to become too great, the wire may become so hot that it will damage the insulation or even cause a fire. A voltage drop in your home can cause a drop in the efficiency of all lights as well as appliances. Motors may burn out and you may be paying for electricity that you do not use. Refer to the following table to determine recommended conductor type and size for the size of panel box.

It is also critical for the protection of the occupants of the home that all non-current-carrying metal parts be properly grounded. The only safe and approved method of grounding your home is through an electrical-isolated grounding bar in the manufactured home power supply panel which grounds all non-current-carrying metal parts to the electrical system in your home at a single point.

The ground conductor of the power supply feeder cable connects the grounding bar to a good electrical ground. Insulate the grounded circuit conductor (neutral or white) wire from the grounding conductors (green wires) and from equipment enclosures and other grounded parts. Bonding screws, straps or buses in the distribution panel board should have been removed and discarded at the manufacturing facility.

Homes with a factory-installed service meter base should be grounded differently. The exterior equipment and enclosure must be waterproof, and conductors must be suitable for use in wet locations. When a meter is provided on the home, connect the neutral (white) conductor to the system grounding (green) conductor on the supply side of the main disconnect. The grounding electrode conductor is run from the meter to the grounding electrode conductor(s). The grounding electrode should be an eight (8) foot length of (1/2) inch diameter copper rod or bury it horizontally in a (2-1/2) inch deep trench. Connect the grounding conductor wire to the grounding electrode with a grounding clamp.

**WARNING: On a 3 pole, 4 wire feed it is extremely important that the neutral connector not be grounded in or on the manufactured home or the home service entrance cabinet.**

Electric crossovers between halves of section homes are located along the center line between the sections. The crossover wires will be located in the first floor joist cavity from either end of the home. These crossover locations can be distinguished by access cover panels. Remove these panels and connect the enclosed wires using the numbered splicing

devices, connecting them to their corresponding numbered device on the adjacent section.

### Smoke Alarm Installation and Testing

In the floor system, in the second floor joist cavity in from either/both end(s) of the home there will be an electrical box with the wiring to connect the home's smoke alarm system. Connect the wires from one section to the other by tying the wires black to black, white to white, red to red and bare to bare.

Once the wiring is connected, press the test button on each alarm individually. As you test, be sure that the alarm sounds on every mechanism in the system. Should any of the alarms you are testing not sound, check all wiring connections. If necessary replace the alarm with a new and similar mechanism. Perform another operational test on all alarms.

When your home is designed to be placed over a basement, it is required that this lower level be protected by a smoke alarm(s). You should check with your local authority to see if other alarms may be required due to the design of your basement.

A smoke alarm with a battery back up will be sent with the home and should be interconnected with the other alarms on the main level of the home. This is done so that it will sound when any of the other alarms on the main level of the home are triggered. The following are steps that need to be taken to connect this lower level smoke alarm to the remainder of the system.

Towards the front or rear of the home the electrical crossover is located in the floor system, there will be an electrical box with the wiring to connect to the smoke alarm. Connect the wires on the alarm to the wiring in the box tying the wires black to black, white to white, green to green and the yellow wire on the alarm to the red wire in the box.

Once the wiring is connected and the alarm secured in place, press the test button on each alarm (including those on the main level) individually. As you test, be sure that again, the alarm sounds on every mechanism in the system. Should the alarm(s) you are installing or the others in the system you are testing not sound, check your wiring connections. If necessary, replace the alarm with a new and similar mechanism. Perform another operational test on all alarms.

### Phone and Television Hookups

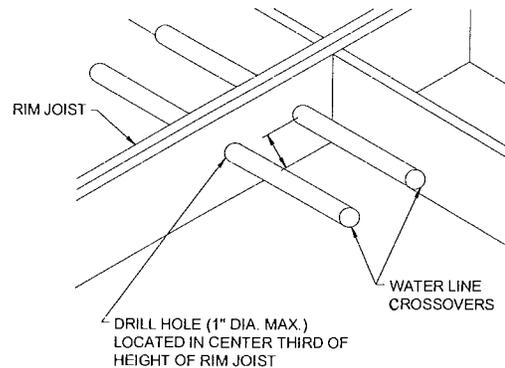
If you have ordered phone and television hookups, these will be located in the third floor joist cavity from the rear of the house. These will be (12) inches away from the marriage wall on each section. If there are hookups on both sections of the house you will have to connect these at the marriage wall line.

### Water System

Your homes water system has been designed for an inlet water pressure of 80 psi. Should the home be installed in an area where pressure exceeds 80 psi, a pressure reducing valve should be installed.

A (3/4) inch threaded inlet is provided by the manufacturer for the water supply systems connection. This inlet is

located below the home and usually near the water heater compartment. A tag on the side of the home indicates the location of the water inlet. A shutoff valve must also be installed between the water supply and the house inlet. The valve must be a full port gate valve or a full port ball valve.



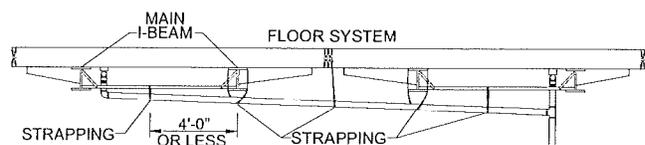
**CAUTION:** The main shutoff valve is not supplied by the manufacturer, but must be installed on the system to comply with the federal construction and safety standards.

All piping located underneath the home is subject to freezing temperatures and shall be insulated to prevent freezing. The manufacturer has provided a heat tape receptacle outlet located on the underside of the home with-in two (2) feet of the water supply inlet. The use of a heat tape is recommended to further prevent pipes from freezing. Be sure that heat tapes are listed and approved for use in manufactured homes. Installation shall be in accordance with the heat tape manufacturer's installation instructions.

If your home has fixtures that require water located on both sections, there will be proper pieces and fittings provided for connecting the water lines. A (1/2) inch water line that crosses the marriage wall line uses a single fitting. On one side the line is cut back while the corresponding line on the other half will have extra length to compensate. A (3/4) inch water line that crosses the marriage wall line will have (12) inch sections of line equipped with the appropriate fittings to connect to the water lines that are cut back from the marriage line on both sections. The dimensions to the crossover will be listed on the *Water Line* print (assuming presence of crossover).

### Drain, Waste and Vent

If there are plumbed fixtures on both halves, there will be drain pipe and fittings provided by the manufacturer in order to complete the entire drain line. An enclosed *Drain Line* print will specify how to assemble the fittings and drain pipe provided.



**DRAIN LINE STRAPPING DIAGRAM**

Due to the possibility of transportation damage, the manufacturer has provided the drain line fittings, the drain line pipe sections and the assembly instructions (shown on the Drain Line print in dashed lines) and are shipped loose to complete the plumbing system at the setup site.

The drain line shall be assembled using the pipe, cement and supports shipped with the home. Assembly of the system shall be in accordance with state and local codes.

Final drain connections are made at the three (3) inch outlet located in the center portion of the home. Approved three (3) inch connectors should be used at both ends when connecting this drain outlet to the main sewer system. The drain lines installed on the home must have a slope of (1/4) inch per foot. In order to support the connecting drain line, fittings, pipe, strapping and glue has been provided by the manufacturer. This support strapping should be spaced at intervals not greater than four (4) feet apart.

After the system has been connected, all the fixtures in the home should be filled with water and allowed to drain through the newly installed system. Check all joints for any visible leaks.

### **Gas System**

The heating system in your home may have been designed to operate on natural gas. If your energy source is LP (liquid propane) modifications must be made to each gas appliance in the house. Check with each respective appliance manual for conversion standards, these conversions are to be done by qualified individuals.

On some sectional homes which locate gas appliances in both halves, the gas crossover line will be provided between the home sections. This crossover line will be located below the floor structure and near to the center line. It will be equipped with an approval flex connector and a shutoff valve. The final connection of the crossover is made after the dust cover on the shutoff valve has been removed and connected (screw type) on to the two (2) halves, completing the connection.

After the gas system has been installed, it must be checked over meticulously to insure absence of leaks.

To avoid possible damage to associated gas valves and regulators incorporated on appliances, do not pressurize the gas line in excess of eight (8) ounces maximum after final connections are made.

After final testing of the gas lines, the home can be connected by using a listed gas connector of the capacity indicated on the label by the gas inlet.



### **Interior Finishing**

#### **Large Light Fixtures**

If your home has large light fixtures or ceiling fans, you will have to complete their installation on site. The light fixtures will be shipped loose with the home. Locate the junction box that has been placed where your light fixture will be

attached. Remove the cover plate from the junction box, this will expose the wires for assembly.

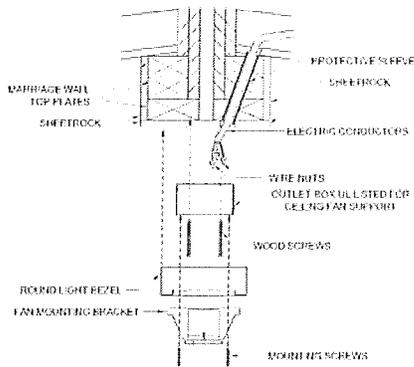
Remove the wire nuts from the end of the wires and complete as follows:

- 1) Connect wires together according to color (i.e. black to black) using a wire nut. Note: Grounding wires may be either bare or color coded green.
- 2) Grounding of the mounting bracket must be made by attaching the grounding conductor to the bracket grounding screw or if no screw exists, a listed clamp must be used. This connection must be made prior to the connection of the fixture.
- 3) Place fixture over junction box, secure it with the bracket supplied by the fixture manufacturer.

#### **Ceiling Fan on Marriage Wall Beam (Cathedral Option Only)**

If you have ordered a ceiling fan that should be placed on the marriage wall beam, of a cathedral ceiling your home has been constructed with provisions for the installation of the fan. This installation shall be completed following the setting and fastening of your home. This fan shall be installed as follows:

- 1) Once the sections have been fastened together, you should make sure the electricity has been turned off at the circuit breaker of panel box to reduce the risk of electrical shock.
- 2) Remove the wire nuts from the electrical conductors and take the electrical box from the bottom of the marriage wall beam before removing shipping wall components. This should allow the conductors to pass through as the shipping wall top plate is removed.
- 3) Finish the marriage wall opening as detailed, but remember to allow electrical conductors to pass through the finish material.
- 4) Open one of the knock-out holes in the top of the electrical box that is provided. (This electrical box must be UL listed for ceiling fan support.) Feed the electrical conductors through this hole and slide the electrical box up to the beam. Secure the box to the marriage wall beam with a minimum of three (3) - (#8 x 2-1/2) inch screws that are provided.
- 5) Once the electrical box is solidly fastened into place, slide the round light bezel over the box. Using the mounting screws provided, fasten the fan mounting bracket to the electrical box. This will hold the ends of the electrical conductors into the center of the mounting bracket.
- 6) From this point, there are several options in mounting your ceiling fan. Consult the ceiling fan manufacturer's installation instructions, decide which ceiling fan mounting you will use, and proceed with the appropriate instructions per their manual. Where necessary, each section will note the different procedures for the various types of mounting and wiring.



## Appliance Installation

### General

A gas or electric clothes dryer installed in the home must be exhausted on the outside by a moisture lint exhaust duct and termination fittings. If your dryer sits along an exterior wall, the appliance will have already been properly vented through this exterior wall. However, if your dryer doesn't set along an exterior wall, you will need to complete the means of venting after the home has been set.

### Clothes Dryer

If your home has been constructed with provisions for a dryer vent, this installation shall be completed as specified in the appliance manufacturer's installation instructions on site, prior to the use of your appliance. The dryer vent shall be installed as follows:

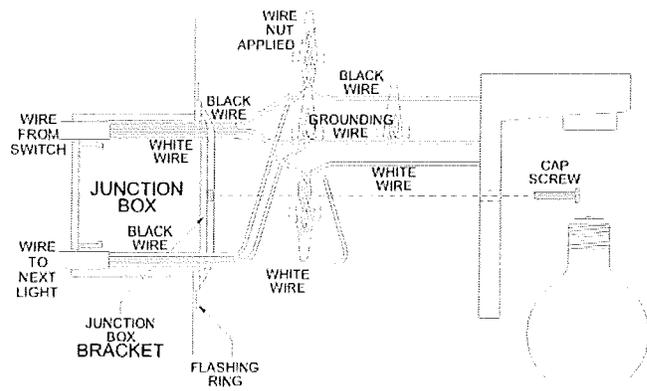
- 1) A four (4) inch diameter access has been provided in the floor directly behind the dryer. The access hole has been covered with a plywood cover.
- 2) Select a length of four (4) inch dryer duct to complete the vent. **This duct will be required to exhaust to the outside of the home. The vent can not terminate underneath the home.**
- 3) Secure the duct to the vent of the dryer. Feed the duct through the access hole, through the protection membrane covering the underside of the home, and out to the exterior of the home.
- 4) Install a louvered vent termination kit on the exterior of the home. (This kit is not provided as part of the home and is the responsibility of the homeowner.)
- 5) Completion of the vent shall be the sealing of the outer membrane at the point the duct exits the membrane. Several types of tape sealant are available on the market locally that would adequately seal the membrane from entrance of moisture and/or rodents.

## Exterior Finishing

### Exterior Light Connection

- 1) Remove junction box cover.
- 2) Connect wires together according to color (i.e. black

- to black) using a wire nut. Note: Grounding wires may be either bare or color coded green.
- 3) Grounding of the junction box bracket must be made by attaching the grounding conductor to the bracket grounding screw or if no screw exists, a listed clamp must be used. This connection must be made prior to the connection of the fixture.
- 4) Fold wires over the junction box bracket back into junction box.
- 5) Place light fixture over junction box and using a cap screw, secure the fixture into the threads in the junction box bracket.
- 6) Caulk the top of the light fixture to complete weather seal.
- 7) Furnish bulb and attach globe.



Exterior Light Connection

### Porches & Steps

Porches and steps must be designed and built to the specifications of any local authority having jurisdiction over the site. It is the responsibility of the homeowner to ensure compliance. These must **NOT** use any part of the home for structural bearing or support. The home was designed and built to meet specific loading requirements; any alteration to this loading will void the structural warranty and any problems thereafter are the responsibility of the homeowner.

### Home Extensions & Additions

Addition or extension design, construction and acceptance is the responsibility of the state, city or municipality having jurisdiction. The home was designed and built to meet specific loading requirements; any alteration to this loading will void the structural warranty and any problems thereafter are the responsibility of the homeowner.

### Gutters & Downspouts

Homes containing a vertical fascia board of at least 1x4 and a drip edge are suitable for the installation of a standard 4" gutter and downspout system. Verify suitability with the gutter contractor. Be sure to have the contractor locate downspouts so that runoff is directed away from the home.



## **Final Inspection**

### **General**

After your home has been completely set up, it is imperative to have a final inspection to insure no items have been overlooked. Any missed step could cause a service problem. Special emphasis should be placed on the following items:

### **Air Infiltration Barrier**

A special material is fastened to the bottom side of your new home. It was installed at the factory to protect against moisture, rodents and unconditioned air. This covering was inspected at the factory, but could have been damaged during transit. It is important that the areas that are damaged be resealed.

Using vinyl patching tape designed to repair tears or holes. If a hole is large, use a patch of the same or similar material as the bottom covering and tape the edges for an airtight seal. Specifications for the sealing tape are listed in the Homeowner's Packet.

### **Exterior Siding and Trim**

A thorough check should be made of all portions of the exterior siding to make certain that it is not cracked, split, buckled or loose in any manner. Any siding observed to be in this condition should be repaired or replaced.

All fasteners that are loose should be retightened or replaced.

All decorative trim pieces or moulding strips should have special attention to make certain there are no gaps or voids in the sealant tapes or caulking material. If any such places are observed, they should be resealed.

It is highly recommended that you employ the use of gutters and downspouts to help preserve your exterior siding. The downspouts, if done correctly, will make most water flow away from the foundation of the house.

### **Roofs**

The roof should be checked to make certain that all vent pipe flashings are in place, properly attached and properly sealed.

The shingles should be checked for proper attachment, making certain that none are loose or have been displaced during transit.

### **Clearances**

If there are any low-hanging trees or bushes adjacent to your home which could cause damage to the exterior or the roof, they should be trimmed out or cut accordingly. Future growth of these bushes or trees should be considered in connection with possible movement during wind conditions or under snow or ice loads.

## **Caulking**

There are many good brands of caulking material and roof sealers which can be purchased from local retail stores. Whatever brand of caulking and/or sealer is purchased, the instructions regarding application should be read closely. This will include any special preparation of the surface to be coated. Observe the labeling on this material for any notes concerning resistance to running or streaking the sides of the home. This can be very unsightly and in many cases extremely difficult to remove.

## **Interior**

At this time, all furniture, carpet, fixtures or other loose items should be installed. All clamps or brackets installed on windows and doors for shipping purposes should be removed and the operation of these items checked. After initial leveling, recheck doors, cabinet doors and windows for square and re-square as needed.



## **Summary**

Once you are initially finished with this manual, remember to store it with all your home related manuals for future reference.

This concludes the setup portion in preparing your home for residence. We hope you enjoy your new investment for many years to come. Thank you for choosing Chief Industries to assist you in making your dream a reality!