

MWPS-72015

Laminated Arches

CAUTION!

Additional professional services will be required to tailor this plan to your situation, including but not limited to: assurance of compliance with codes and regulations; review of specifications for materials and equipment; supervision of site selection, bid letting and construction; and provision for utilities, waste management, roads or other access. **Furthermore, any deviation from the given specifications may result in structural failure, property damage, and personal injury including loss of life.**

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Cooperative Extension Work in Agriculture and Home Economics and Agricultural Experiment Stations of North Central Region - USDA Cooperating
Laminated Arches
Title Page
MIDWEST PLAN NO. 72015

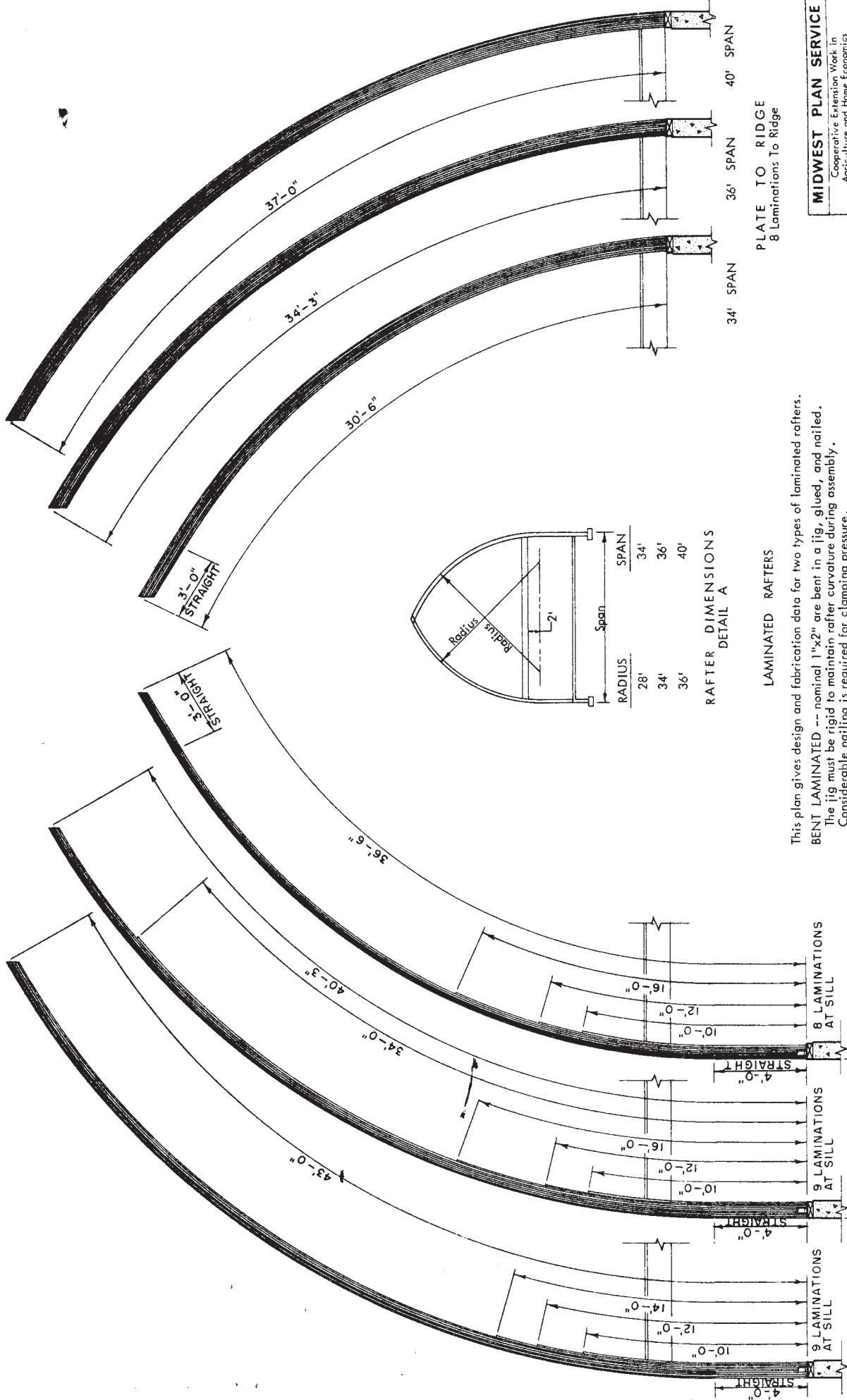


PLATE TO RIDGE
8 Laminations To Ridge

RAFTER DIMENSIONS
DETAIL A

LAMINATED RAFTERS

This plan gives design and fabrication data for two types of laminated rafters.
BENT LAMINATED -- nominal 1"x2" are bent in a jig, glued, and nailed.
 The jig must be rigid to maintain rafter curvature during assembly.
 Considerable nailing is required for clamping pressure.
 The outside face is easier to nail roofing to.
SAWED LAMINATED -- nominal 1"x6" or 1"x8" boards are cut along an arch, and arranged as arch segments.
 A long rigid curved saw fence is required for the special sawing.
 The outer face of the rafters is less smooth.
 The arches are easier to assemble, and require fewer and smaller nails.

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LAMINATED ARCHES
 Sheet 1 of 4 Sheets

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SILL TO RIDGE

34' SPAN

36' SPAN

40' SPAN

8 LAMINATIONS
AT SILL

9 LAMINATIONS
AT SILL

9 LAMINATIONS
AT SILL

16'-0"
12'-0"
10'-0"

16'-0"
12'-0"
10'-0"

14'-0"
12'-0"
10'-0"

4'-0"
STRAIGHT

4'-0"
STRAIGHT

4'-0"
STRAIGHT

37'-0"

34'-3"

30'-6"

3'-0"
STRAIGHT

3'-0"
STRAIGHT

36'-6"

40'-3"

34'-0"

43'-0"

CONSTRUCTION STEPS -- BENT LAMINATIONS

Rip 1x2's from 1x6 or 1x8 boards. Use lumber that is Construction Grade Douglas fir or equivalent. Lengths of at least 18' are necessary to avoid joints less than two feet apart.

Build a jig as shown in Detail B (Detail F sheet 4, for circular arches). It may be desirable to make legs for the platform to make it table high.

Choose long, clear strips for the outer laminations.

Nail first strip to form blocks with 7d box nails.

Cement coated or galvanized nails are recommended for their superior holding power.

Spread glue with a stiff fiber brush or paint roller on both laminations to be joined and nail second lamination in place with 4d box nails about 9" apart (see "glue to use").

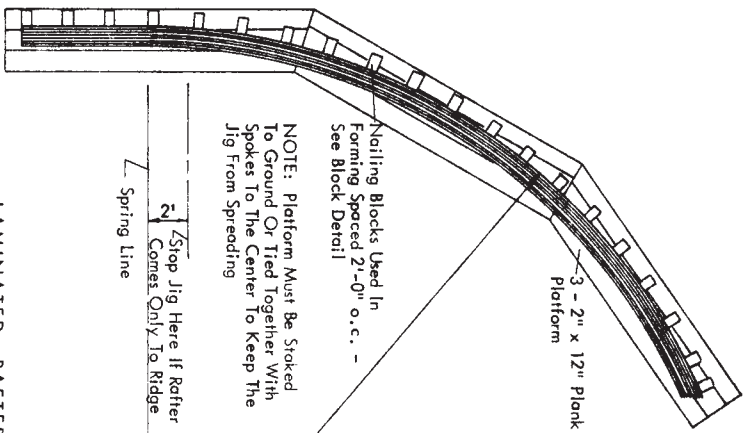
Glue and nail third lamination in place with 7d box nails about 9" apart. Continue with 7d nails for other laminations. There should be a minimum of 2'-0" between joints of any of the laminations.

Place 3/8" bolt near each end of rafter.

Remove from form and clip or clinch nails used to hold first lamination to form. Back-nail first lamination with 7d nails 12" apart.

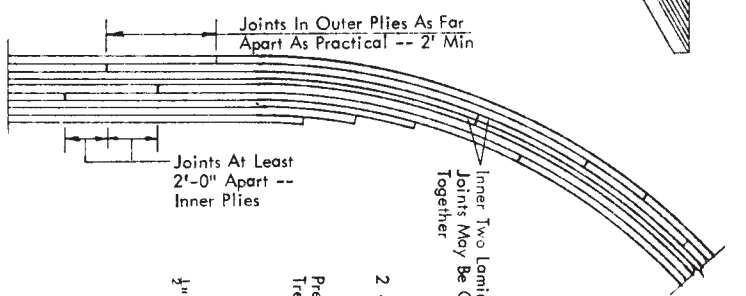
GLUE TO USE

Use casein or resorcinol resin glue. About 2 1/2# of dry casein or 7 1/2# of resorcinol resin glue will be required for each rafter. Mix only enough for about a 4-hour period at one time. Spread glue on both surfaces to be joined and nail in place immediately. Have some glue squeeze out of the joint to insure that enough glue was used.

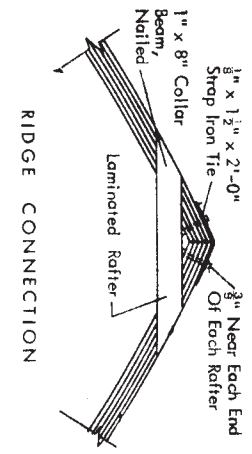


BLOCK DETAIL BENT LAMINATIONS

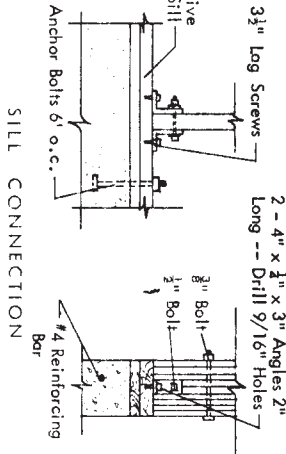
LAMINATED RAFTER JIG DETAIL B



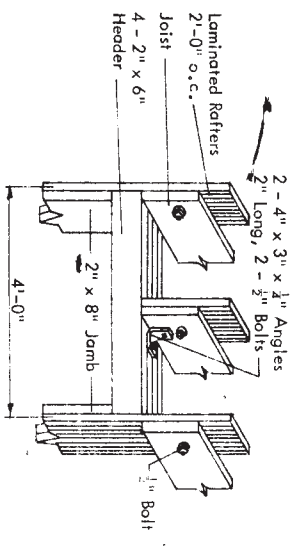
JOINT SPECIFICATIONS



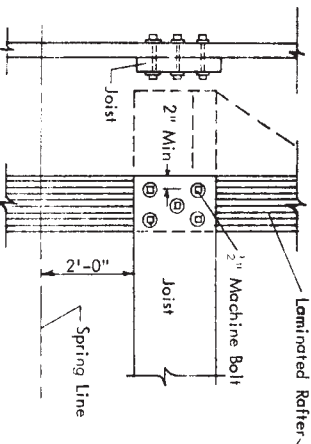
RIDGE CONNECTION



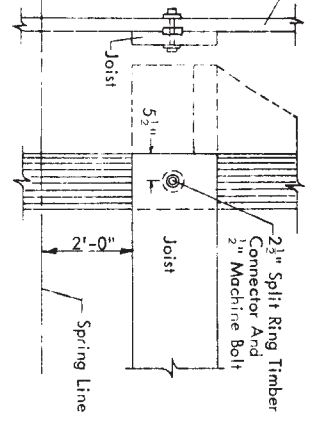
SILL CONNECTION



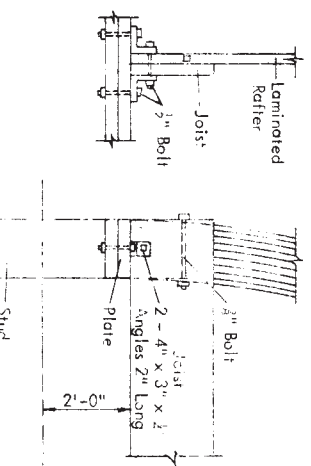
SIDE WALL DOOR FRAMING



JOIST CONNECTION -- SILL TO RIDGE



JOIST CONNECTION -- PLATE TO RIDGE



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LAMINATED ARCHES

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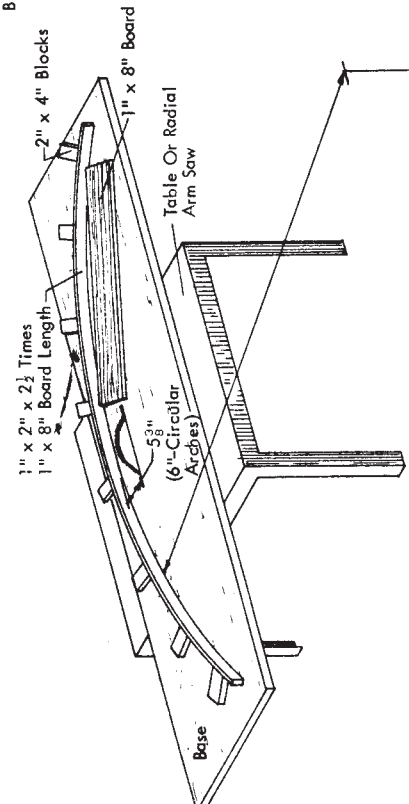
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CONSTRUCTION STEPS — SAWED LAMINATIONS

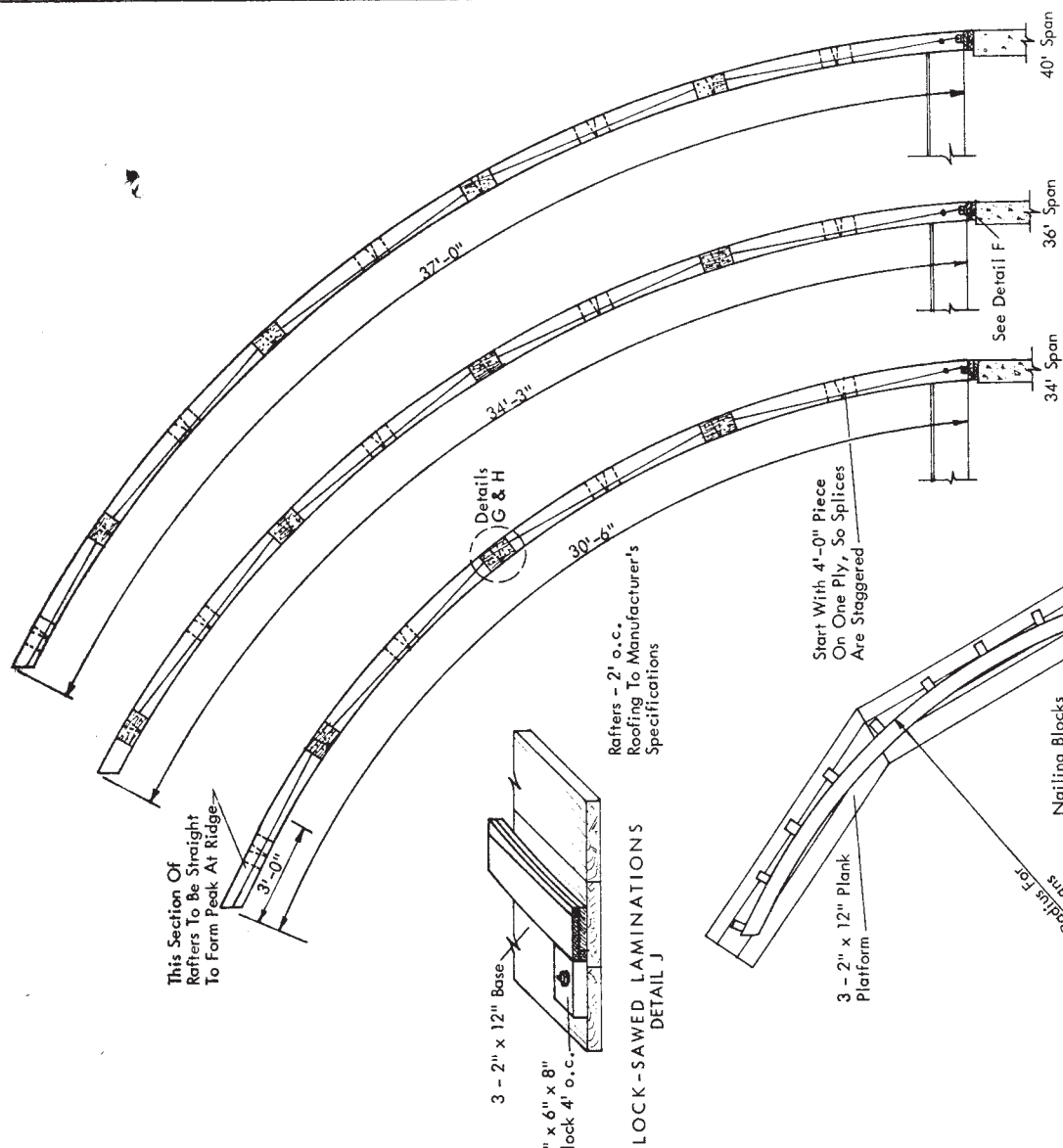
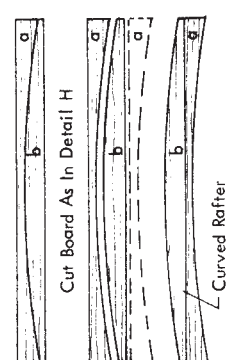
1. Build the special saw guide shown in Detail C.
2. Attach guide to your saw. The saw blade must be sharp and have a good set.
3. Rip enough 1"x8"x8' (6' boards for circular arches) boards to build the required number of arches. Each arch has two layers of 1"x8" boards. See Detail G, Sheet 4. Use Construction Grade Douglas-Fir Lumber or equivalent.
4. Build a jig as shown in Detail D (Detail E, Sheet 4, for circular arches).
5. Place the first layer of 1"x8"s in the jig and space the second layer by the jig.
6. Spread a thin layer of glue on the faces to be joined, and put in place immediately. See **GLUE TO USE**.
7. Nail the layers together with 4d and 6d cement coated nails as shown in Detail H, Sheet 4.
8. Glue, place, and nail a 3"x6g"x12" plywood splice plate over each joint. The outer grain of the plywood should be placed across the rafter. You will be able to cut 56 splice plates from one 4'x8' sheet of plywood.
9. Turn the arch over and repeat step 8.

GLUE TO USE

Casein or resorcinol resin glue may be used. About 2 lbs of dry casein or 7 lbs of resorcinol resin glue will be required for each rafter. Mix enough glue for about a 4-hour period at one time. Spread glue on both faces to be joined and nail in place immediately. Some glue should ooze out of the joint when the nails are driven. If it doesn't, you haven't used enough glue.



DETAIL C



BLOCK-SAWED LAMINATIONS
DETAIL J

SAWED RAFTER JIG
DETAIL D

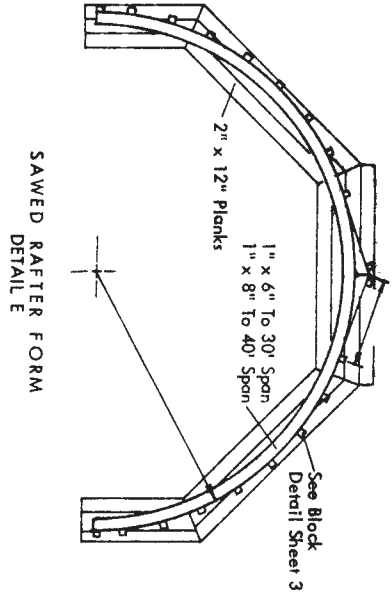
**RAFTER DIMENSIONS
SAWED LAMINATIONS**
Rafters 2' - 0" o.c.

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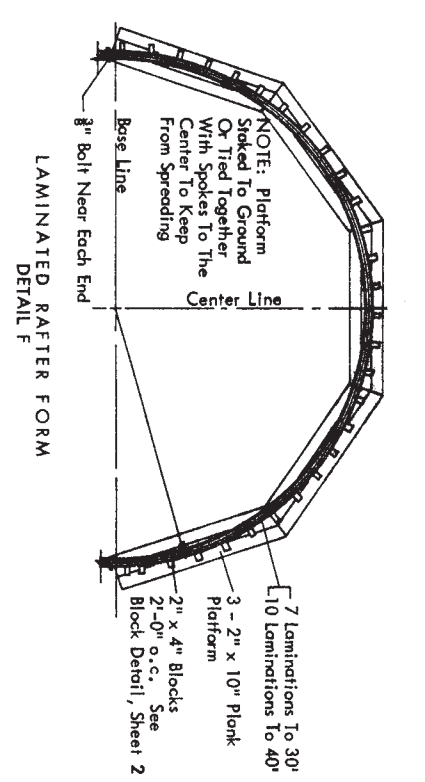
LAMINATED ARCHES

Sheet 3 of 4 Sheets
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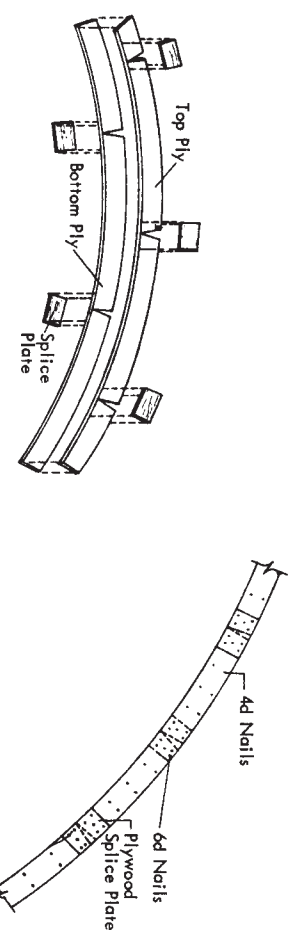
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SAWED RAFTER FORM
DETAIL E

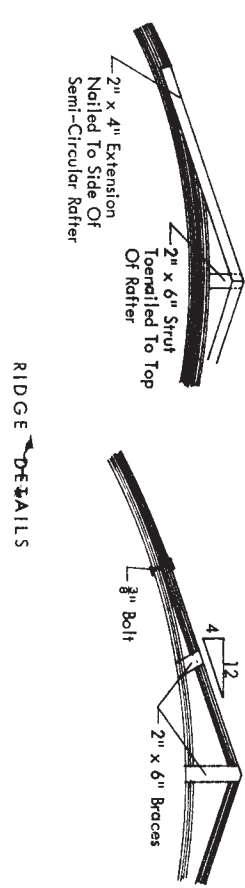


LAMINATED RAFTER FORM
DETAIL F

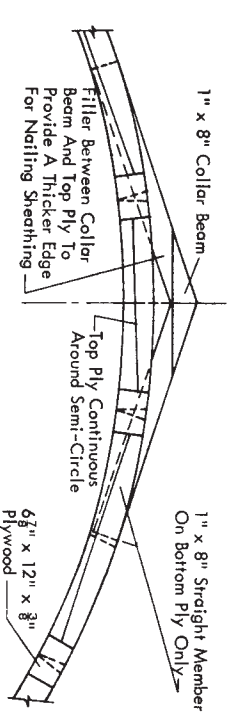


RAFTER CONSTRUCTION
DETAIL G

NAILING PATTERN
DETAIL H

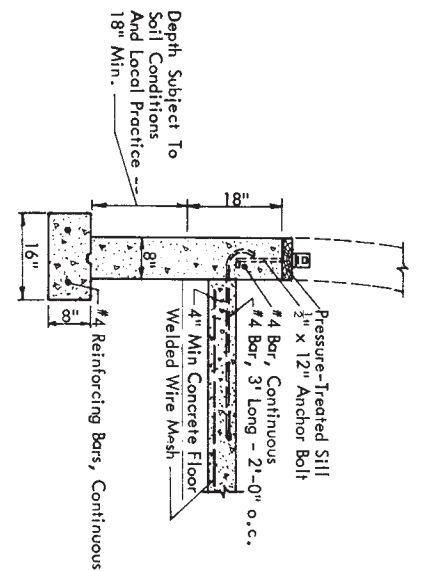


RIDGE DETAILS

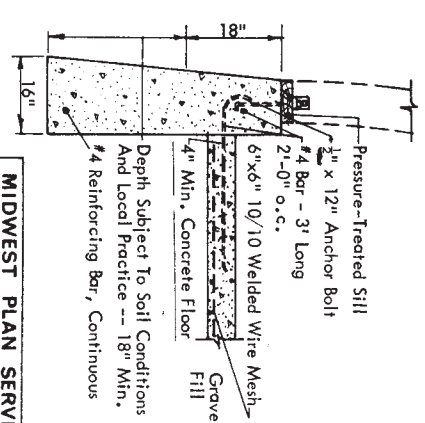


RIDGE DETAIL

Splice Plate
Exterior Grade



FLOOR DETAILS



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LAMINATED ARCHES

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