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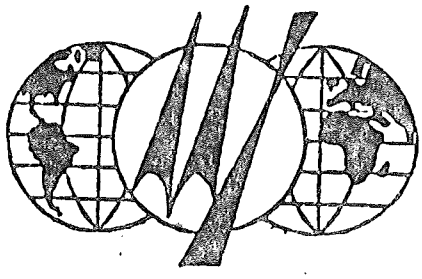
# CONTINUOUS PERIMETER AND BASEMENT TYPE FOUNDATION
## (2 x 8 FLOOR JOIST SYSTEM ONLY)



MODULINE INTERNATIONAL, INC.
205 College Street S.E., Leacy, Wash. 98503

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On the following pages are plans, specifications and installation instructions for the set-up of your home on a perimeter type foundation. These plans and specifications must be followed when the house is placed above a crawl space unless the services of a registered professional Engineer or Architect are engaged to design a different home foundation and anchorage system.

A continuous perimeter foundation used with a 2 x 8 floor system permits the home to be supported along its perimeter and eliminates the need for intermediate support piers below the steel "I" beams. If the steel chassis does not accommodate your foundation it may be removed after placement or it may remain suspended from the home floor system.

Additional set-up procedures such as the connection of plumbing, electrical, and structural systems are found in the "Moduline Field Set-Up Manual".

A basement type foundation is similar,but differs in that it requires a larger foundation wall. Due to the variation of topography, these foundation walls must be designed by a registered professional Engineer or Architect to meet the structural requirements and local building codes. The steel chassis may be removed from the bottom of the home to enhance the basement or remain to add support for the home. If the chassis is left in place, the home may also be supported by girders placed laterally under the chassis at 10'-0"o.c. maximum. If the steel chassis is removed from the home, the chassis "I" beams may be used for the doublewide center home support. (See a registered Engineer or Architect on further structural requirements on these methods).

Several methods of installation are shown, the crane method is recommended to place the home onto a basement type foundation, which is mentioned later in this manual.

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I. GENERAL FOUNDATION NOTES:

a. All work and materials shall conform to the latest edition of the Uniform Building Code and/or local Building Codes.

b. Insure that soil percolation tests are performed and the necessary permits are obtained. The foundation plan may be subject to approval by the local Building Authorities.

II. FOUNDATION CONSTRUCTION NOTES:

a. The under floor area is to be completely enclosed around the perimeter by the foundation wall.

b. The foundation footings must be placed on firm undisturbed soil (not loose fill) or soil which has been compacted to at least 90 percent of its maximum relative density, with a minimum bearing capacity of 1000 PSF.

c. The base of the foundation shall extend below ground to the frost line as specified by the local Building Authorities but in no case shall be less than 12" below ground all around the perimeter foundation.

d. Concrete shall have a minimum compressive strength of 2000 PSI.

e. Vertical stepped wall footings shall not exceed 3/4 of the horizontal distance between steps. Horizontal distances between steps shall be not less than 2 ft. Horizontal and vertical steps shall be placed monolithically. Vertical connection shall be the same width as the footing and not less than 6 inches in thickness.

f. Crawl space ground level shall be at least 18 in. below bottom of wood floor joists and 12 in. below bottom of wood girders except when pressure treated wood is used for these members.

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g. The under floor area is to be ventilated by openings with at least 1.5 sq. ft. of free area per 25 lineal feet of exterior foundation wall.

h. A minimum 18" x 24" access opening shall be provided for the under floor area.

i. Always make certain space is allowed in the foundation for drain, water, and gas line penetrations.

j. Treated foundation sill plate cuts must be treated on the exposed ends.

III. FOUNDATION ANCHORING NOTES:

a. All exposed fasteners shall be galvanized or protected against corrosion.

b. Foundation anchors shall be 1/2" or 5/8" x 18" bolts with 2" washers or an anchor type equivalent to a 5/8" anchor with a capacity of 770 lbs. vertically and 750 lbs. horizontally.

c. Sill plates to have a minimum of two anchor bolts per piece with one bolt located within 12" from each end.

d. The sill plate must be attached to the foundation and to the home in accordance with Table "A".

IV. FOUNDATION REINFORCEMENT NOTES:

a. Where earthquake design is required, and in seismic zone 2 or 3, reinforce foundation walls under the following conditions:

Concrete walls when height exceeds 6 times thickness.

Masonry walls when height exceeds 4 times thickness.

b. Size and spacing of reinforcement shall be in accordance with accepted engineering standards.

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V. MOISTURE PROTECTION:

a. A vapor barrier with a permeability rating of less than 1.0 Gm. per 24 hrs. per square meter shall be installed over the under floor earth, (6 mil polyethylene is recommended).

b. In locations where the foundation is subjected to a high water table or where surface or ground water drainage may present a problem, additional precautions will be required to protect all points against penetration of water.

VI. DRAINAGE:

a. Foundation or footing drainage shall be provided around foundations enclosing basements or habitable areas below grade. Drains shall be installed at or below the area to be protected and shall discharge by gravity or by mechanical means to a positive outfall such as a drainage ditch or swale, or into a storm system.

b. When surface drainage is necessary, the surface shall be properly sloped away from the home.

VII. BACKFILLING FOUNDATIONS:

a. Material used for backfill shall be clean and free of wood scraps or other deleterious substances and shall be placed carefully against walls and shall be well compacted.

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## LIST OF MATERIALS (Not Provided)

Poured concrete continuous footing

Poured concrete or 6" concrete block Perimeter Foundation Walls

½" Ø Temperature reinforcement and footing ties (#4 grade-40)

½" Ø or 5/8" Ø x 18" Anchor Bolts (½" Ø or 5/8" Ø x 10" for solid concrete foundation)

½" Ø or 5/8" Ø x 2" Anchor bolt washers

2" x 8" Treated Sill Plates

3/8" x 4" Lag screws (corrosion resistant) or 16d nails or 14 ga. staples

Redwood or Cedar shims

Screened underfloor access opening framing

Underfloor access opening framing

6 mil polyethylene vapor barrier

Standard set-up jacks and set-up equipment

Drain Tile as required

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TABLE A

CONTINUOUS PERIMETER FOUNDATION

| LOCATION | | FASTENER/ ANCHOR | SINGLEWIDES | | DOUBLEWIDES | |
|---|---|---|---|---|---|---|
| | | | WIND ZONE I (15 PSF) | WIND ZONE II (25 PSF) | WIND ZONE I (15 PSF) | WIND ZONE II (25 PSF) |
| FLOOR JOIST TO PLATE | ENDWALL | 7/16" X 3"X14 GA STAPLE OR 16D NAIL | 28"O.C. | 12"O.C. | 72"O.C. | 24"O.C. |
| | | 3/8" X 4" LAG | 62"O.C. | 27"O.C. | 72"O.C. | 53½"O.C. |
| | SIDES | 7/16"X 3"X 14 GA STAPLE OR 16D NAIL | 12½"O.C. | 3¼"O.C. | 72"O.C. | 5"O.C. |
| | | 3/8" X 4" LAG | 62"O.C. | 27"O.C. | 72"O.C. | 53½"O.C. |
| FOUNDATION ANCHORS | ENDWALL | ½" Ø X 18" A.B. | 72"O.C. | 62½"O.C. | 72"O.C. | 72"O.C. |
| | | 5/8"Ø X 18" A.B. | 72"O.C. | 72"O.C. | 72"O.C. | 72"O.C. |
| | SIDES | ½" Ø X 18" A.B. | 72"O.C. | 46½"O.C. | 72"O.C. | 72"O.C. |
| | | 5/8"Ø X 18" A.B. | 72"O.C. | 64" O.C. | 72"O.C. | 72"O.C. |

NOTES:

Anchor bolts may be 10" long if concrete foundation walls are used.

DESIGN LOADS

Live Loads:

Roof: 20 PSF or 40 PSF
Floor: 40 PSF
Wind: Zone I 15 PSF lateral/9PSF uplift
Zone II 25 PSF lateral/15 PSF uplift

Dead Loads:

Roof: 7 PSF
Floor: 13 PSF
Total Home: 20 PSF ± 2 PSF

Factor of Safety: 1.5

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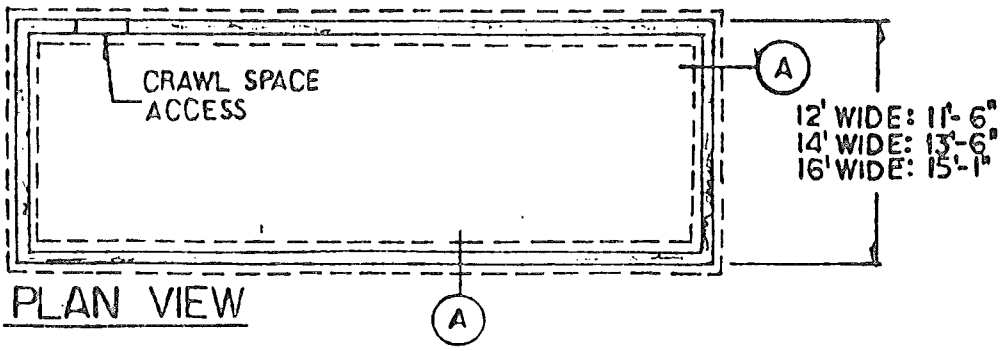
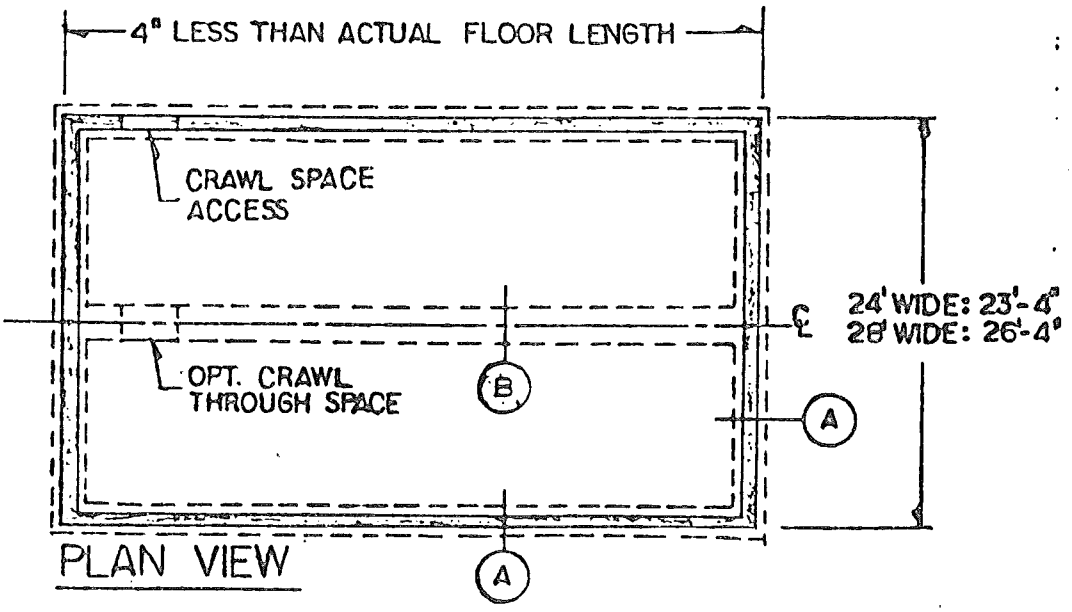
# CONTINUOUS PERIMETER FOUNDATION PLANS

SINGLEWIDE HOME




PLAN VIEW

DOUBLEWIDE HOME




PLAN VIEW

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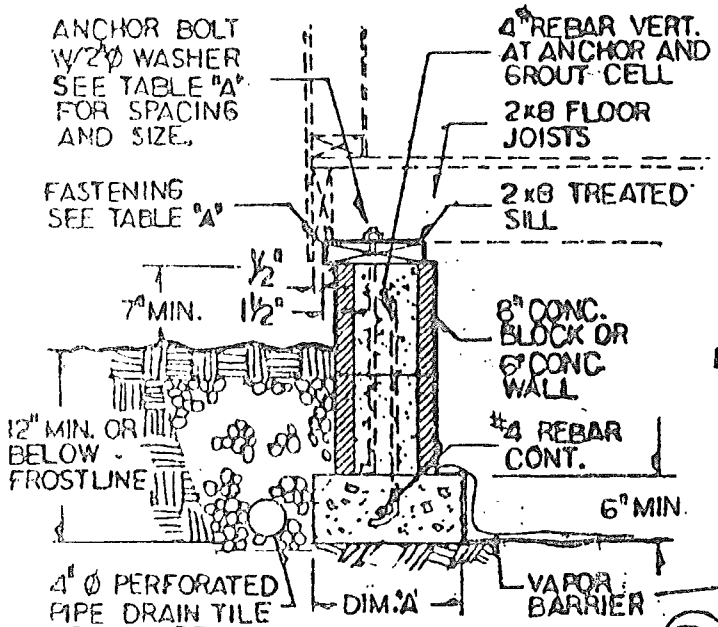
# DOUBLEWIDE CENTER SUPPORT DETAILS

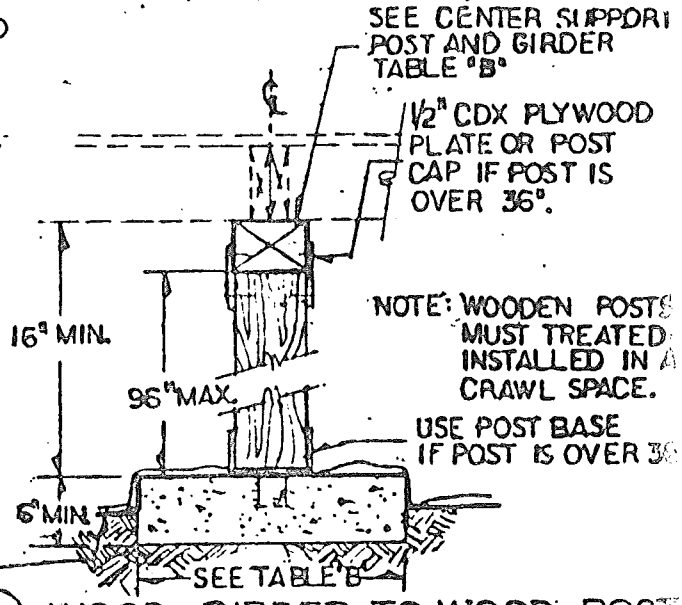
## PERIMETER (SINGLEWIDE & DOUBLEWIDE) HOMES



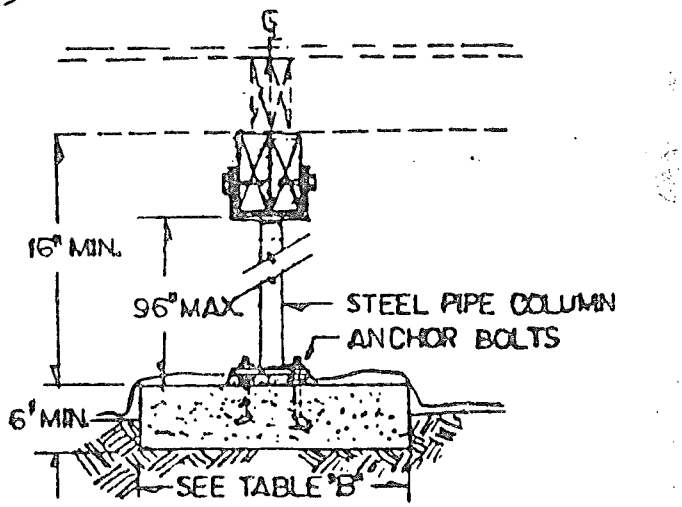

(A) DETAIL

| WIND ZONE | | DIM. 'A' |
|---|---|---|
| ZONE I | SINGLEWIDE | 14" |
| | DBL. WIDE | 14" |
| ZONE II | SINGLEWIDE | 20" |
| | DBL. WIDE | 14" |

## CENTER SUPPORT (DOUBLEWIDE HOME)

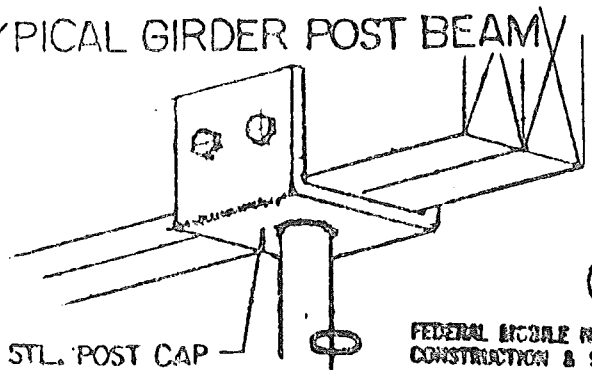


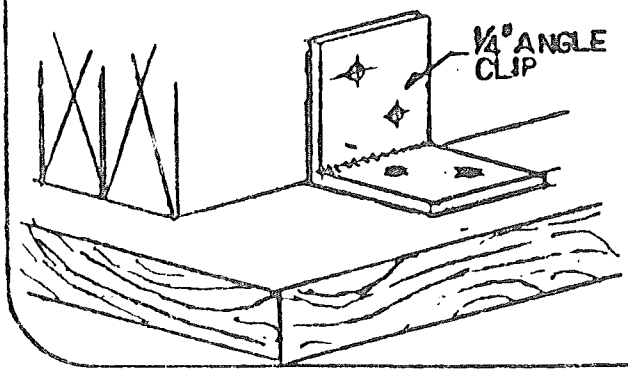

(B1) WOOD GIRDER TO WOOD POST




(B2) WOOD GIRDER TO STEEL POST

## TYPICAL GIRDER POST BEAM

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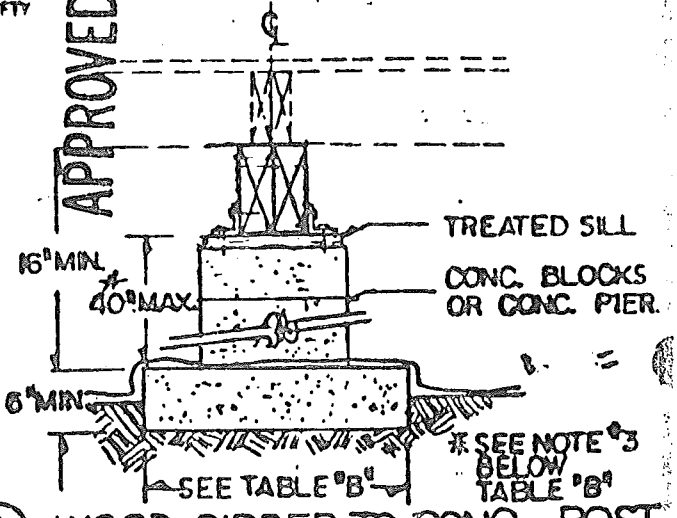
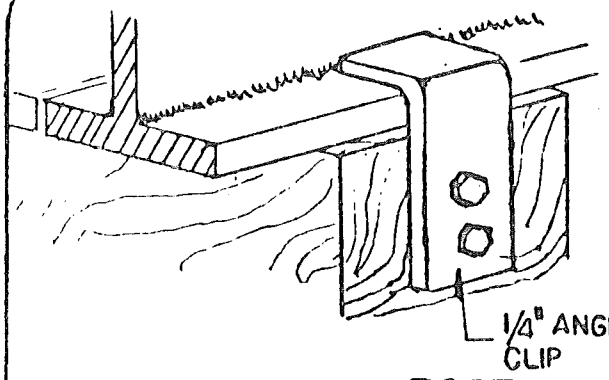
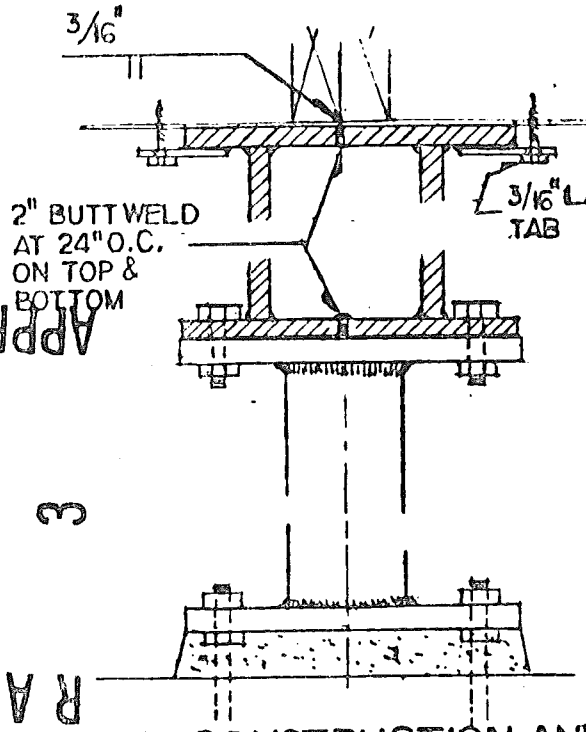



(B3) WOOD GIRDER TO CONC. POST

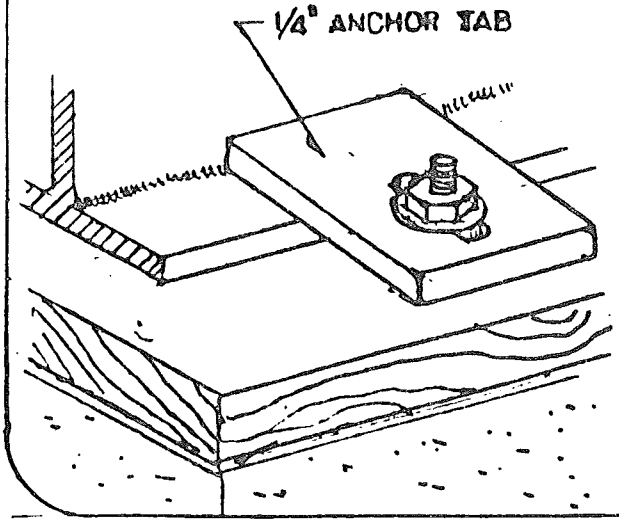
# DOUBLEWIDE CENTER SUPPORT DETAILS



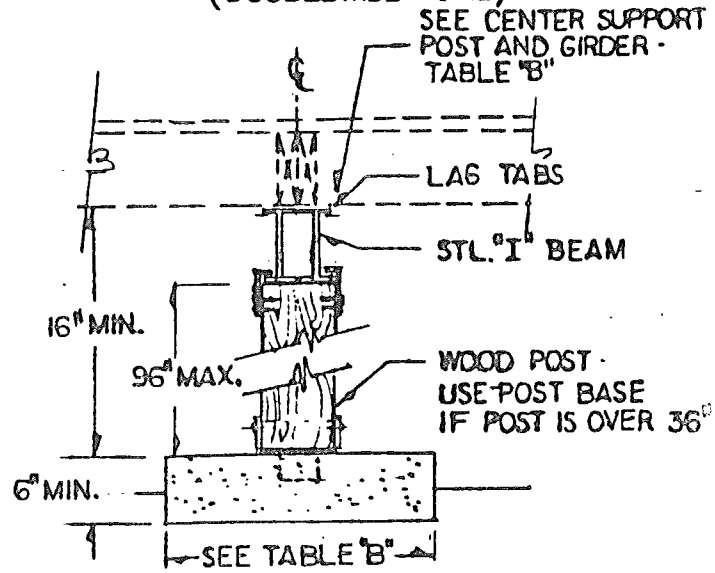

TYPICAL GIRDER-POST CONNECTION DETAIL



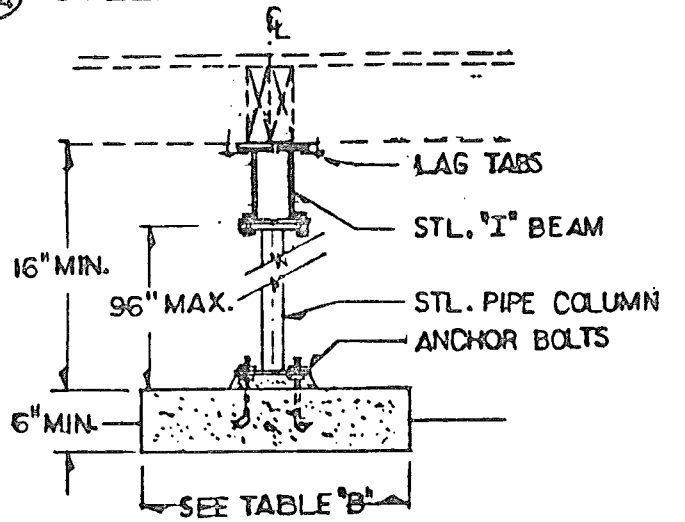

GIRDER CONSTRUCTION AND TYP. CONNECTION TO STEEL POST DETAIL



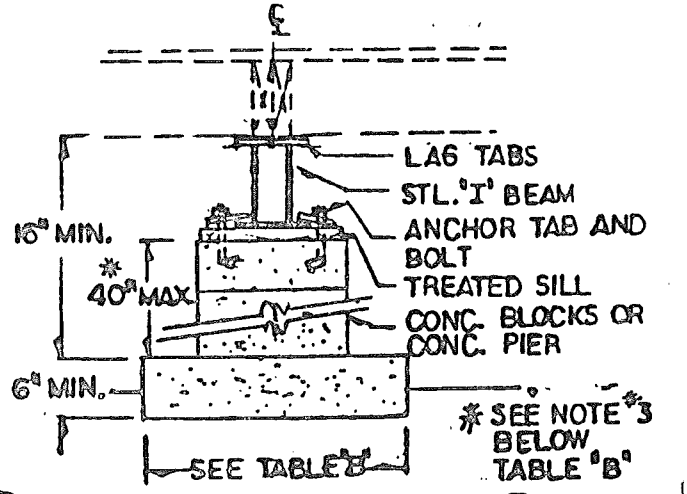

## CENTER SUPPORT
(DOUBLEWIDE HOME)




(B4) STEEL "I" BEAM TO WOOD POST




(B5) STEEL "I" BEAM TO STEEL POST




(B6) STEEL "I" BEAM TO CONC. POST

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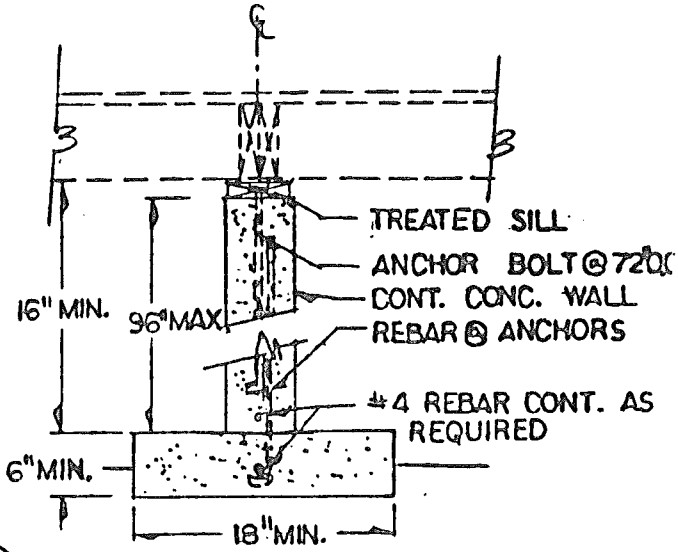
# DOUBLEWIDE CENTER SUPPORT DETAILS

## CENTER SUPPORT
(DOUBLEWIDE HOME)




(B7) CONTINUOUS CONC. WALL

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# TABLE "B"
## DOUBLEWIDE CENTER SUPPORT POST AND GIRDER
(DESIGNED FOR FLOOR LOAD ONLY)

| DETAILS | GIRDER/BEAM SIZE | MIN. POST SIZE | MAX. POST SPACING | MIN. FOOTING SIZE (1500PSI SOIL BEARING |
|---|---|---|---|---|
| (B1) WOOD GIRDER TO WOOD POST | 6"x8"HF#1 | 4" x 4" WOOD POST | 5' -0"o.c. | 18" x 18" x 6" |
| | (2)4"x10"HF#2 | | 8' -0"o.c. | 24" x 24" x 6" |
| | | | | |
| (B2) WOOD GIRDER TO STEEL POST | (2)4"x10"HF#2 | 2½" Ø STEEL PIPE | 8' -0"o.c. | 24" x 24" x 6" |
| | 6" X 8"HF# | | 5'-0"O.C. | 18"X 18" X 6" |
| | | | | |
| (B3) WOOD GIRDER TO CONC. PIER | 6"x8"HF#1 | CONC. PIER CAPACITY 6000 lbs. | 5' -0"o.c. | 18" x 18" x 6" |
| | (2)4"x10"HF #2 | | 8' -0"o.c. | 24" x 24" x 6" |
| | | | | |
| (B4) STEEL I-BEAM TO WOOD POST | (2)8" I-Beam | 6" x 6" WOOD POST | 13'-2"o.c. | 30" x 30" x 6" |
| | (2)10"I-Beam | | 15'-6"o.c. | 32" x 32" x 6" |
| | (2)12"I-Beam | | 17'-9"o.c. | 34" x 34" x 6" |
| (B5) STEEL I-BEAM TO STEEL POST | (2)8" I-Beam | 2 1/2" Ø STL. PIPE | 13'-2"o.c. | 30" x 30" x 6" |
| | (2)10"I-Beam | | 15'-6"o.c. | 32" x 32" x 6" |
| | (2)12"I-Beam | | 17'-9"o.c. | 34" x 34" x 6" |
| (B6) STEEL I-BEAM TO CONC. PIER | (2)8" I-Beam | CONC. PIER CAPACITY 12000 lbs. | 13'-2"o.c. | 30" x 30" x 6" |
| | (2)10"I-Beam | | 15'-6"o.c. | 32" x 32" x 6" |
| | (2)12"I-Beam | | 17'-9"o.c. | 34" x 34" x 6" |

NOTE:

1. For the roof ridge beam bearing post, separate doublewide center support posts must be installed under the home. Refer to Set-Up Manual for sizing and locations.

2. Post to girder connections do not require fasteners when the girder posts do not exceed 40" in height.

3. When concrete block pier height is between 40" and 80" use double interlaced concrete blocks and a solid concrete cap.
   When the height is over 80" use double interlaced concrete blocks with every block cell filled with concrete, laid in concrete mortar with #4 steel rebar in each cell, and a solid concrete cap.

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# RECOMMENDED PROCEDURES FOR PLACEMENT OF HOMES ON PERIMETER FOUNDATIONS

## I. PREPARATION

The home site must be properly graded and sloped to provide for storm drainage run-off - especially the area immediately beneath and around the perimeter of the home - to prevent water accumulation.

Refer to the "Moduline Field Set-Up Instructions", for more detailed site preparation information and complete home set-up procedures.

A. SITE

1.) Using the drawings provided herein, when the site is properly prepared and on firm undisturbed soil, construct the entire perimeter foundation. Provide penetrations through or under the foundation for utility connections.

B. FOUNDATION REQUIREMENT AND PREPARATION FOR HOME PLACEMENT

1.) Make certain the foundation is square and level.

2.) All mudsills should be installed and anchored to the foundation.

3.) The polyethylene or other approved vapor barrier should be installed on the ground over the entire crawl space area at this time.

4.) Center support on doublewide must be level with outer perimeter foundation.

## II. INSTALLATION OF HOME

The home may be installed on the foundation by a number of different methods:

A. The home may be installed on the completed foundation by rolling or sliding the home onto the foundation.

B. The home may be hoisted onto a completed foundation.

C. The home may be driven onto a semi-completed foundation.

Explained briefly below are three(3) methods of installation. The first two methods involve installing the home on a completed foundation, while the third method is for installing a home on a semi-completed foundation.

A. USING ROLLERS, TIMBERS AND JACKS FOR PLACEMENT OF A HOME

1.) POSITIONING HOME FOR PLACEMENT

a) Before starting, the foundation must be completely back filled and rough graded to permit backing each half of the home into position lengthwise along the foundation. If settling of the home occurs during movement from the weight of the axles, old concrete forms, plywood, or other dunnage should be placed on the ground for support.

b) If the foundation has any structure (projecting out $90^{o}$ from the foundation) that may be a hindrance in moving the home into position along the foundation, then both halves can be set from the other side of the foundation. For simplicity, let's assume the project we are talking about has a garage foundation projecting from the front of the home foundation. In this situation, both halves of the home should be set from the rear of the foundation and property.

c) Move the home along side of foundation, placing the home as close to the foundation as possible and aligned with both ends of the foundation (gable-ends).

2.) PREPARING BEAM FOR MOVING HOME ONTO FOUNDATION

a) TRACK BEAM ON OUTSIDE OF HOME PERIMETER FOUNDATION

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Place (2) two timbers (8 x 8 is the minimum recommended size) across the foundation. Position one timber beam immediately behind the rear axle spring hanger and position the other timber beam approximately halfway between the front axle hanger and the front (hitch) end of the home.

Both timbers should span the entire width of the home foundation and reach under both "I" beams of the home. The timber beams must be level and temporarily supported 36" on center with firm piers. In addition, they should be braced from the mudsill to maintain a straight run perpendicular to the foundation-wall for the rollers. The timbers should be a minimum of 36 feet long or they may be made-up of shorter segments bolted together using steel side plates to form a tight butt joint with a flush top surface. If this latter approach is chosen, the timber beam butt joints must be supported by

the temporary piers.

IMPORTANT: Timber beams must be level and solidly supported every 36".

b) PLACEMENT OF TRACK ON BEAM

Mount a structural steel channel, flat bar or tubing to the timber beams to provide a surface (track) for the movement of the rollers laterally over the foundation walls. This roller track surface must run continuously from the outside "I"-beam under the home all the way to the furthest foundation wall with all track surface butt joints solidly supported and flush.

3.) PLACEMENT OF HOME ONTO TRANSPORTING TRACK

a) Raise the home with two jacks placed under each "I"-beam just to the rear of the rearmost spring hanger, place the roller assemblies on the rear timber beam track and detach the axles from the frame and lower the home onto the rollers. Raise the home at the front using the hitch jack, place the roller assemblies on the front timber beam track, release the hitch members and lower the hitch end onto the rollers. Next, remove the entire hitch "A" frame assembly. Then, check to make certain that no obstructions are hanging below the home that will hit the foundation or otherwise prevent the home from rolling freely across the foundation opening to the front half of the foundation.

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CAUTION: NEVER WORK UNDER A HOME THAT IS NOT ADEQUATELY BLOCKED. DO NOT RELY ON JACKS ALONE!

4.) POSITIONING OF HOME ONTO PERIMETER FOUNDATION

a) Roll the home into position (this can normally be done by two men pushing on the perimeter floor joist if rollers and track are properly placed).

b) Then "line-up" the ends of the home with the foundation, and "line-up" the open side of the home with the center mark on the mudsill or the foundation.

5.) SETTING OF HOME ONTO PERIMETER FOUNDATION

a) Raise this half of the home using four 12 ton capacity jacks, to relieve the rollers and beam runways. Remove rollers and beams to the foundation centerline and then lower the home

onto the foundation making certain that all corners of the home are set on marks and set "true" to the foundation. The jacks will have to be set on independent piers.

b) Before releasing the jacks from the home, block and shim under this half. Make sure 15# roofing felt or composition shingle is installed between the concrete block and wood blocking or shims. Beam runways should be dismantled only to the centerline, allowing the runways to remain intact for the rear half of the home to be moved into position on the foundation.

6.) SETTING SECOND HALF OF A DOUBLEWIDE HOME ONTO FOUNDATION

a) Move the second half of the home into position along the rear of the foundation and then, following the same procedures as outlined above for the first half except that less track surface will be required, roll the second half across the foundation to meet the first half.

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b) Align both ends of this half with the first half of the home and with both rear corners of the foundation. When all points are aligned, mount four jacks (12 ton) into position under the frame "I"-beams and raise the home to relieve the rollers and beam runways. Remove rollers, beams, and bracing and lower the second half into position on the foundation, maintaining alignment at all corners with the other half of the home and foundation.

7.) FINAL ADJUSTMENTS BEFORE SECURING

a) With the home resting on the foundation, but before releasing the jacks, block and shim at the centerline and perimeter. Make sure 15# roofing felt or a composition shingle is installed between the concrete block and wood blocking shims.

b) On a doublewide home, secure both halves of the home together with "carriage" bolts and/or lag bolts through the perimeter joists.

B. USING A LIFTING CRANE FOR PLACEMENT OF A HOME

1.) PREPARING HOME TO BE LIFTED

a) Locate the "center of gravity" of home and for a doublewide each half of the home.

Find "bridal strap" locations on the home and nail steel protectors with 2" x 4" blocks, over exterior siding, at these points. (Two to four straps may be used).

At these strap points, nail 2" x 6" blocking 12" to 16" long at the finished overhang on the fascia board.

The "I"-beams under the home should be supported within 24" to 36" from the strap points with crossmember and outrigger installations.

Place 2" x 4"s from the floor to the ceiling at the ridge beam, to support any long open span, where the lifting straps may distort the floor, ceiling, ridge beam or wall during lifting.

NOTE: Optional features used in the homes could vary the location of the "center of gravity" due to the weight factor of each, such as fireplaces bay windows, raised floors, etc.

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b) With the crane supporting the home, remove the bolts from the shackle holders of the axles, releasing the axles from the frame and remove the bolts from the hitch members, releasing the hitch.

2.) PREPARING FOUNDATION FOR HOME

a) Mark the center of the foundation and/or mudsill at both ends of the foundation.

b) Mark the strap locations on the mudsill and cut approximately 16" of mudsill out in a wedge shape (8" each way from the center of the strap) and save the wedge to replace it from inside the crawl space, later.

3.) LIFTING AND POSITIONING OF HOME ONTO FOUNDATION

a) Designate one person and only one person to give all instructions to the crane operator. With someone at all four corners of home being raised, direct the home over the foundation and place the home, being careful to maintain equal distance from the foundation at the four corners and have the centerline of the home fall on the centerline marked previously on the mudsill and/or foundation. Release the straps and remove them from the home. Replace the mudsill wedges back in the exact same positions from which they were removed.

b) While strap locations and steel protectors are being installed on the other half, someone can be shimming all piers, under the half just set, with wood blocking and shims.

NOTE: Use asphalt felt or composition shingle between wood blocking and concrete blocking on all piers under the home.

4.) LIFTING SECOND HALF OF DOUBLEWIDE HOME ONTO FOUNDATION

a) With straps located and steel protectors and all blocking in place on the other half, (as done on the first half) raise the second half to release the axles and the hitch from the frame.

b) Locate the strap centers on the home and mark their location on the mudsill and again cut 16" wedges from the mudsill, for strap removal.

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c) Proceed here, the same as in the preparing foundation for the home with the exception of setting this half 1½" - 2" from the other half, allowing room for the straps or cables to be released from this half. After releasing the crane from the second half, raise this half with four jacks and move it over tight against the first half of the home, aligning both gable-ends flush at the same time. Lower the jacks and if desired, secure both halves together with carriage bolts and/or lag screws through the perimeter joists.

5.) FINAL ADJUSTMENTS BEFORE SECURING

a) Block and shim center bearing support and replace the mudsill wedges back in the exact same positions from which they were removed.

C. HOME PLACEMENT ON A SEMI-COMPLETED FOUNDATION

1.) POSITIONING HOME FOR PLACEMENT

a) Back the home into position through the opening provided by the absence of one stem wall. For doublewides, back only one half of home through opening at this time. If settling of the home occurs during movement from the weight of the axles, old concrete forms, plywood, or other dunnage should be placed under the tires for support.

2.) INSTALL TEMPORARY SUPPORTS

a) Place temporary jacks or supports under "I"-beams if necessary.

3.) SETTING HOME ON FOUNDATION

a) Raise the home with two jacks placed under each "I"-beam just to the rear of the rearmost spring hanger and detach the axles from the frame and lower the home onto the foundation or intermediate piers placed behind and adjacent to the jacks (if the home can't be lowered all the way to the foundation in one step). Raise the home at the front using the hitch jack to release the hitch members and lower the hitch end onto the foundation or intermediate piers placed behind and adjacent to the jacks.

CAUTION: NEVER WORK UNDER A HOME THAT IS NOT ADEQUATELY BLOCKED. DO NOT RELY ON JACKS ALONE!

b) Make certain that the ends of the front half of the home "line-up" with the foundation, and on doublewides "line-up" the open side of the home with the center mark on the mudsill or the foundation that was previously placed on footing. If adjustments are necessary, the entire home may be lifted free of the foundation using four 12 ton jacks placed under the "I"-beams. This will then permit minor adjustments in the final position of this half.

NOTE: If the home is perfectly aligned with the foundation, before releasing the jacks from the home, block and shim the foundation under this half. Make sure 15# roofing felt or composition shingle is installed between the concrete block and wood blocking or shims.

c) The steel chassis may be removed at this time.

4.) POSITION AND SETTING SECOND HALF OF A DOUBLEWIDE HOME ONTO FOUNDATION

a) Move the second half of the home into position following the same procedure outlined above for the first half and try to place it within 2" to 6" of the first half. Raise this half with four jacks and move it over tight against the first half of the home, aligning both gable ends flush at the same time. Lower the jacks and if desired secure both halves together with carriage bolts and/or lag screws through the perimeter joists.

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5.) FINAL ADJUSTMENT BEFORE SECURING

a) Block and shim at all bearing points, including center structural bearing support before releasing the jacks but with the home resting on the foundation.

## III. FINAL PROCEDURES

### A. UTILITIES CONNECTION BETWEEN THE TWO HALVES OF A DOUBLE-WIDE

1.) Heat duct, water, drainline and electrical crossover connections should be completed at this time.

2.) Fireplace free-air ducting and clothes dryer ducting from under the home to the exterior of the crawl space should also be installed at this time.

### B. SECURING AND CLOSING UP BOTH HALVES OF A DOUBLEWIDE HOME

1.) If desired lag screws may be installed at the roof beams to secure both halves together. (Refer to Moduline Field Set-Up Instructions, Page 6)

2.) Tuck insulation and/or foam padding into the center-line cracks at the roof line, endwalls, and floor, including gable-ends.

3.) Install roof felt, metal ridge cap, shingles and ridge shingles.

NOTE: The metal ridge cap is a structural splice and must be installed as shown in the Moduline Field Set-Up Instructions, Page 6.

4.) Close up the exterior siding, fascia, soffit and all exterior trim, and caulk where required.

5.) Trim out the interior of the home.

### C. SECURING HOME TO FOUNDATION

1.) Fasten lag screws, wood screws, nails, or staples through the mudsill into the floor joists and/or perimeter joists (spacing depends on the method selected - Refer to Table A).

### D. UTILITIES CONNECTION

1.) Water and drain line connections to the home should be completed next.

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